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Mechanicals Properties of Woven Intra-Ply Hybridization Natural and Synthetic Fibre Composite: A Review

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Abstract – *In particular, kenaf-based natural fibre reinforced composites provide an effective replacement for the current materials. Researchers are worried about its advantages over synthetic polymers in terms of being completely biodegradable, environmentally benign, renewable, affordable, low density, and non-toxic. Fibre-reinforced matrix composites have been employed in a wide range of sectors, including aerospace, automotive, and construction. Combining two or more fibres into a single matrix is the foundation for the creation of hybrid composites. Single fibre reinforced matrix composites can improve their mechanical characteristics with the aid of hybridization. As a result, several attempts have been undertaken to enhance the mechanical characteristics of natural fibre-reinforced matrix composites by combining them with synthetic fibres of high elongation.*

Keywords: hybrid fibre, intra-ply, matrix, Natural Fibres, Synthetic fibre.

1. Introduction

Nowadays, interest in using renewable resources is growing due to environmental awareness of social and economic considerations. Some plastic material contains substances that can cause environmental pollution. Therefore, the use of materials from natural fibres is highly emphasized compared to materials from synthetic fibres capable of causing pollution to the environment (Hassan et al., 2020; Radzi et al., 2022). Therefore, the use of fibre-reinforced composites from natural fibres as material used in mechanical, civil, and aerospace structures in low and medium load applications are increasing. This is due to the lower weight of natural fibres, better physical and mechanical properties, during the processing of natural fibres low energy consumption is required, and easy to obtain. Natural fibre can be obtained from plants, animals, and minerals (Luqman et al., 2022).

This review aims to focus on the trends of the mechanical of hybrid natural and synthetic fibre reinforced thermoset and their application. In addition, comprehensive research in terms of engineering and uses of hybrid natural and synthetic fibre, and realize the capabilities of this fibre in the manufacturing industry.

2. Hybrid Composite

Hybrid composite materials are made by mixing more than one dissimilar type of fibres in a polymer matrix. Hybrid composites provide advantageous properties and can withstand sustained loads in crashes and impact situations (Felipe et al., 2017). Hybridization improves mechanical properties while lowering costs and improving performance. Inter-play, also known as laminated, intra-ply, sometimes referred as tow by tow, intimately mixed hybrid, and sandwich are examples of hybridization. These hybrid composites provide for a mix of qualities such as stiffness, ductility, and strength that single fibre reinforced composites cannot achieve. In comparison to

single fibre reinforced composites, hybrid composites have a longer fatigue life, improved durability, and lower notch sensitivity (Shahzad, 2011).

3. Mechanical Properties on Hybrid Using Intra-Ply

The hybrid composite are created by combining two or more fibre into one matrix. Many studies have been conducted to determine the ideal combination of natural fibre to produce the best utilisation results while reducing the negative effects (Asim et al., 2017). Nowadays, most hybrid composites are currently made entirely of synthetic fibres, such as Kevlar with carbon, Kevlar with fibreglass, and carbon with fibreglass. However, hybrid composites combining synthetic and natural fibres have recently attracted interest around the world (Amir et al., 2019). The table 1 below shows summaries of mechanical properties of hybrid natural and synthetic fibre from previous studies.

Table 1: Mechanical properties of woven intra-ply natural and synthetic fibre from previous studies.

Fibre	Matrix	Tensile Properties		Flexural Properties		Method of Manufacturing	Ref
		TS (MPa)	TM (GPa)	FS (MPa)	FM (GPa)		
Glass/ Banana	Unsaturated isophthalic polyester	31.00	1.29	30.00	1.28	Hand lay-up	(Rajesh & Pitchaimani, 2017)
Kenaf/ Kevlar	Epoxy	145.20	25.59	133.13	3.97	Hand lay-up	(Yahaya et al., 2015)
Flax/ Kevlar	Epoxy	172.00	16.00	200.00	10.00	Vacuum infusion	(Audibert et al., 2018)
Basalt/ Flax	Polyamide 11	44.90	1.01	50.30	1.31	Film stacking	(Russo et al., 2019)

4. Conclusion

The hybridization technique can improve the mechanical characteristics and lessen the constraints of single fibre reinforced polymer composites. The addition of either synthetic fibre or natural fibre with comparable high elongation improves the mechanical characteristics of natural fibre reinforced polymer composites. Natural fibres provide several benefits, including low cost, low density, environmental friendliness, recyclable nature, and abundant availability. Because of their acceptable mechanical qualities, natural fibres can be utilised in place of synthetic fibre.

Acknowledgement

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Security Risk Management in Transportation Industry

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Abstract – *The Internet of Things (IoT) is a commonly implemented ecosystem that interconnects numerous computing devices with an unprecedented identifier and the capability to systematically transfer data over the network without human intervention. Without appropriate security practices, the business prone turns into a cybercrime target. This paper aims to review IoT security risks and propose countermeasures in the transportation industry. This study discloses gaps in security risk management and presents NIST Special Publication (SP) 800 as the proposed framework for security risk management in the transportation industry. The framework yields a systematic methodology for managing cybersecurity risk within the industry; therefore, it mitigates IoT security risk in the industry.*

Keywords: IoT risk management, risk management, transportation risk.

1. Introduction

The Internet of Things (IoT) links computing devices using a distinctive identification. It has the ability to transmit data automatically or at a manufacturer-specified rate over a wireless network. IoT ecosystems are made up of embedded intelligent devices that can gather, send, and respond to environmental datasets. The IoT devices needed a unique application, a network connection, and a communication protocol during the communication (Zantalis et al., 2019). IoT is crucial for business, particularly for industry 4.0 and its potential to boost annual revenue, cut operating costs, and increase operational efficiency (Manavalan & Jayakrishna, 2019). In addition, IoT lets consumers live more comfortably and securely by streamlining regular routines.

This paper identified the gap in IoT risk management among the practitioners and organizations that did not apply adequate security protection technologies (Brass & Sowell, 2021). Furthermore, limited cybersecurity frameworks provide guidelines exclusively in the IoT ecosystem (Gordon et al., 2020).

2. Security Planning and Risk Management

IoT integrates a wide range of disciplines and connected devices for factual information and data sharing. Therefore, the IoT ecosystem immediately becomes a supreme target in the networks. In this section, the study focuses on the IoT security risk management challenges.

Security risk management is defined as a continuous process of identifying the consequences and likelihood of known threats (Bourget et al., 2019). Potential security risks are typically brought on by weak systems, individuals, such as human error or hackers, ineffective company practices or procedures, criminality, attacks, or unforeseen natural occurrences.

Planning for security comprises a scalable control for potential deployment and assessment in response to a changing threat. The business effect level for threat level outcomes is shown in Table 1 below.

Table 1 : Business impact level of threat

No	Impact Level	Consequence of Threat
1	Low	Insignificant damage to the transportation industry
2	Low to Medium	Limited damage to the transportation industry
3	High	Significant damage to the transportation industry
4	Extreme	Severe damage to the transportation industry
5	Catastrophic	Exceptionally grave damage to the transportation industry

The developer and business owner had to be fully involved in risk management. Intrinsically, risk management is a strategy that is incorporated into business operations rather than being kept separate or treated as a distinct entity.

3. Methodology

This paper uses a traditional literature review to identify the security risk management in the transportation industry from a public database such as Google Scholar. The information was derived from previous studies focusing on the IoT ecosystem's cybersecurity framework.

Cybersecurity under the National Institute of Standards and Technology (NIST) framework is appropriate for embedding IoT technology, even though several frameworks are available to aid the transportation industry build an ISRM framework. Version 1.1 of the NIST, released in April 2018, improves and clarifies version 1.0, which was released in February 2014. Due to its flexibility, the revised version of the NIST framework was created and recommended for both new and existing framework users.

The risk management process involves six processes with the supporting documentation required based on the NIST SP800 framework (Dempsey et al., 2014).

Table 2 : NIST Risk Management Framework

No	Process	Description	Findings
1	Categorize	Categorized information system	Document with FAQs, Roles, Responsibilities, and Quickstart guide
2	Selection	Selection of security control	A list of security and privacy control
3	Implementation	Implementation of security control	Recorded security policies and framework
4	Assessment	Assessment security control	The risk assessment assets, findings, plan of action, project plan, and rules of engagement
5	Authorization	Authorize Information System	Recorded accreditation documents, briefing material, and recommendation report
6	Monitoring	Monitoring Security Controls	Monitoring and updating the security control status

4. Conclusion

IoT is a developing technology that has significantly improved the transportation sector (Zantalis et al., 2019). However, deploying a cybersecurity framework to safeguard the transportation sector from potential hostile attacks in the IoT ecosystem is essential. This study identifies the gaps in security risk management throughout the industry, and this paper evaluates the critical threats and suitable remedies.

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Patient Engagement Through Remote Patient Monitoring in healthcare services: A Review of Literature

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Abstract – *Innovations in healthcare services, such as remote patient monitoring, are enabled by the rapid advancement of sensors and communication technologies which can increase patient engagement by providing individuals with the resources and motivation to have a more substantial presence in improving their health. Additionally, enhancing patient engagement is commonly regarded as improving the quality of patient care. This review investigates the effect of remote patient monitoring (RPM) in improving patient engagement. The review shows that, despite evidence of RPM as an effective mechanism for improving patient engagement, a proportion of patient resistance to the use remains. Understanding the factors that influence patients' use of RPM can assist healthcare organizations in developing more effective approaches to accepting and using RPM.*

Keywords: Patient engagement, Remote patient monitoring, Healthcare services.

1. Introduction

Technology and services in healthcare are evolving at a rapid pace. Patients can now be monitored remotely, which has numerous advantages in an aging world with rising health issues. Because of advances in communication and sensor technology, patients can go about their daily routines at home while still being closely observed by medical professionals using straightforward applications to monitor patients (Mustapha *et al.*, 2021) However, measures to include patients in more substantial ways, such as efforts to improve or restructure service delivery by incorporating patient experiences, are increasing. The patient's role in healthcare decision-making has been changing due to the evolving technologies, and Internet has opened new avenues for improving standards in the healthcare sector. As patients become more engaged in their healthcare system, outcomes from it may enhance, thereby positively impact on the delivery of healthcare facilities to the patients (Esmaeilzadeh, Dharanikota and Mirzaei, 2021).This review investigates the effect of remote patient monitoring in improving patient engagement. To fulfil this aim, the following objectives were established; (I) to explore the concept of RPM, (ii) to identify patient engagement concept, (iii) to find the role of RPM in improving patient engagement, and (iv) to address the factors that influence the use of RPM.

2. Related work

Patient engagement is described as the willingness and ability to actively choose to participate in care in a way that is unique to the individual, in collaboration with a healthcare practitioner or institution, to improve outcomes or care experiences (Ramdurai, 2020). Patient engagement refers to the partnership between patients,

families, and health professionals across different levels of the healthcare system to improve healthcare quality, as stated by (Esmaeilzadeh, Dharanikota and Mirzaei, 2021). Referring to the views of (Bombard et al., 2018; Kuipers et al., 2019), they demonstrate that Once patients are engaged in decision-making, patients have a greater understanding of and commitment to the healing and wellness processes. Patient engagement has been linked to better results and experiences with healthcare, this focus on patient engagement is accompanied by rising evidence of a link between patient engagement and healthcare quality (Bombard *et al.*, 2018; Murali and Deao, 2019). Likewise, patient engagement and patient satisfaction using engagement tools lead to improved patient health outcomes (Xu et al., 2022).In short, patient engagement encourages patients to be more active in managing their health and participate actively in their treatment. Furthermore, patients' engagement is a strong predictor of both quality and healthcare expenditures. Patient engagement goals can vary from one provider to another; these goals can mean different things to different providers. More important, however, is the goal when implemented correctly, patient engagement technology will improve your patient's healthcare experience and, as a result, overall outcomes.

Remote patient monitoring (RPM) is an approach to promoting health and improving patient care. Patient's medical and physiological data is communicated digitally from their homes to health care facilities through phone, Internet, or videoconferencing (Farias *et al.*, 2020). Similarly, RPM focuses on improving patient care by using digitally transmitted health-related data (Thomas et al. 2021). This transmitted data allows for the early detection and intervention of disease symptoms, as well as patient education and the improvement of the patient-physician relationship. RPM is a system that allows healthcare providers to keep close to their patient's health and status while they are out of the hospital, practice According to (Rajeswari et al., 2021). Telehealth, mobile health, telemedicine, telecare, and other forms of remote healthcare all refer to the monitoring of patients outside of hospital settings via technology with different reason for use (Lee *et al.*, 2020). Briefly stated, remote patient monitoring will refer to the use of a non-invasive peripheral device that automatically transmits data to a web portal or mobile app for patient self-monitoring and/or health provider assessment and clinical decision-making.

2.1 The role of RPM in improving patient engagement

Patient engagement has grown increasingly crucial for organizations as patients have more choices and access to healthcare information. Organizations must keep patients engaged in boosting patient experience and retaining current patients (Triberti and Riva, 2016). Patient engagement is increasingly dependent on technology (Leonardsen *et al.*, 2020). The appropriate technology can promote patient engagement by providing patients with access to critical information (Cadel *et al.*, 2021) .

One of the principles of RPM is its ability to increase patient engagement by providing individuals with both the means and the motivation to take more significant interest in enhancing their health. RPM improve engagement by reducing access obstacles, RPM enables better accessibility for remote patients, Patients to participate actively in their care team, and RPM enables more timely care through real-time data collection (Farias et al., 2020; Maqbool et al., 2020). (Farias *et al.*, 2020)Multiple possibilities benefit from using RPM, including diagnosing illnesses in real-time,

monitoring patients with conditions as varied as chronic disease and less severe disorders, and monitoring athletes' health (Malasinghe, Ramzan and Dahal, 2019). RPM reduces the need for hospitalizations (Cheikh-Moussa et al., 2020). The confidence to self-manage, including independently altering prescription regimes, was boosted by remote monitoring. Additionally, patients felt that sharing their monitoring data empowered them and made them more equal participants in their treatment, enabling them to participate with health care providers more effectively (Ma *et al.*, 2022) . Factors such as age, education, annual household income, and length of time in the program were found to be significant predictors of engagement using RPM (Kirkland *et al.*, 2021). Patients' engagement measurements using RPM are underreported and inconsistent. However, its draws attention to an essential factor in the engagement activity such as the behavioural domains of patient engagement as a significant indicator of successful employment (Madujibeya *et al.*, 2022). RPM encourage patients to self-manage symptoms in collaboration with professionals; however, it is important to consider the caring experiences of persons living alone, as well as the hurdles to engagement. Patient characteristics such as health and knowledge, family, friend and staff support, accessibility and usability of informational and material resources, and service factors influenced engagement.(Kirkland *et al.*, 2021). The challenges and enablers identified by the text analysis were associated with health status, accessibility, and usability (Simblett *et al.*, 2018). Usability studies are crucial to the creation of an RPM system and its ultimate acceptability by end users (Klaassen, van Beijnum and Hermens, 2016). For the positive advantages of RPM technologies to be achieved, the delivery system must be usable by both patients and clinicians (Parmanto *et al.*, 2016). Several usability concerns, such as the interface's complications, difficulties in understanding the language, and lack of directions. Concerns regarding equipment or technology, issues over service change, ease-of-use, understanding of the benefits of RPM, access to treatment, cost, and privacy may influence the use of RPM (Saeed, Manzoor and Khosravi, 2020).

3. Conclusion

This review studies the effect of RPM in improving patient engagement. Most scholars indicated that RPM is a practical approach for increasing patient engagement because it provides individuals with the means and the motivation to take more significant interest in enhancing their health. Likewise, RPM-reducing access obstructions and geographical barriers enable better accessibility for remote patients to engage actively in their healthcare, which strengthens engagement activities. Moreover, RPM enables more timely care through the collection of real-time data. Despite the evidence of RPM as an effective mechanism for improving patient engagement, a proportion of patient resistance to the use remains. Understanding the factors that influence patients' use of RPM can assist healthcare organizations in developing more effective approaches to accepting and using RPM. The patient's role in the engagement process should be the core consideration in introducing an engagement strategy using RPM. Therefore, understanding how patients feel about RPM is a crucial aspect that will facilitate healthcare center administrators in making the appropriate choices. More specifically, patients' intention to use RPM to engage with their healthcare provider needs more attention while introducing monitoring solutions. Additionally, various usability attributes of RPM are very much sensitive to the users. Demographic characteristics have been identified as another indicator of the acceptance and use of RPM patient engagement. To this end, introducing a very

efficient and effective RPM system has become an essential issue for healthcare providers and patients. This review highlights the significant of RPM usability, patient intention to use the RPM, and the demographic characteristic that influences the engagement process in improving patient engagement using RPM.

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Reviews of Cyber Harassment Model for Social Media User

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Abstract – *As social media becoming more progressive, cyber harassment on social media is also increased. Lack of awareness and lack of attitude with other social media users while using social media is still not enough. Thus, the purpose of this study is to identify the factors that lead to cyber harassment on social media and proposed cyber harassment model for social media users in Malaysia. Identified factors will be used to implement into the proposed cyber harassment model. The factors will be validated by distributing survey questions to social media users in Malaysia. The results will then be analyze using SmartPLS software. Related factors identified can be use by the government and non-government agency as a guidance in designing the guideline in social media use.*

Keywords: information management, information security

1. Introduction

Nowadays, technologies are becoming develop especially smartphones where we can perform many kinds of activities. The activities include video calls, online bank transaction, surfing online websites and social medias. Smartphones becomes more well-known as a lot of activities can be done through it. People are much more prefer to use smartphone instead of laptop in terms on watching videos, dramas or listening to music. That is why smartphone specification are becoming more specific to cater the user needs (Miftah et al., 2013).

Social medias started to get more well-known on smartphone when the Facebook application was released on February 4, 2004. Then, more social medias application started to launched and being introduce to the world. With social medias some people manage to find their old friends or families that have been separated. The impact of social medias affects how most smartphones are designed which is to follow the user needs while surfing their social medias. Most of the smartphone specification are manufactured to have a great quality camera, a bigger storage and compatible with other smart devices (Munirathinam, 2020). However, there are advantages and disadvantages on social medias becoming well-known. One of the cons is the increase on cases of cyber harassment. Cyber harassment can be considered as cyber threats since the harassment is usually done through an online platform which in this case is social medias. Cyber harassment can harm social media users by causing emotional pain and, as a result, disengagement from social media networks or even life itself (van Laer, 2014). Lack of empathy and common sense by certain social media users is one of the reasons why cyber harassment occurs. Cyber harassment issues will get worst if it is not address properly. Therefore, the aim of this paper is to identify the factors that leads to cyber harassment and serve as guideline in designing the proposed cyber harassment model

2. Cyber harassment

Cyber harassment can be defined as an online act that is repeatedly and intentionally aim to hurt, inflicts the pain or cause damage toward the other party using an electronic device (Bilic, 2013). Cyber harassment is not considered as a new term in this era. Cyber harassment could also be identified with cyber bullying and online bullying term since the meaning for both of these terms are the same. In 2018, a study shows that Malaysia ranked in sixth place out of 28 countries for cyberbullying among youth and ranked second when compared with Asian countries (Malaysian and Global Views on Cyberbullying | Ipsos, n.d.). This is a worry for all parents considering teenagers nowadays have more freedom in using electronic devices whether on smartphones or laptops. Most of the victim experienced bullying or harassment wanted to feel dominant or aiming to revenge. Since the victim has been exposed to violence, it causes some of them to be more violence towards others (Pereira et al., 2016). Also, by staying anonymous on the internet makes them feels safe and not have to worry if they are going to get caught by the authorities or by the victims that they harass.

3. Methodology

To come out with the factors that lead to cyber harassment, a traditional literature review is conducted by using related sources on the publisher such as google scholar, and ScienceDirect. Based on the keywords use "Cyber Harassment on Social Media", only three related papers that have been use as a guidance for identifying the related factors before proceeding with the main component to develop the proposed model.

4. Results

There are many factors that leads to cyber harassment. It could be a statement that was shared and is not taken well by other people. Sharing good things or good news may also be subject to cyber harassment. A few of research papers have talked about the factors that leads to cyber harassment.In (Song & Song, 2021) paper, the authors have identified a total of 118 types that cause cyberbullying which include a variation body shaming, school, marriage, military and more. They have also identified a total of 91 methods of cyberbullying which include extortion of money and valuables, witch-hunt, alienation, sarcasm, etc. The authors also discuss the factors that affect all of the types of cyberbullying that is mentioned. Their research results show that impulse factors ranked as first place (29.9%) for the causes of cyberbullying. The impulse factor does not affect the perpetrator but affect more towards the victim and the bystanders. The authors stated that bystanders actually make the behavior of peer bullying much worse.

While in (Van Royen et al., 2017) paper, the authors discuss two factors that lead to cyber harassment. The first one is the person who have a low self-control are more likely in involving themselves doing unreasonable actions and they usually are less capable in realizing the consequences. The authors found that both lack of self-control and cyber harassment are mostly found on younger teenagers. The other one

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is online disinhibition which can means the ability of a person to suppress their inappropriate behaviors through online. The authors list five reasons on online disinhibition which include has less authority on the internet, the non-visible of body reactions and facial expressions, treats the online world as a game and the anonymity on users. In Malaysia, the increase of cyber harassment has increased because of social networking that is becoming more progressive. The result shows that because of social medias the victim of bullying could manage to fight back by either doing the same thing or worst from what the perpetrator did. Compared to traditional bullying, the victims may not have the courage to fight back their bullies.

Table 1 Summary of Factors and Methods of Cyber Harassment

Authors	Factors of cyber harassment	Methods of cyber harassment
Song & Song (2021)	Body shaming, school, marriage, military (118 factors)	Impulse factors take the first place for cyber bullying/harassment
Van Royen et. al (2017)	- Person have low self-control - Online disinhibition	Through social media comments.
Balakrishnan (2015)	The progress of social networking	Through social media comments and victims may fight back the cyber bullies.

Conclusion

This paper cover the initial investigation of the phases in designing the conceptual model of the cyber harassment model for social media use. Literatures on cyber harassment have been conducted in order to identify the factors, determine the problem and the existence of the current issue. This factors will serve as a guideline for identifying the related factors that can be used for developing the proposed conceptual model.

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Digitalization of Road Safety Assessment and Audit: A Review

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Abstract – *Numbers of road accidents and crashes has become alarming nowadays and has been highlighted as one of global issues in every country. Towards the effort of reducing the number of road accidents and ensuring highest safety level for the road users, one of the approach in assessing the road safety principles is by carrying out road safety audit. Road Safety Audit (RSA) can simply be defined as a procedure conducted to assess the potential road hazards or risks and provide recommended mitigation measures. It is a process with proactive nature which has been widely used internationally and in Malaysian road and transportation industry. Although the guidelines used and requirements varies between each countries but the context of the safety audit are likewise similar. Several countries has started to look into the possibilities of digitalizing the RSA process through 3D modelling application, traffic simulation, virtual reality, virtual simulation etc. These computer-generated approach of RSA process has not only transform the way to conduct RSA but also contributes to more effective, sustainable and comprehensive workflow and results. Thus, this study is aimed to review the state of art and identifying the gaps in the current application of technology and digitalization for road safety assessment and audit. Four main steps in the reviewing process involves: identify relevant databases, generating potential query strings, collection and filtration and data analysis. The review findings shows the broad spectrum of coverage on virtual road safety assessment and audit aspects which significantly covers from the driver's and vehicles perspectives. However, the integration of these technologies to road safety assessment and audit from designer and auditor perspectives and in fact the practice itself are still limited.*

Keywords: digitalization, road safety assessment, road safety audit, virtual simulation, VRSA

1. Introduction

Towards a functioning society, transportation infrastructure is one of the significant aspects to be consistently developed and scrutinized. Since the term "infrastructure" encompasses a broad range of sub-sectors, the road and highway industry can be grouped under the transportation domains' infrastructure sector. According to Oxford dictionary, infrastructure can be defined as be define as 'the basic physical and organizational structures and facilities needed for the operation of a society or enterprise' (O. U. Press, 2016).

Consequently, road accidents and road deaths has been an alarming issues and was recognized as global issue in every country (Azhari et al., 2022). According to World Health Organization (WHO), approximately about 1.3 million people died each years as the results from road traffic crashes. Among the causes which contributes to this numbers are safe system approach to accommodate human error, speeding, driving under influence of alcohol and other psychoactive substances, non-use of safety equipment (child seat, seatbelt etc.), distracted driving, unsafe road infrastructure, unsafe vehicles, inadequate post-crash care, lack of traffic law enforcement (WHO, 2022). Although there are many probable causes which can lead

to road accidents and crashes, it is also imperative to note that by having a safe and reliable road design, the likelihood and severity of potential incidents can be minimized or reduced. Therefore, in order to achieve this, road safety assessment or audit need to be carried out throughout the whole life-cycle of the road project from conceptual stage, design stage, construction stage as well as operation and maintenance stage.

2.0 Related Works

2.1 Concept of Road Safety Assessment and Audit

Road Safety audit or in shorter terms 'RSA' practices has been adopted in worldwide for many years. Briefly, road safety assessment or audit is a process to assess road principles from multidisciplinary perspectives and shall be carried out by independent team of experts in three main stages namely pre-construction, construction and post construction (Consultancy, T.,2008).Traditionally, the process involves planning, arrangement of audit, selection of audit team, performing audit analysis and reporting of the findings and results. These series of process can be conducted through site visits, a checklist, a review of project documents, and drawings (Jun, Y. et al. 2021).

Another significant feature of RSA concept is the proactive nature where it does not primarily depending on the crash data and enables the cause and effect to be addressed (U.S Department of Transportation Federal Highway Administration, 2006). Although the accidents can also be caused by human error, Luca, P. et al. (2016) has suggested different perspective on the typical "blame the road user" view is thus replaced by the one responsible in providing and enforcing road transport system responsible to citizens, guaranteeing their safety in the long term.

2.2 Technology Application in Road Safety Assessment and Audit

Several studies has revealed the issues and challenges in adopting the traditional RSA practices which includes limited time for auditing, misconceptions on RSA requirement, insufficient information from designer, difficulty to visualize, misinterpretation of 2D drawings etc. (Abu Mansor, S. N et al., 2019; Nabors, D. & Soika, J., 2013). On contrary, by having the integration of technology application in conducting RSA has facilitate the process in term of visualization through 3D application, graphical support to project stakeholders, suitability to diverse project type, integration of driving simulation etc. (Nabors, D. & Soika, J., 2013; Santiago-Chaparro, K. R. et al., 2011).

In today's state of art, there are few studies which has revealed the capabilities of conducting virtual simulation or virtual reality in assessing the road safety principles. The embedded digital technology as the main core in conducting RSA or road safety inspection has shown remarkable results towards effective and sustainable approach. Studies by (Nabors, D. et al, 2013; Santiago-Chaparro, K. R. et al., 2011; Noyce, D. A & Chitturi, M., 2018; Yeliseev et al., 2016) has extend the application of digitalization of road safety assessment in terms of utilization of 3D application, virtual road safety audit (VRSA), VRSA as virtualizing the geometry and operational features and Interactive Accident Risk Map respectively. Thus, this study shall further review and extend the available publications on the technology application in road safety assessment and audit with the intention to synthesize the overview of the progression.

3. Methodology

This study was conducted based on similar approach by Costin, A. et al. (2018) which highlights four main steps: identify relevant databases, generating potential query strings, collection and filtration and data analysis. Further to this process, the research gaps within the existing literatures were drawn out and the significance of the potential research scopes were highlighted.

Several databases were selected from both public (Scopus, Web of Science) and individual publisher databases (ASCE, IEEExplore) based on their relevance to the research themes and scopes. For this study, the query strings of (("road safety assessment" OR "road safety audit" OR "road safety inspection") AND ("virtual reality" OR "virtual simulation" OR "3D modelling" OR "driving simulation" OR "traffic simulation")) within the TITLE-ABSTRACT-KEYWORD filter was generated. Here, "TS" denotes the article subject. Next, all the publications found from the searches were filtered and segregated in accordance to its relevancy based on their abstracts and keywords. Initially, the total of 350 number of publications were gathered from the first search however, 300 publications were then taken for further analysis with themes assignment.

4. Results
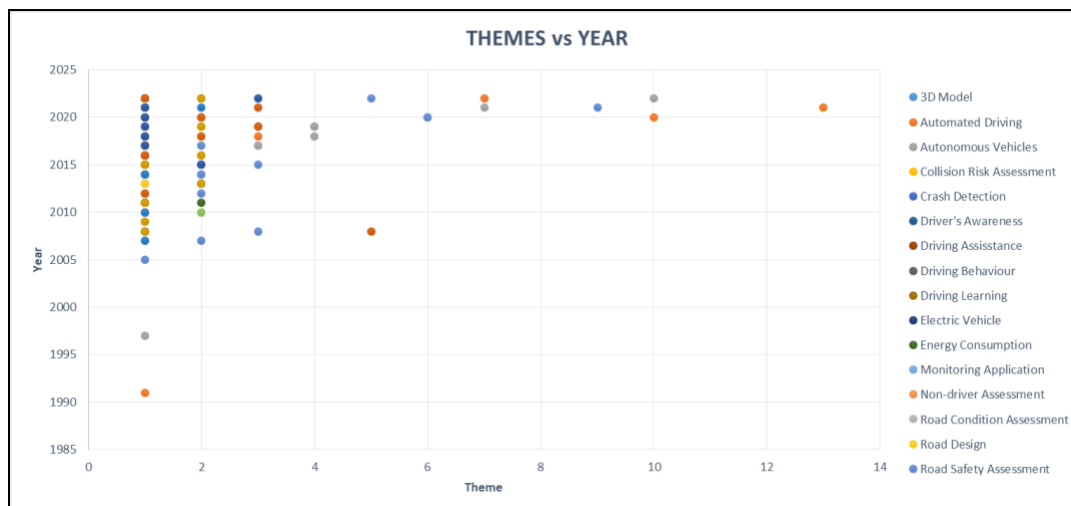
Chart 1 : Result findings (Theme (Frequency) VS Year)

Table 1 : Result findings based on theme frequency

THEMES	FREQUENCY
Automated Driving	43
Road Safety Assessment	42
Autonomous Vehicles	39
Driving Assistance	25
Traffic Assessment	21
Driving Behaviour	19
Collision Risk Assessment	15
Vehicle Dynamic	14
Road Safety Audit	10
Vehicular Sensory System	10

Non-driver Assessment	9
Data Mapping	8
Crash Detection	7
Energy Consumption	6
Road Design	6
Threat Assessment	6
Driving Learning	5
Road Condition Assessment	5
Driver's Awareness	3
3D Model	2
Electric Vehicle	2
Monitoring Application	2
Traffic Management Plan	1
	300

Based on the review conducted, it is apparent that the earliest study found from the search was in year 1990. The trends shows progressive increasing trajectory each year and shows notable expansion within the recent years from year 2019 to year 2022. The review findings shows the broad and significant spectrum of coverage on virtual road safety assessment and audit aspects which mostly covers from the driver's (automated driving, driving behaviour, awareness, driving learning etc.) and vehicles (autonomous vehicles, driver's assistance, vehicle dynamic, vehicular sensory system, energy consumption, electric vehicles etc.) perspectives. Throughout the years, there are also numbers of studies focusing on the 'assessment' activity within these technology which covers from safety, safety audit, collision risks, traffic, non-driver, design road condition, threat etc. This shows the capabilities of these technologies to transform the road and transportation industry from many angles.

Most of the available studies also contributes extensive knowledge on the ability of these technologies to assist the end users of the road especially the drivers, but there are still large room to be explored on the utilization of these technologies by the personnel whom are responsible on the design and construction of the road. By extending the context of these matter, it will not only helps to improve the whole project delivery but also results in safer and more reliable road. Subsequently, the studies on how technology application such virtual simulation and virtual reality can be integrated into road safety assessment and audit practice are still limited.

5. Conclusion

There are many ways to look into the possibilities of integrating technology and digitalization for road safety. The recent trends shows substantial evolution towards automation of every aspects related to road and transportation especially on the vehicle and driving experience. From road design and construction standpoint, since RSA procedure are structured with series of safety aspects or items checklist from design perspectives throughout the whole process, it is deemed to be valuable for each of the items can be transformed into virtual world, thus RSA can be virtually simulated. As road safety assessment or audit are required for road project in most countries, it is also imperative to further explore on transforming this traditional practices towards digital approach.

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Policy and Mental Health Issues In Malaysia : A Review

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Abstract – *In September 2015, mental health was included in the UN Sustainable Development Goals (SDGs). In this historic step, the United Nations (UN) acknowledged the burden of disease of mental illness, and defined mental health as a priority for global development for the next 15 years. Mental health is a current issue that becomes a problem among developing country. In Malaysia, National Mental Health Policy have been enacted as one of the main policy in this issue. This study aims to give a review on the role of this policy in Malaysian mental health issues. At the end of this study, some recommendations on this policy will also be proposed as the way forward for this policy to provide direction to all involved in mental health planning and implementation towards improving the mental health and well-being of the Malaysian population.*

Keywords: policy, mental health, Malaysia

1. Introduction

Mental health is characterized by the World Health Organization as a state of well-being in which a person is mindful of self-efficacy, can handle stretch well, can work beneficially and able to contribute to society (World Health Organization, 2004). In each stage of human life beginning from childhood to adulthood, mental health is an imperative angle that needs consistent attention. This can be since mental health is principal to the well -being of individuals and the capacity of society to operate viably. Individuals with mental health problems are incapable to think rationally and are at chance of acting out of control.

The American Psychiatric Affiliation has recognized 20 sorts of mental health problems confronted by the world community. The passing rate caused by mental health problems has also been alarming. Based on prior studies conducted, it was found that the passing rate due to mental health issues expanded from 28.1 million death rate in 1990 to 49.7 million deaths in 2020, in which it was an increase of 77 per cent. Based on the reality of the impact of mental health on individuals worldwide, United Nation (UN) has listed mental health in the Sustainable Development Goals (SDGs) (United Nations, 2015).

This move shows that UN recognizes the weight of mental health issues, thus makes mental health a priority in the global development for the next 15 years. To address this growing mental health problems, it is essential for the authority to have effective mental health policies. A mental health policy is an organized set of values, principles, and objectives to enhance mental health and reduce burdens of mental disorders among a population (World Health Organization, 2004). A sound and comprehensive mental health policy can increase the significance of mental health to be as important as physical health, help address issues of stigmatization of mental

health in society, be the main pillar for the development of mental health programs and play a role in delivering mental health services in an integrated manner.

In this paper, discussions on mental health policy in Malaysia will be presented. The highlight of the discussions will be on the evaluation of the policy and mental health related issues. Besides, policy recommendations are also provided and then this is followed by the way forward.

2. Policy and Mental Health Issues in Malaysia

In line with Malaysia's mental health vision to create a psychologically balanced and healthy society, with emphasis on the promotion of mental health and the prevention of psychosocial problems, the National Mental Health Policy was formulated by the Ministry Health Malaysia in 1998. This policy, which was later revised in 2012, contains three important objectives, namely: (i) to provide a foundation in the formation of strategies and a direction for all those involved in planning and implementation of health programs aimed at improving the mental health and well-being of all citizens, (ii) to improve mental health services among the population who are at risk of having psychosocial problems and (iii) to improve psychiatric services for those with mental disorders by providing the care and protection among families, communities, and relevant bodies. The National Mental Health Policy emphasizes several important points which are accessible and equitable, equipment/comprehensive, continuity and integration, multi-sector collaboration, community involvement, human resources and training, standards and monitoring, research and legislation.

Mental health policy should be the main guide in addressing issues related to mental health and is used as a measure to address the increasing number of mental health problems in Malaysia. However, the policy often receives criticism from various quarters. Former Deputy Prime Minister of Malaysia, Datuk Seri Dr. Wan Azizah Wan Ismail suggested that mental health policy in Malaysia be reviewed due to the increasing mental health problems in the country. The approach taken by Malaysia in terms of mental health policy is still lagging compared to other countries and this policy is also seen as still incomplete and will be discussed further in this study.

This situation gives an impact on mental health problems in Malaysia. Malaysia is at risk of having more people with mental health problems because their number increases every year. Based on the National Health and Morbidity Survey (NHMS) conducted in 2015, mental health problems among the community in Malaysia in 1996 was 10.7 per cent and this increased to 29.2 per cent in 2015 (Ministry of Health Malaysia, 2015). In 2017, the National Health and Morbidity Survey (NHMS) found that every one in five Malaysians suffered from mental health problems like depression, every two out of five Malaysians suffered from anxiety while one in 10 suffered from stress (Ministry of Health Malaysia, 2018).
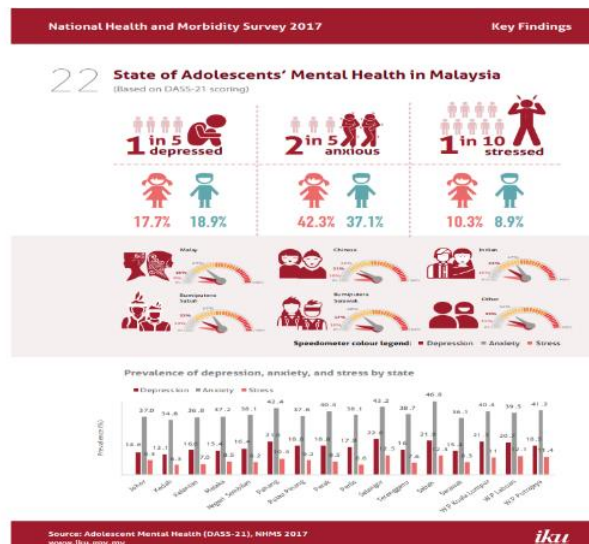
Figure 1 : State of Adolescents' Mental Health in Malaysia (MOH, 2018)

3. Methodology

This study used document analysis method. The approach of document analysis method has developed since the early 50s from the fields of literature, social science and beyond to various other fields (Krippendorff 2018). Document analysis method allows the researcher to analyse the value and detect what can be obtained in a document. In this study, the researcher managed to refer to several public documents related to mental health policy such as The National Mental Health Policy. These public documents are very useful, as Patton (2015) declared that they can reveal aspirations, arrangements, tensions, relationships, and decisions that might be otherwise unknown through direct observation. This study adopted the document analysis framework as stated by Krippendorff (2018). According to Krippendorff (2018), there are several important components in this framework namely (i) documents, (ii) developing research questions, (iii) research context, (iv) constructive analysis, (v) sampling and (vi) conclusions.

4. Conclusion

Continuous efforts especially from the government must be taken to enhance the society's awareness on mental health issues to prevent this issues becoming more serious. If the government is serious about improving the lives of people and understands the way problems are interacting, they must ensure that developed policies and interventions are based on an in-depth understanding of human behaviour. Thus, the National Mental Health Policy seems needs to be revised and at the same time the analysis and evaluation of the policy needs to be based on the current needs and conditions of the society.

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Real-Time Facial Recognition System using Feature-based Models

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Abstract – Face recognition systems that are effective and precise are more useful since they enhance security problems. This research has applications in a variety of fields, including digital identity, biometrics, security information, surveillance systems, and law enforcement. A face detection approach is used before recognizing faces. Facial detection is the first step in identifying a face in a video or photo. The device's face recognition is identified in live video by algorithms seeking to identify features of faces after face detection. Face recognition with various feature descriptors and classifier techniques has been developed. The goal of this research is to evaluate the accuracy and efficiency of two feature-based techniques, the Local Binary Pattern Histogram (LBPH) and the 128-d embedding face by dlib, in real-time. The study is being carried out using a Raspberry Pi 4 with the Open-CV and Python environment libraries to recognize and detect faces. Webcams are used as optical sensors on the Raspberry Pi. The accuracy of the techniques was selected as the performance criterion. Our research reveals that extracting features from 128-d embedding face performance outperforms LBPH with a 97 percent accuracy.

Keywords: face recognition, face detection, local binary pattern histogram, embedded face features.

1. Introduction

Facial recognition is a biometric system that analyses facial feature data to determine identity. Face recognition is split into two main sections: facial detection and facial recognition matching. The facial recognition system is based on the human's facial features and the supplied face picture or video. Detect whether there is a person's face and provide the location, size, and information of each main facial organ. Depending on the data, the identification traits of every face are retrieved and matched to known faces in the dataset to verify the identity of the face (Yang & Han, 2020). Nowadays, various machine-learning (ML) techniques may be utilized to detect multiple faces; four of the most well-known face detectors are Haar Cascade, Dlib-HOG, Dlib-CNN, and MTCNN. After detecting the facial region on the digitized photograph, it takes a feature that may be utilized to identify one facial from another to recognize the person whose identity it is. There are methods for extracting features from facials, such as Local Binary Patterns Histogram (LBPH), Principal Component Analysis (PCA) in EigenFaces, Linear Discriminant Analysis (LDA) in FisherFaces, and 128-f facial embedding takes its inspiration from feature extraction utilizing deep convolution network (Handaga et al., 2019). This paper is organized according to the following topics which are feature-based model, methodology and conclusions.

2. Features-based Model

The majority of face recognition systems in real-time have problems, especially in devices that do not have high specifications in defining algorithms that are suitable and have high accuracy. There are two features-based extraction methods is used to find the best detection dan recognition performance. The first method is LBPH with Haar cascade, while the second method is 128-d face embedding face features with CNN and Haar cascade in the device that is controlled and provides a safe and quick method of identifying the individual to know which best method has high accuracy in real-time.

Local Binary Pattern (LBP) is a straightforward and effective texturizer that identifies picture pixels using a threshold and assesses the output to be the binary value for each pixel neighborhood. It may indicate local peculiarities across the images. Good results may be obtained largely in a controlled atmosphere. Each region was represented by a pixel with a numeric value. These numbers are acquired and computed using a histogram for a classifier. These numbers are classified. This system's facial image is divided into local sections, and the LBP definition is extracted individually. The Local Binary Pattern assigns each region to a scale of the region in the (3×3) areas. The number of center pixels is used as a threshold, and the result is a binary integer. If the score is above the threshold, the binary is (1), otherwise it is (0). (Jacob, 2021) After the eight-digit binary is created, this data is converted back to decimals and indicates the local binary pattern area code.

A neural network (NN) is made up of layers. An input layer, one layer, or two layers hidden, and an output layer are all present. A Deep Neural Network (DNN) has more than two layers of hidden. It is capable of working with both unsupervised and 10 supervised data. Data that has been supervised is labeled data. A photograph of a human with the label "name" that indicates the individual's name, for instance, is supervised data. Unsupervised data is data that hasn't been labeled. To cluster the information based on similarity, DNN is utilized. A DNN learns to feature extract on its own. To extract significant characteristics, hundreds of millions of images are necessary. NN will turn a face image into the facial vector of features in 128-d for extraction of features (Abdullah, 2021). This extracted step-in technique utilized three channels (RGB) for input photographs to produce a 128-dimensional vector for every image.

3. Methodology
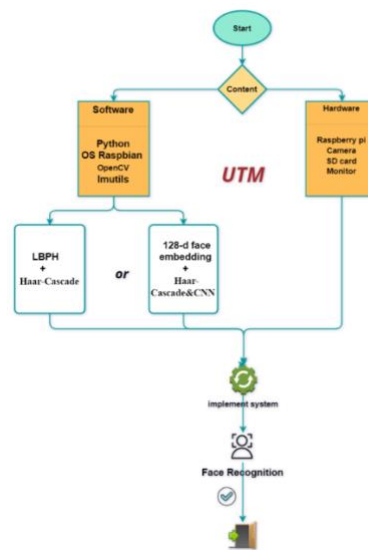
Figure 1 Work Flow

4. Conclusion

The study is being carried out using a Raspberry Pi 4 with the Open-CV and Python environment libraries to recognize and detect faces. Webcams are used as optical sensors on the Raspberry Pi. The accuracy of the techniques was selected as the performance criterion. Our research reveals that extracting features from 128-d embedding face performance outperforms LBPH with a 97 percent accuracy.

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Real-Time Temperature and Humidity Monitoring Testing Approach in Poultry Farm

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Abstract – The advancement of technology eases daily human life in various aspects. Currently, the world is moving from conventional methods to an internet-based system called the internet of things (IoT). The IoT system allows real-time monitoring and response which are efficient and produce reliable result. Managing poultry farm is a massive works where many variables like temperature and humidity need to be control to ensure stable production of meat. Thus, this project experiments with a prototype of an IoT-based temperature and humidity monitoring system in a poultry farm.

Keywords: Internet of things (IOT), real-time monitoring, poultry farm

1. Introduction

In 2020, Food Agriculture Organization (FAO) of the United Nation reported that 40.6% of meat available in global market is poultry product estimated 337 million tons. Poultry farming mainly chicken but includes turkey, ducks, and geese to produce eggs and meat for daily food. There are two types of poultry layer and broiler where layer technique is known for purposes of eggs production while broiler is used for raising poultry for meat. In this project, a concept prototype of real-time monitoring poultry farm system was developed. The system measures temperature and humidity level in the farm and send notification message through telegram when value is out of threshold set besides alarm ringing to alert workers on site. All reading is stored in cloud for easy access and further analysis.This paper is organized according to the following topics which are literature review, methodology and conclusions.

2. Literature Review

B. Ramteke and S. Dongre (2022), designed an IoT-based intelligent automated poultry management system to provide balanced diet and water supply and increase healthcare management of the birds focusing on layer poultry. From the proposed system, the authors concluded that the optimum temperature in layer poultry is between 20°C to 24°C because when the temperature raised above 24°C, there will be declining in weight and shell of eggs produced. In addition, when the temperature is lower than 20°C, the birds require more feed per day. W. Sarachai, et al. (2019), developed notification system for fan failure detection in poultry farm . The researchers placed sensor to read signal wave of fans and processed the data using Raspberry Pi 3B to determine any malfunctional of the fans with a threshold value. When the reading decrease to below threshold, the system sends notification through either phone call, SMS or LINE messenger. M. N. Elham, et al.(2020), studied

implementation of Internet of Things and blockchain on poultry farm monitoring to ensure the temperature and humidity level at optimal. The system measure temperature and humidity in the poultry farm and store information using blockchain. The authors agreed that data transfer using blockchain is more secured and transparent besides can be perceived by users later. K. A. Sitaram, et al. (2018), proposed smart management system of poultry farm including monitoring system, automated response and data presentation. The system consists of temperature, humidity, ammonia, water level and feeder sensor where if the value measured is out of threshold set, cooling fan, exhaust fan, ventilation window, water pump and DC motor reacted respectively to the sensor. All measurement will be sent to the web server through GPRS module for internal monitoring also, LCD to display current measurement on site. M. M. Islam, et al.(2019), constructed a prototype of automated poultry farm system with anti-stealth and anti-arsenal feature alongside data storage on website. A sensor is placed at main gate to detect movement to prevent trespassing by outsider. The purpose of having anti-arsenal feature in this farm because the authors convinced that having high density of electricity cables would cause sparks. Moreover, this system also provides temperature, humidity, light intensity and gas monitoring where all are stored and displayed on "ThinkSpeak" website.

3. Methodology

Flow chart given illustrates overall operation of the system in Figure 1. The temperature and humidity sensor, DHT11 is set up in the environment to measure at one minute interval frequency and send information value to the system. the raspberry pi analyse the information to determine whether the reading is within threshold or not in this case, the threshold is set between the lowest of 25°C and the highest of 30°C also 70% to 90% temperature and humidity rate respectively. If the reading is beyond the threshold value, an alarm alongside with telegram bot notification to accredited telegram account is activated. In addition, all reading will be uploaded in the Firebase for data collection and analysis in future.
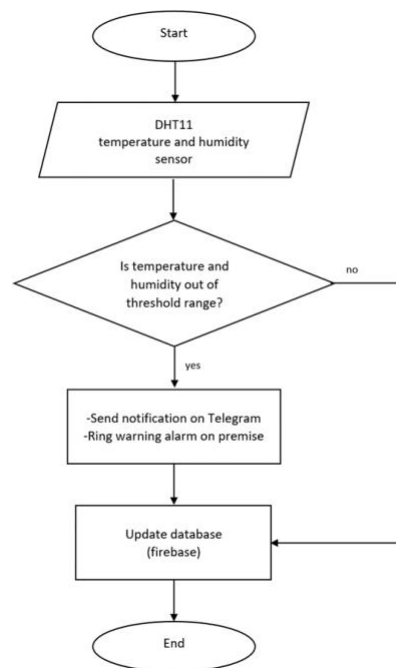
Figure 1 Flowchart of the system

4. Conclusion

The proposed system benefits farmer such a way that monitoring temperature and humidity of poultry farm become easy with real-time telegram notification and alarm on site. In future, the integration sensor like ammonia level, light intensity, smoke detector as well as automated responses for these sensors.

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Migration Of Monolith Application to Microservices Application: State-Of-The-Art Techniques

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Abstract – *Microservices architecture has become enormously popular as traditional monolithic architectures no longer meet the needs of scalability and rapid development cycle. Furthermore, the success of large companies in building and deploying services is a strong motivation for others to consider making the change. However, performing the migration process is not trivial. Most systems acquire too many dependencies between their modules and thus cannot be sensibly broken apart. For this reason, studies that provide information associated with the migration process to practitioners are necessary. Existing migration techniques are categorized into three main approaches: static analysis, dynamic analysis, and model-driven analysis. This paper focuses on the model-driven analysis approach. A literature search was conducted using search strings to discover recent migration approaches based on model-driven analysis. The migration steps were extracted and identified for each proposed model-driven analysis technique. By understanding the differences and similarities between the approaches, the strength and weaknesses of each technique can be identified.*

Keywords: microservices architecture, monolith, software migration, model-driven analysis

1. Introduction

Microservices Architecture (MSA) is a cloud-native architectural style inspired by Service-Oriented Architecture (SOA). It consists of small, autonomous services that communicate and work together. MSA allows organizations to deliver software faster, respond quicker to change and embrace newer technologies. Some of the world's most innovative and lucrative businesses, such as Amazon, Netflix, Uber, and Etsy, owe their massive success in IT efforts to microservices. Migrating a monolithic system into a microservice is a long and challenging process that requires much effort from the stakeholders. Proper decomposition of monolith into microservices with appropriate granularity can be seen as the main challenge in architectural migration. There exist several approaches for extracting and identifying candidate microservices, such as model-driven analysis (Amiri, 2018; Chen et al., 2018; Fan & Ma, 2017; Li et al., 2020; Sayara et al., 2018), static analysis (Eski & Buzluca, 2018; Knoche & Hasselbring, 2018; Krause et al., 2020), and dynamic analysis (Jin et al., 2018, 2021; Taibi & Systä, 2019).

This paper aims to discuss the differences and similarities in terms of the general steps in service identification and extraction between state-of-the-art migration techniques based on model-driven analysis. A comparison table on state-of-the-art migration techniques is produced.

The organization of the paper is as follows. Section 2 discusses similar review articles on state-of-the-art techniques for migrating from monolith to microservices. Section 3 discusses the methodology involved in gathering the state-of-the-art

migration techniques. Next, the state-of-the-art migration techniques will be discussed in Section 4, and finally, Section 5 will conclude the article.

2. Related Work

Several research papers have described reviews on state-of-the-art techniques for microservices migration. Kazanavicius and Mazeika (2019) elaborated on the challenges and technics of legacy software migration from monolithic to microservice architecture. Ponce, Marquez, and Astudillo (2019) gathered, organized, and analyzed twenty monolith to microservice migration techniques.

3. Methodology

The methodology used in this research was a literature search from several databases such as Web of Science, ScienceDirect, and Scopus. The articles were selected based on search strings "monolith to microservice migration techniques" and by reading the abstract to filter the approach based on model-driven analysis. Some articles were also discovered and selected based on state-of-the-art techniques described in related work or references.

4. State-Of-The-Art Model-Driven Analysis Migration Techniques

Several state-of-the-art model-driven analysis techniques have been identified in our study. Table 1 shows the list of state-of-the-art migration techniques for model-driven analysis. The table shows the author, year, and general steps involved in each approach.

Table 1: State-of-The-Art Model Base Migration Techniques

Number	Author and Year	Findings (General step)
1	Kuryazov, Jabborov, and Khujamuratov (2020)	Analysis, Extract, Refactor, Integrate
2	Amiri (2018)	Extract
3	Sayara, Towhid, and Hossain (2018)	Analysis, Extract, Conflict Identification
4	Li, Ma, and Lu (2020)	Analysis, Extract, Develop
5	Chen, Li, and Li (2018)	Analysis, Extract
6	Tyszberowicz, Heinrich, Liu, and Liu (2018)	Analysis, Extract, Develop, Deploy
7	Fan and Ma (2017)	Analysis, Extract, Develop
8	Ahmadvand, and Ibrahim (2016)	Analysis, Extract
9	Michael Gysel, Lukas Kölbener, Wolfgang Giersche, and Olaf Zimmermann (2016)	Analysis, Extract
10	Levcovitz, Terra, and Valente (2016)	Analysis, Extract, Develop

Some of the papers have similarity in terms of the migration steps. Figure 1 shows the summary for all analyzed papers for the migrations steps.

Figure 1 : Summary of migration steps
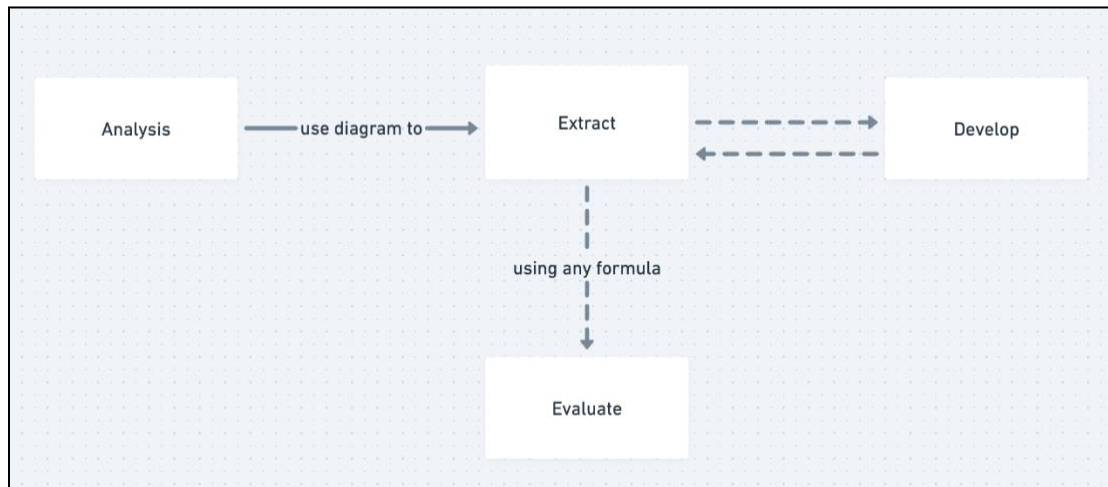
The most common component is extract which is the main goal of the technique. The second most common is analysis step. Paper by Amiri (2018) start with extraction without analysis in the first step. The paper assumes that we already have analysis diagram (BPMN diagram) and by using that diagram, it extracts microservice candidate.

5. Conclusion

In conclusion, several state-of-the-art migration techniques have been identified in this study through literature search. Different migration techniques require different steps, and each step has its guidelines to be executed. The strengths and weaknesses of the approaches can be identified by determining the steps involved in service extraction and identifying the extraction criteria. These findings will then be used further to solve the main research problem.

Acknowledgment

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Classification of Economy Activity Location By Geohashes using Machine Learning

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Abstract – *Geohashes has been widely used in co-location information geographically on the map. Identifying new economy location has become critical with the mass migration of people and rapid urbanization and transportation link in Malaysia. As a result, using geohashes will be able to co-located the relevant information related to the locality and provide additional insight during the urbanization and economy development process. Predicting the location using machine learning will allow the use of big data to be consumed in the process of urbanization. These will improve and provide different perspective in the decision making process.*

Keywords: applied computing, machine learning, classification, geohashes

1. Introduction

This paper explore how machine learning can be used for studying and understanding the location of economic activities in the most reliable way, timesaving, cost-efficient and simply usable option. However, companies are charging higher costs for vendors to strategize and provide blueprint proposals on new potential economic growth locations. Furthermore, time spent to analyse is huge because non-digital methods are still in practice such as physical survey or obtaining feedback from industrial players, multiple stakeholders involved in determining the new location such as meetings, analysing and making sense of each input from different parties in the process.

As a result, by proposing a new methodology in understanding economic activity of location using machine learning, the result will help in policy making process in addressing economic and social issues such as poverty, food security, unemployment, inequality, mobile coverage, and financial inclusion. Specifically, the new potential economy location will help the authority or potential stakeholder to save time and cost spent in coming out with analysis related to the new location. Generally, the results of this analysis shall help to identify high potential areas for economic activity and further improvement in underdeveloped areas. By identifying the economy activity score index by location may help other interested parties in understanding the area for growth.

The aim of this research is to address the issues related to work in location assessment by various parties such as urban planning, economy planning unit, local authority, commercial business, or social organization. Through innovation of techniques used in performing location assessment, the benefits of the work will

improve the time taken to complete the location assessment related work, provide various perspectives and identify potential gaps for future work related.

2. Data Source and Methodology

To provide a near comprehensive location assessment, 3 types of data will be processed. There are infrastructure data, demographic data and economy data that are related to the location. The infrastructure data will give a perspective from accessibility, serviceability, nearness and strategically of the location. The demographic data provides the information of related population such as age, race, gender and population. The economy data provides the information related to household income, point of interest and economic corridor. Below are the list of data source.

Table 1: List of data source

Data	Data Format	Data	Data Format	Data	Data Format
HOTOSM : RAILWAY	Spatial	HOTOSM : WATERWAYS	Spatial	KLINIK PERGIGIAN	Text
HOTOSM : HEALTH FACILITIES	Spatial	HOTOSM : BUILDINGS	Spatial	HOSPITAL KERAJAAN	Text
HOTOSM : EDUCATION FACILITIES	Spatial	HOTOSM : ROADS	Spatial	MUKIM BORDER	Text
HOTOSM : SEAPORT	Spatial	KLINIK DESA	Text	15 MAIN CITIES	Spatial
HOTOSM : AIRPORT	Spatial	KLINIK 1MALAYSIA	Text	SEKOLAH RENDAH DAN MENENGAH	Text
Police and Fire Station	Spatial	Pos Office	Spatial		

The machine learning method used is a supervised learning which is binary classification where the goal is to classify categorical class labels which are discrete and unordered such as yes or no. In this analysis, classification on geohashes will determine which geohash are suitable for future economy activities or not based on the learning of other locations.

3. Developing Spatial Features

The critical factor in data science is to extract relevant features that going to be consumed in the process. For spatial data, several features can be generated from the existing infrastructure, demographics and economic data. Such features that can be generated are:

    i. Total population per geohash.
    ii. Total point of interest (POI) per geohash.
    iii. Total education facility per geohash.
    iv. Total hospital and clinics per geohash.
    v. Distance of geohash with nearby clinic and geohash.
    vi. Distance of geohash with nearby schools and university.
    vii. Total essential services like police station and fire bridge per geohash.
    viii. Distance of geohash with nearby essential services.
    ix. Total building area per geohash.
    x. Distance of geohash from the airport and seaport.
    xi. Total of road intersection per geohash.
    xii. Total accessibility of geohash to the nearby population like town, city or village.

The result from the geohash analysis will determine which location are mostly appropriate for the economy activity. In the work done, the paper has identify potential areas of economy growth for Selangor as depicted in Figure 1 below.
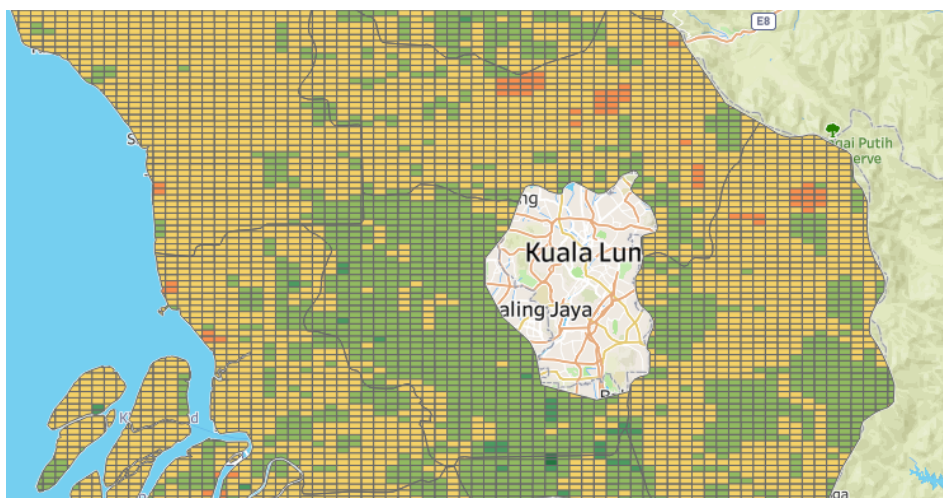
Figure 1 : Potential growth analysis result for Selangor

The above visual of Selangor for potential growth for economy provides further area to be developed for example are south west of Selangor such as Petaling Jaya and Subang Jaya.

4. Conclusion

The work for identifying future potential growth of economy are still at large need further resources and data computation for be able to provide more comprehensive assessment. In Malaysia, due to large expand of geographical area

including Sabah and Sarawak and diversity of culture , it is hope to provide various insight related to the economy opportunity based on locality study.

Acknowledgement

It is acknowledged that this paper is taking local consideration based on available data and interpretation of the data at the point of time the data being obtained from various sources on the Internet for this analysis between May 2022 to June 2022. This paper does not involve any proprietary data or non- disclosure insight from any third party to be considered in this project. No assumptions are considered as input in this project based on the decision made by the local state or federal government for future projects in their locality. This project does not involve recommending any proven future related projects such as property, infrastructure, special zone, or corridors.

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Small and Medium Enterprise Family Business Succession Plan: A Review

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Abstract – *Transgenerational entrepreneurship is defined as the innovative, proactive creation of self-reliance in a family-owned business that continues for generations. Whereas family business succession is the process of transferring business management and ownership to the next generation by inheritance. Even though the process is crucial, incumbents must adopt a succession plan to ensure transition and company continuity. With the exception of the smallest number of successors in small and medium-sized enterprises (SMEs) compared to corporate firms, the selection process needs to be more comprehensive. The study aims to identify the challenges and factors that need to consider in selecting a successor by the incumbent in implementing the succession plan. The results of the study found that informal family involvement in the selection of successors, internal conflict between business and family, the leader's obsession with his leadership legacy, and the successor's level of readiness to accept responsibility are the main challenges in implementing a succession plan. While the factors that are given attention during the implementation of the succession planning process include education, competence, demographic factors, relationships with family members and incumbents, experience, integrity, birth order, and primogeniture.*

Keywords: Family-owned business, succession plan, succession challenges, succession factors, successor, incumbent

1. Introduction

The declaration of the Movement Control Order (MCO) in March 2020 as a result of the spread of the Covid-19 epidemic has forced the closure of government and private premises domestically and globally, except for the country's main services such as health and safety, telecommunications, retail, finance, and transport (Message of YAB Tan Sri Muhyiddin Hj. Mohd Yassin, Prime Minister, 18 March 2020, 2020) has caused the Malaysian economy to shrink by 17.1 percent in the second quarter of 2020 (Bernama, 2020). In fact, it also forces the adaptation of new norms not only for households but also for industry players (Metro, 2020). Since family business is one of the business entities that contribute to the growth of the global economy (Ratten & Jones, 2020), this business also faces challenges in the context of the ability to survive and the readiness to face the transformation of the "new normal" considering that the future fate of the business depends entirely on the leader business. This economic crisis has prompted family business leaders to re-plan business strategies in the future by focusing on succession planning which will involve the continuation of the business in the next generation of the family (Englisch & Ambrosini, 2020). However, facing the challenge of business sustainability in the current economic situation, makes succession planning a complicated responsibility (Institute for Family Business, 2020). Most founders or business leaders feel that it is

a very critical and sensitive process (De Massis & Rondi, 2020; Institute for Family Business, 2020) where they will hand over the management and ownership of the business to a successor from time to time. In fact, the issue of failure in the implementation of succession plans still occurs in family businesses even though many studies have been conducted to debate this issue (Bell & Pham, 2020; Lucky et al., 2011; Pham et al., 2019). As a measure to ensure the ability of the business to survive in an unbalanced market, family business leaders need to lead the business more efficiently and ethically. Family businesses require change by evaluating business priorities, transforming into digital businesses, as well as reorganizing family business takeovers in ensuring business sustainability. Therefore, this study was carried out to identify the challenges faced by incumbents in implementing succession plans in addition to identifying factors that need to be paid attention to in choosing potential family business successors.

2. Family Business Succession Plan

Over several decades, family businesses have been acknowledged as the oldest commercial entity (Nyoni 2019; Ramadani et al. 2019; Ratten et al. 2017) and distinctive (Afza Amran and Che Ahmad 2009; Sandu and Nye 2020). Some of the most successful firms have built a vast and powerful empire in global commerce, beginning with a business that was formed, owned, managed, and carried out inside the family (Budhiraja and Pathak 2018; Kandade et al. 2020; Van, Huu, and Ushakov 2017). They share the same views and aims, as well as the same productive measures to grow the family's economy while sustaining commitments and family bonds. Their dedication to developing and extending the firm ensures that it will be passed down through generations (Mosbah, Serief, and Wahab 2017; Mosbah and Wahab 2018; Waseem et al. 2018). Previous academics characterised a family business as one in which the administration and management of the firm are carried out in order to fulfill a corporate goal that is owned or controlled by a mixture of family members or a small group of family members (Holte 2019; Teixeira et al. 2020). The decision to continue the vision and purpose ensures that their business will be viable for future generations (Gagné et al. 2019; Monticelli, Bernardon, and Trez 2018). As a result, the family company legacy will be jeopardised, and it will most likely cease to exist as a firm created by family members (Mohamad, Naiimi, and Abdullah 2018; Schlömer-Laufen and Rauch 2020). In addition to the company leader, the successor faces hurdles when he is ready to take the position and the duty of carrying on the family firm's heritage.

One of the difficulties that the successor will confront is unhappiness among family members since they are younger than other family members. The age difference (Hiebl and Li 2020; Magasi 2016) and variations in viewpoint (Camfield and Franco 2019; Ghee, Ibrahim, and Abdul-Halim 2015; Ghee, Ibrahim, and Fen 2013; Thomson et al. 2016; Xian, Jiang, and McAdam 2021) make it difficult for successors to build a new generation business identity that can be accepted by all family members (Kandade et al. 2020; Umans et al. 2019). As a result, the successor's mastery of communication must be prioritised in dealing with his admission into the government system and subsequently developing a harmonious connection at all levels of the business as well as the family community.

The process of transferring authority and inheritance to the next generation is the most significant stage in the life cycle of a family company (Bizri 2016; Fitz-Koch and Nordqvist 2017; Hussain, Muhammad, and Zakaria 2020; Schell et al. 2020). This is due to the requirement for incumbents to designate possible future business leaders who truly possess the ability and credibility to run their family's legacy firm (Bathija and Priyadarshini 2018). As a result, because succession planning is a dynamic process, corporate leaders must develop a strategic strategy for implementing it.

Previous researchers have investigated several criteria in choosing probable successors who are qualified to accept the inheritance of the next generation's corporate heritage. According to the findings of a number of studies, corporate executives pick successors based on primogeniture considerations (Bizri 2016; Calabrò et al. 2018; Schell et al. 2020; Udomkit, Kittidusadee, and Schreier 2021). Primogeniture is a traditional idea that the eldest son of the family is the one who is anticipated to inherit the family company (Dou and Li 2013; Fürst 2017; Gilding, Gregory, and Cosson 2015; Wang 2010). In reality, several experts' conclusions acknowledge that one of the selection variables that requires consideration is the birth order of children in the family (Bulut et al. 2019; M.Adly and Anggadwita 2018; Wu et al. 2020).

Meanwhile, education is recognised as a vital trait to consider when choosing a successor. Potential successors who are also family members must equip themselves with formal education earned throughout their high school or university studies. (Bell and Pham 2020; Calabrò et al. 2018; Fürst 2017; Osnes et al. 2019). Furthermore, most experts say that corporate executives must combine both knowledge and experience to guarantee that their successors have greater credibility to run the organisation. The exposure gained while working with a business-related outside firm is thought to give the heir with significant experience to apply in the family business. This technique can also build an indirect network of external commercial contacts with family-owned businesses (Kubíček and Machek 2019). Indeed, the credibility of possible successors who will carry on the business heritage necessitates the incumbent examining the skill capabilities (Martini and Dewi 2020; Schell et al. 2020; Zhu 2020; Zybura et al. 2020) possessed by the potential successor. The combination of information and skills gained via school and experience working with enterprises other than family-owned businesses can increase the successful candidate's decision-making abilities.

In the meantime, the possible successor's level of interaction with incumbents and other family members impacts future successor selection. It is consistent with the findings of research by Abdullah et al., 2011, which found that the majority of business owners consider family connections to be a key (Martini and Dewi 2020) aspect of succession planning. It considers family structures and values that are followed and passed down from generation to generation. Communication context (Magasi 2016; Martini and Dewi 2020) between successors with company executives and family members attracts special emphasis since it is an efficient channel for resolving misunderstandings or disputes in family enterprises.

3. Methodology

In order to perform research, this study used a document analysis technique. It is a strategy for analysing many sorts of documents, such as books, newspaper articles, academic journal articles, and institutional reports. Any text-based document is a possible source for qualitative analysis (Patton, 2015). The term "document" refers to a variety of materials, including visual resources such as pictures, videos, and films (Merriam & Tisdell, 2016). Documents containing visual content, like documents including text, can be a source of qualitative analysis (Flick, 2018). This study examined previous scholarly publications to investigate material related to the challenges of executing succession plans as well as criteria to consider when selecting a successor.

4. Conclusion

Several elements have been considered in the process of determining who is a qualified possible successor who would run the family business in the future. Gender (primogeniture), birth order, education, experience, abilities, and the link between successors and company executives and family members are some of the variables that are frequently considered.

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Employability Skills of TVET Graduates For Future Resilience In Hospitality Industry

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Abstract – *The pulse of a nation is driven by local skills that can be produced throughan effective education system. Thus, Technical and Vocational Education and Training(TVET) have been introduced by the government. The Eleventh Malaysia Plan (RMK -11) was introduced to accelerate Malaysia's development to provide a highly- skilled workforce. However, the Covid-19 world health crisis has slowdown this effort. The hospitality industry has also been affected by this crisis which has led to changes in the existence of new technologies and skills that demand TVET graduates to be better prepared to enter the labor market. Indeed, the crisis will contribute to unemployment because the hotel industry will start to depend on technology and digital advancement. This paper discusses the employability skills of TVET graduates that can enhance their future resilience in the hospitality industry. Employability skill dimensions for hoteliers in post-covid-19 are also stated in this paper which consistsof 6 dimensions critical thinking, innovation, creative problem solving, flexibility and adaptability, communication and emotional intelligence, self-awareness and self-management and negotiation and relationship management.*

Keywords: employability skills, TVET graduates, Covid-19, hospitality industry

1. Introduction

Technical and Vocational Education and Training (TVET) is an education and training process that leads to employment and emphasizes industry practices in various related fields (Choi, 2021). It is seen as very important in the development of a country where the training received in the system will produce a society with certain basic skills, thus being able to supporta country to continue to progress in economic development and contribute to skilled and semi-skilled manpower to meet the needs of certain employment sectors (Minghat and Yasin, 2020). Since education is an important platform forhuman capital development, therefore, Thus, an education system that emphasizes industry practices in various fields have been introduced by the Malaysian government in the Malaysia Plan Eleventh (11MP) and it is known as Technical and Vocational Education and Training has been identified as change drivers which are innovative approaches to accelerate Malaysia's development to provide a highly skilled workforce (Economic Planning Unit, 2015).

However, this effort has been disrupted by the existence of a health crisis that has hit the world drastically which is known as the Covid-19 pandemic that caused unexpected abrupt changes and significantly disrupted the hospitality industry and has highlighted growing issues in workplace safety, skill gaps, technology adoption,

and work reorganization in the hospitality industry (Huang et.al., 2021). The spread of Covid-19 accelerated these adoptions, forcing businesses to look into creative digital solutions to be deployed so that the organizations could continue to function remotely and continue to serve and attract their guests in the future (Narisetti, 2020). Besides, higher standards of hygiene, contactless services and effective digital marketing are the things that will be demanded by the hotel guest in the new era of Covid-19 (Pillai, et al., 2021). Hence, to remain competitive in the situation of labor market which is expected to be more challenging after the pandemic is to equip prospective graduates with employability skills (Rehman, 2021). In general, graduate employability skills are an important element of higher learning, as they include a range of skills and knowledge students should be equipped with in order to become gainfully employed once they graduate (Nazrona et al., 2017).

2.0   Employability Skill Dimensions for Hoteliers in Post-Covid-19

It will always be necessary for hospitality professionals to excel in skills like customer service, culinary, food and beverage services, and management. Despite the fact that the world will start to look more normal this year, the hospitality industry has been impacted by the pandemic and will continue to be affected. Since the Covid-19 crisis began last year, several skill sets have emerged as critical to businesses. These skills are particularly in demand among professionals right now and will continue to be so for some time to come. As stated by Browne (2021) a survey has been conducted that found employability skills are more important to the success of business in the hospitality and tourism industry and the dimension of these skills is going to continue to be in high demand in the post-corona hospitality industry. Dimensions of employability skills that have been proposed by Bowne (2021) are (i) critical thinking, (ii) innovation, (iii) creative problem solving, (iv) flexibility and adaptability, (v) communication and emotional intelligence, (vi) self-awareness and self-management and (ix) negotiation and relationship management.

2.1   Understanding Employability Skills

Employability skills are a set of achievement, understanding, and personal attitudes or qualities that mark the individual as potentially more able to get the desired job and be successful in their career choice (Azmi et al., 2018). Karim and Maat (2019) describe employability skills as the ability to participate, represent, and expand in incentives due to rapid changes in work settings,communication skills, problem-solving skills, teamwork skills and interpersonal skills have become even more essential to graduate employability. Meanwhile, Supriatna et al. (2019) stated employability skills are known as the transferable group's core skills that describe the main functions of the knowledge, skills, and attitudes needed in the workplace of the 21st century. Lifelong learning also is one of the employability skill components that are important in dealing with situations during and after Covid-19. To achieve this goal, the Ministry of Human Resources has encouraged skill improvement, re-skills and cross-skills in the labor market landscape to equip themselves with new skills and master skills in various fields of employment (Bernama, 2020).

2.2   Employability Skills in Resilience Hospitality Business

The hospitality industry has been affected by the Covid-19 pandemic, and hotels that have managed to stay in business are struggling to stay competitive along with the affected economic impact. Further, a skilled workforce is vital to meet the changing nature of the industry and meet its needs. This situation increases the demand for the efficiency of the hotel staff as the customer demand changes according to the current situation (Shapoval, 2021). In this context, to remain competitive, hotels need to not only provide excellent service but also learn from the situation and adapt to offer a safe, flexible and enjoyable experience to their customers (Pillai,2021). Employability skills can help the hotel industries highlight the importance of their competencies such as fluency in different areas, digital literacy, conflict, interpersonal relations, management, teamwork and flexibility (Magalhaes,2021). Besides that, as stated by ILO (2021), individuals who are able to work on a team can practice leadership skills, and those who are resilient will be able to conquer all challenges and move forward in facing a challenging current workplace. Moreover, the industry not only needs employees who are knowledgeable and skilled in specific subjects only but expects the graduates produced to have a complete skill set that includes good skills, knowledge and attitudes or social skills to drive inclusive and sustainable economic growth (Kenayathulla et. al., 2019).

2.3   The Importance of Employability Skills for TVET Graduates

The increased number of higher institutions in Malaysia has provided greater opportunities for individuals to pursue their studies and directly contributes to the growth of the country's human capital. However, the issue of unemployment among graduates after graduation needs to be taken seriously. This is because unemployment among graduates is not due to a lack of job opportunities because it is always available but one of the factors causing graduates to fail to get and maintain jobs was a lack of soft skills known as employability skills (Nazron et al., 2017). Moreover, this issue has become more challenging due to the world is facing an increasingly competitive environment coupled with the Covid-19 pandemic has changed the landscape of the Malaysian economy including the disruptions in the labor market, business model changes that alter the world of work driven by the rapidity of 4IR and demand for new skills as a result of mainstream changes (Khatiwada, 2021). This means that failure in mastering technical skills and soft skills will lead to difficulty for TVET graduates to enter the labor market. Since industries are looking for students with higher competencies (Ismail et al., 2021), hence, TVET educational institutions as providers of graduates must respond quickly to any changes in employability skills which include the knowledge and skills that are in accordance with the requirements that are demanded by the industry to ensure their graduates able to compete in the current workplace (Nugraha et al., 20203.

3. Findings

The covid-19 pandemic affected a large portion of the world's population, putting the global economy in a state of crisis (Portnoya, 2022). This pandemic made people lose the human touch, however, the need and importance of employability skills are at their peak whereby empathy, resilience, and communication skills are needed in every aspect to prosper today (Vanzara, 2020). In 2020 many employers have taken the decision to delay or reduce the number of graduates that they are recruiting (Ammeran, 2020) and in an overcrowded graduate labor market, employers will distinguishbetween equally qualified graduates to determine standout employability (Anderson and Tomlinson, 2021). Therefore, employers are anticipating that graduates should be work-prepared and request a scope of capabilities and characteristics of them (Singh, 2017). Subsequently, Dhaliwal and Misra (2020) noted that most employers today are looking for employees who have good soft skills such as integrity, communication, courtesy, responsibility, interpersonal skills, positive attitude, professionalism, flexibility, teamwork,and work ethic. Besides that, employers often look for graduates who are well-balanced and have good academic records, while possessing soft skills such as communication skills, problem-solving skills, interpersonal skills, and the ability to be flexible (Nazron et. al, 2017). Kenayathulla et al., (2019) further advocated soft skills such as interpersonal skills, communication skills, ethical behavior, and cognitive skills are the characteristics that employers consider when screening job applicants, and that employees who are knowledgeable, get along well with others, can work well in a team, are reliable and dependable, enjoy learning, and have good written and oral communication skills are preferred by employers in today's world. Ultimately, employers want graduates that able to help them in dealing with changes, are skilful in solving matters related to technical or non-technical problems and are able to work independently by enhancing employability skills holistically (Rohanai et al., 2020).

In a conclusion, nowadays, employability skills are not just about maintaining a job in these difficult times but also about managing employment challenges when they arise. Thus, graduates must be able to groom themselves with these skills to be able to learn things faster and more effectively becauseit will help them to handle things with ease and sensibility. In addition, employability skills will remain throughout life enabling them to succeed not only in their academic studies but also in their careers and personal lives.

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Opening the Policy Window to Survey-accurate and Accessible Underground Utility Data

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Abstract – *The population and development that are constantly increasing and naturally have pressured the government to expand the use of their land physically in the vertical direction, above and below ground. JUPEM, as the national authority in national surveying and mapping, has been mandated to obtain accurate and precise underground utility data. In an effort to obtain accurate UU data, many challenges are encountered in dealing with various stakeholders. At the same time, the ability of decision-makers is a big challenge in ensuring that JUPEM obtains accurate data.*

Keywords: underground utility, decision-makers,

1.   Introduction

The journey towards having survey-accurate data is very challenging proving a need for data confidentiality protection for underground utility owners to prevent vandalism, stolen, or unnecessary competition. Despite the concern for their rights, the government, however, wants access to the data by relevant authorities given their significance for future physical development and disaster management purposes. In exploring and bridging the gaps between the protection of rights and rights to data, this article applies Kingdon's multiple-streams framework to identify what opportunities are available to encourage utility owners to subscribe to survey-accurate data and permit access to the data.

2.   Research methodology

This research is exploratory in nature. The data were collected through five series of focus group discussions (FGD) to cater to five different groups of participants, representing the Quad Helix parties. This is to ensure each group obtains a similar opportunity to voice out their thoughts. The participants were government agencies, utility owners, license surveyors, academia, and non-government agencies. They were purposely selected because of their involvement in the underground utility process. It adapts Colebatch's dimensions of policy practice. According to Colebatch (2009), policymaking involves three dimensions of equally important participants. The first of these dimensions involves decision-makers (horizontal), while the second is the interest groups in the policy networks (vertical), The third dimension is scene-setting, where everyone tries to understand and learn together what is happening on the

ground and what the top management can do to achieve their intentions. The general structure used to collect data is presented in Figure 1.
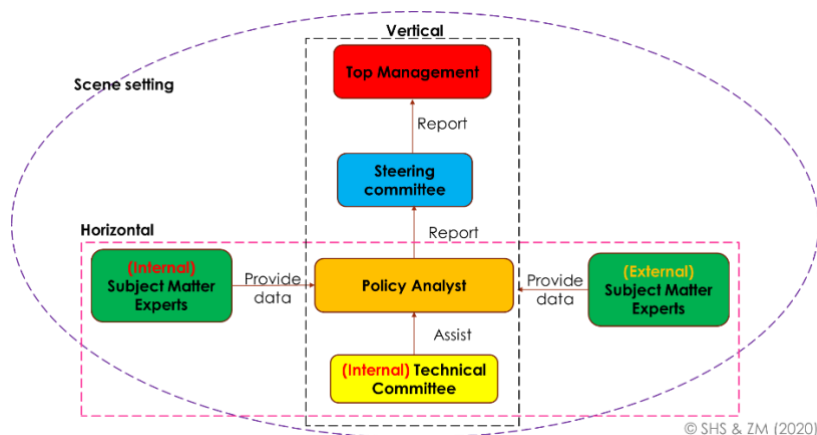

Figure 1: The dimensions of policy practice (Adapted from Colebatch (2009))

The FGDs were initially conducted physically but then changed to virtual FGDs due to the COVID-19 Movement Control Order. Data collected were analyzed thematically. Triangulations were conducted to validate the data.

3.   Findings and Discussions

The participants provided a lot of inputs related to issues on the implementation of underground utility mapping. The potential solutions were also pronounced. However, only issues with potential or feasible solutions are officially recognized as problems that are included in this agenda-setting process. This is because the decision-makers have limitations, especially on the resources to solve some of the problems. Problems that are opted out are nonetheless reported and recorded in the written final report, made avail to the policymakers, for their future referral for example, for policy evaluation and review. These inputs were then grouped into five major issues according to themes, and prioritized according to their relative criticality for improvement. Using the Analytical Hierarchy Process to conduct the rank of priority, these five issues of the problem stream are related to (a) legal mechanism; (b) governance; (c) ecosystem; (d) federal-state relationship; and (e) underground utility mapping process.

The policy stream is about the solutions endorsed by the policymakers (Kingdon, 2003). Findings showed that the five issues are resolvable because of the availability of (a) a national repository for underground utility data called *Pangkalan Data Utiliti Nasional*; (b) Utility Mapping Technical Committee to provide a platform for stakeholders to discuss underground utility mapping issues; (c) Intellectual Property Right to protect the rights on the underground utility data, and (d) collaboration to enhance technical competencies to all surveyors and to support continuing education and professional development at international level.

In referring to Kingdon (2003), the existence of both problem and policy streams are the main reasons to open the policy window or the opportunity for policymaking. To

maximize the opening, the existence of a political stream is essential. In the context of this study, the political stream comes through the Department of Survey and Mapping which is mandated by the Cabinet to manage and govern underground utility mapping and act as the national repository for underground utility data in Malaysia.

Problem stream

(a) legal mechanism; (b) governance; (c) ecosystem; (d) federal-states relationship; and (e) underground utility mapping process

Policy stream

(a) PADU; (b) Utility Mapping Technical; (c) Intellectual Property Right; and (d) financial supports

Policy window

Policy agenda

Political stream

(a) mandate by the Cabinet
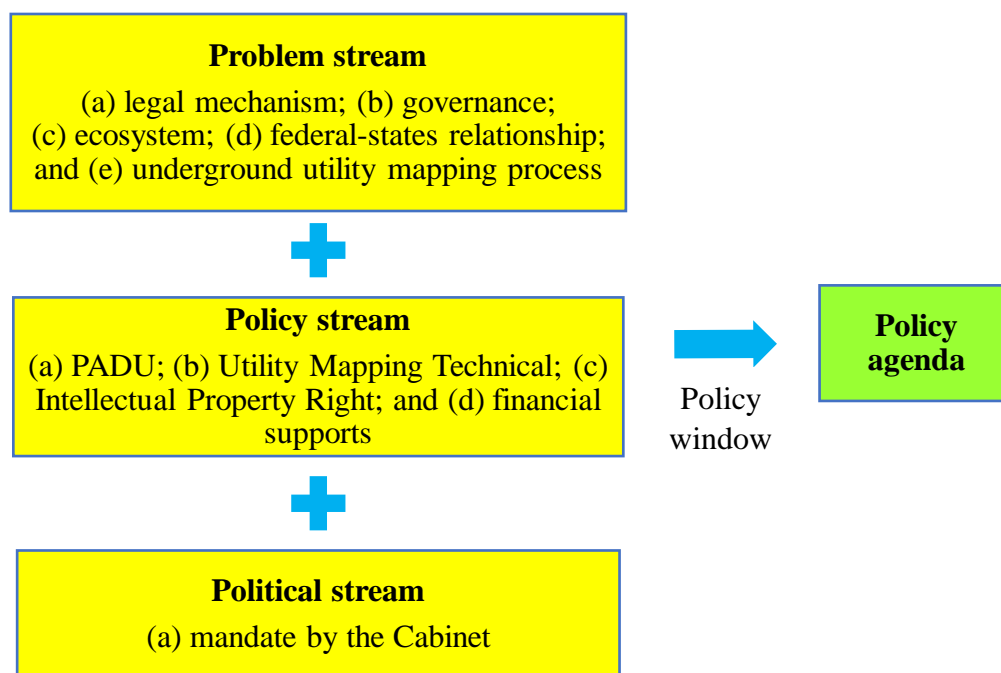
Figure 2: Multiple streams of policymaking (Adapted from Kingdon, 2003)

4. Conclusion

Research limitations: This study is exploratory in nature. It was successful in identifying the factors that contribute towards the three streams of policy agenda. Further study using the quantitative method should be conducted to confirm which factors are significant in opening the policy window.

Practical implications: The method used in this study can be adopted by policymakers for identifying the agenda of any policies that they want to develop. Besides that, the findings can be used as a benchmark for other authorities around the world to identify the policy agenda, especially in the field of underground utilities.

Social implications/Impact on society and/or policy (if applicable): The identification of concrete problems, justifiable solutions, and also responsive authorities are critical in the development of policy agenda, which will guide the development of a policy document. Besides having good implementation programs, an evidence-based and contextualized policy may increase the likelihood to achieve the government's intention, which in this study is to acquire reliable, survey-accurate, and accessible underground utility data in Malaysia.

Acknowledgment

While there are plenty of studies conducted on the technical part of underground utility mapping, this is the first study that investigated this subject from the context of agenda-setting. In addition, using the well-established Kingdon's model to explain the agenda-setting of the national underground utility mapping policy is one of the strengths of this study. Furthermore, this study is part of the actual process for developing the national underground utility mapping policy.

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IR 4.0 Occupational Safety and Health Management Critical Factors in Construction Industry: A Pilot Study

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Abstract – *The fourth Industrial Revolution (4IR) provided many benefits, but it also introduced unanticipated threats to occupational safety and health (OSH) that need to be minimised. As a result of the realisation that 4IR technology carries new OSH risks, a framework for OSH readiness was created to improve OSH management in the construction industry. Construction's OSH management players will use the designed 4IR OSH readiness framework as a guide and a point of reference as they implement 4IR technology into their daily operations. The main goals of this study are to evaluate the pilot study questionnaire and identify the essential components for the framework. As a research tool, a new questionnaire is created. Before pilot study distribution, content validity and linguistic analysis were conducted. The Google Form survey was then sent out via email and WhatsApp. Total of 28 respondents were obtained for the pilot study. The findings include the demographic and company information, awareness level on 4IR concept, 4IR technology familiarity, awareness level on 4IR technology implementation in OSH, elements for 4IR OSH readiness framework, Cronbach Alpha analysis and observation on instrument and methodology. 60.7% of respondents have heard about 4IR concept with moderate level of awareness (53.6% score). Industrialized Building System (IBS) technology received 96.4% score which indicate good level of familiarity. Respondents aware the usage of 4IR technologies helps in OSH management (64.3%). Based on the results, the Cronbach Alpha value for all 77 items was 0.961, which denotes a solid internal consistency range that was trustworthy for the pilot research. All participants were able to fully respond to study questions given the context. Prior to the main data collection, the questionnaires will be improved and further clarified based on the results of the pilot research assessment.*

Keywords: occupational safety and health (OSH), OSH management, factors, pilot study

1. Introduction

The fourth Industrial Revolution (4IR) been introduced in 2011 had gained attention and discussed in many organisation (Ling, Hamid1, and Chuan 2020) Many countries develop own 4IR roadmap upon acknowledgment of 4IR transitions including Malaysia with Industry4WRD (2018) Industry 4.0 Master Plan (2018) and National 4IR Policy (2021). 4IR technology implementation has become a part of various industries and mostly affect manufacturing industry (Azmy and Zain 2015) Today, technologies commonly used in in the manufacturing sectors are being adopted in construction industry. Occupational safety and health (OSH) in the workplace. Construction sector is hazardous workplace with high numbers of accidents (Sawhney et al. 2020). The adoption of 4IR new technologies can create a safe working environment as mentioned in literature. For instance, usage of drones replaces human element in inspection and helpful in avoidance of high-risk manned interventions such as in confined spaces, working at height or in hazardous environment (Júnior et al. 2021).

Although 4IR technologies helpful in OSH management, not everyone agreed. Safe working environment is created thanks to risk identification and risk assessment (Kassim, Razali, and Ariffin 2021). It is different when the risk is unknown. 4IR implementation will change the way of working and will change the existing OSH risk factors with additional of potential new and unknown OSH risk to emerge and studies have triggered their concerns on the new OSH risk brought by 4IR technologies. OSH management system is very important at the construction site. The initial goal of implementing 4IR is to have better OSH management in construction. Due to concern, therefore it is necessary to create a new management system for 4IR in OSH management and identifying the critical factors. This paper included description of elements or factors required for the management. Therefore, the objectives are to evaluate the aspect of the online survey procedure and to validate the pilot study questionnaire.

2. Methodology

This research using self-designed questionnaire as the instrument. Researcher had opted for literature review in the development each item in the questionnaire. The process of reviewing taking place from July to August 2022. Figure 1 shows the flow of research methodology use in this pilot study.
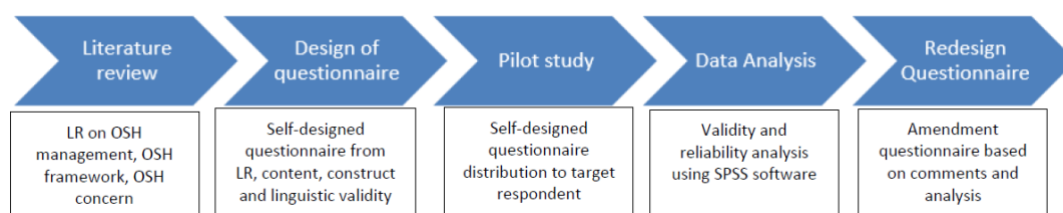
Figure 1: Flow of research methodology

Respondents were selected on random sampling among construction players. Using existing literature as reference, his study targeting for 30 respondents as sample size where 30 been known as popular number in similar study (NCSS). The self-designed questionnaire used consists of several sections. Before being used in data collection, it is firstly undergoing construct, content, and linguistic validity. The pilot study questionnaire was distributed among construction players via email and mobile chat (WhatsApp). Data were collected through online survey (Google Form) because of increased used of digital medium with advancement use of electronic mail (Mondal et al. 2018).

The questionnaire approach is a popular way for researchers in any field to acquire data. The questionnaire contains single-choice questions, multiple-choice questions and Likert scale questions based on the five-Likert scale. Likert scale is selected in this research study because it is aim to understand the opinions and perceptions of the respondents related to the interest of study. The questionnaire for pilot study consisting of eight sections questions and the questions was prepared after literature review of previous study. Following the completion of the pilot study, the data collected was examined using Cronbach Alpha. Cronbach Alpha was used to determine the reliability and validity of data based on factors. Cronbach Alpha's reliability coefficient normally ranges between 0 and 1. The closer Cronbach's alpha

coefficient is to 1.0 the greater the internal consistency of the items in the scale. Literature indicated that internal consistency should be 0.70 or higher, but some use 0.75 or 0.80. The following Cronbach Alpha rules of thumb shown in Table 1 were referred to for the result in pilot study.

Table 1: Cronbach Alpha rules of thumb (George and Mallery 2003)

_ > .9	_ > .8	_ > .7	_ > .6	_ > .5	_ < .5
Excellent	Good	Acceptable	Questionable	Poor	Unacceptable

4. Conclusion

This pilot study found that there is a need to simplifying the questionnaire to make it more understandable and to avoid misunderstanding. The value of Cronbach Alpha is 0.961 for reliability, greater than 0.75, therefore the data under this pilot study is reliable for analysis. In order to develop new 4IR OSH framework, all relevant factors need to be carefully determined. The next stage will be discussed on the main data collection and the chosen elements.

Acknowledgement

We are grateful for the support given by industrial player in answering all questionnaire given.

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Systematic Review on Data Collection Methods for Teaching and Learning IoT Programming

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Abstract –*Internet of Thing (IoT) programming requires a well algorithm design and systematic process of solving problems, which will lead to efficient production, problem based, resources, cognitive tools and many more. So far, the literature regarding teaching and learning for IoT is not systematically examined, updated and reviewed. So this study have conducted an updated, comprehensive review using Systematic Literature Review (SLR) to report data collection methods for teaching and learning IoT programming. Five databases were selected for this SLR to identify related journals of which 21 final papers were systematically reviewed. The findings shows that the quantitative methods were the most common for data collection followed by mix methods and quantitative method.*

Keywords: Internet of Thing (IoT), Systematic Literature Review (SLR), research methods, quantitative, qualitative, mix methods.

1. Introduction

Internet of Things (IoT) is an environment where physical entities are connected and can be accessed by means of internet. IoT is an emerging technology which does not only contribute to industry but also has opened paths for educational institutes to come up with real time solutions [1]. So far, the literature regarding the teaching and learning for IoT is not systematically examined and reviewed. Therefore, we conducted an updated and comprehensive review to report recent research findings regarding the data collection methods for learning IoT Programming in teaching and learning. Section 1 provides an introduction of the project. Section 2 describes the related works while Section 3 on the methodology. Section 4 discusses the results and finally, Section 5 reports the conclusion.

2. Related Works
2.1 IR 4.0

In the Fourth Industrial Revolution (4IR) or Industry 4.0 (IR4.0), there will be a fundamental paradigm shift caused by the combination of Internet technologies and future-oriented technologies. Since Germany announced IR4.0 in 2011 and promised to bring remarkable benefits to the manufacturing industry worldwide, many countries have rushed to launch similar initiatives. For example, the United States of America

has launched a similar initiative called Smart manufacturing while China revealed a national 10-year vision called "Made in China 2025" to transform China into a world manufacturing power in 2014.Malaysia also introduced National Industrial Revolution 4.0 (IR4.0) which expect to improve the country's productivity by 30% across all sectors by the end of 2030 where Malaysia government has identified five core technologies to strengthen local ability, namely artificial intelligence (AI); Internet of Things; blockchain; cloud computing; and big data analytics.

2.2   IoT Programming

IoT programming involves connected devices which comprise of IoT device, gateway, and a cloud or server. IoT device transmits sensing data acquired by sensors to the IoT gateway via the sensor network. The IoT gateway transmits the sensed data to the cloud via the internet. The sensing data are processed on the cloud with visualization and analysis, causing IoT device actuators to actuate via the IoT gateway. Consequently, with IoT systems, plural elements work together to establish an effective system.

2.3   Methods For Data Collection

Among the   basic types of research are quantitative and qualitative. Quantitative research is based on the measurement of quantity or amount. It is normally used to observe phenomena or occurrences affecting individuals. Qualitative research is concerned with qualitative phenomenon. This research method examines and answers questions of how, where, what, when and why a person would act in a certain way toward a specific matter. Mixed methods research is a type of research that combines qualitative and quantitative research techniques into a single study

Research methods may be understood as all those methods/techniques that are used for conduction of research. Basically three groups of research methods: methods for collection of data; statistical techniques which are used for establishing relationships between the data and the unknowns; methods which are used to evaluate the results obtained (Kothari, 2004). This review will focus on data collection methods related with teaching and learning IoT programming.

3. Methodology

Systematic literature review (SLR) is a process used in identifying, evaluating, and interpreting all available research evidence, aiming to provide answers to specific research questions. SLR results are more systematic and unbiased in obtaining results. The review process follow SLR guidelines by Kitchenhem and Charters (2007). There are three main phases: Planning the Review; Conducting the review; and Reporting. The research question for this review is: *What are the methods and instrument used in data collection for studies related to IoT programming?*

4. Findings

Figure 1 shows the overall process of this SLR and the results for each step. Five databases were selected for this SLR to identify related journals of which 21 final papers were systematically reviewed to answer the research question.
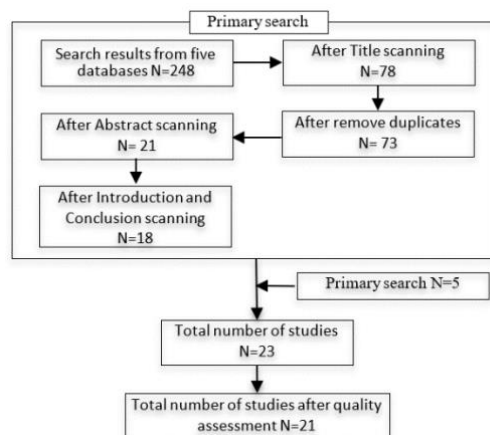
Figure 1: The results for each SLR process

Table 1 shows the 21 final papers for this review.

Table 1: Results of Final Studies

ID	Country	Reference	ID	Country	Reference	ID	Country	Reference
ID1	Japan	Akiyama (2018)	ID8	Hyderabad	Magrabi et al. (2018)	ID15	China	Zhang & Liu (2018)
ID2	Italy	Ardito et al. (2020)	ID9	South Africa	Malele & Ramaboka, (2020	ID16	Israil	Nelke & Winokur (2020)
ID3	Turkey	Avcu & ER (2020)	ID10	Norway	Mavroudi et al. (2018)	ID17	China	He, Ji & Bobbie, (2017)
ID4	United Kingdom	Chin & Callaghan(2013)	ID11	India	Rajashekharaiah (2016) [24]	ID18	Kingdom of Arab Saudi	Attallah et al. (2019)
ID5	Thailand	Chochiang et al. (2019)	ID12	US	Reiss (2019)	ID19	Malaysia	Leong & Letchumanan (2019)
ID6	Amsterdam	Silvis-Cividjian (2019)	ID13	Brazil	Schneider (2020) [26]	ID20	India	Raikar et al. (2018)
ID7	Taiwan	Hsu, Horng & See (2021)	ID14	Canada	de Lima Sobreira et al (2020) [27]	ID21	Italy	Corno et al.(2019)

Based on this review, for teaching and learning IoT programming, quantitative, qualitative, and mixed research methods have being used to collect data. The dominant research method is quantitative (61.9%) followed by mixed method (33.3%) while only one study (4.8%) using qualitative method as shown in Table 2.

Table 2: Methods For Data Collections

Methods	Study ID	Frequency	Percentage (%)
Quantitative	ID5, ID6, ID8, ID9, ID10, ID12, ID13, ID14, ID16, ID17, ID18, ID19, ID20	13	61.9
Qualitative	ID1	1	4.8
Mix	ID2, ID3, ID4, ID7, ID11, ID15, ID21	7	33.3

Quantitative Methods

From this SLR, combination of survey and experimental methods were found the most common data collection for quantitative research. For example, study ID8 which applied active learning environments aimed to promote students' critical thinking regarding IoT programming. In the class, the teachers demonstrated the IoT projects resulting the students to be actively engaged in developing the IoT project. After completed the experiment, survey instruments to assess students critical thinking were conducted. Students conducted a project assignment to build automated plant watering/irrigation system for wireless-based solutions using Design Thinking approach (ID9); students conducted experiments to develop different end-user programming interfaces using basic implementation of IoT programming (ID12). In study ID13, the usability testing being conducted to evaluate block-based programming tools and survey questionnaires were used to evaluate students' perceptions of participation in the activities. The researchers conducted the survey regarding the effectiveness of hands-on and team-oriented learning approaches and problem-solving activities in STEM (ID17). Beside that, ID5 combined survey with test while ID19 used test and experimental.

Qualitative Methods

Findings shows only one study used qualitative method using observation. In study ID1, observations were done on how students constructed IoT system after self-study and attending class using PBL approach.

Mix Methods

Besides utilizing quantitative and qualitative methods, researchers also used the mixed methods which combined the quantitative and qualitative methods. For the mixed method, majority studies used survey and other qualitative methods such as observation, interview and open-ended survey. Study ID4 used survey and observation to know the effectiveness of a novel approach to educate students in computer science. In ID7, the researchers explored how design thinking in an iOS programming course can improve the students' critical thinking, learning motivation and solved practical issues through mobile APP development. Study ID21 conducted a survey on 40 novice student on the difficulty on task and time spend. Open-ended questionnaire used for respondents to give comments on the difficulty of the task. In ID3, the researchers studied how Design Thinking approach can be applied in the processes of teaching programming to 25 gifted students and to reveal its effects on the teaching process. Data were collected through interviews, observations and the Design Thinking Rubric.

5. Conclusion

This SLR provides an overview of research studies on the methods and instrument used for data collection in studies related to IoT programming in education. In this review, the dominant research methods were quantitative followed by mixed methods while only one study (4.8%) using qualitative method.

Acknowledgement

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A Review of Cybersecurity Framework for Cyberattack

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Abstract – *The development of Internet technology is growing rapidly that can contribute to cyber-attacks. Hackers use the Internet as their platform to launch attacks to the target includes the government sector, industry and individuals. One way to help organizations such as government, private sector and individuals protect their information and infrastructure from cyberattacks is to implement a cybersecurity framework. A Cybersecurity Framework is a collection of best practices that an organization should follow to manage their cybersecurity risk. However, various frameworks had been proposed by researchers to prevent cyber-attacks and reduce the damage caused by them. Hence, the purpose of this study is to examine the cybersecurity framework for detecting cyber-attacks on various technologies. The literature review has been used to review the existing cybersecurity frameworks based on various types of cyberattacks. The related cybersecurity frameworks identified can be used by organizations and researchers as guidance and assistance in dealing with cyber-attacks.*

Keywords: Cyber-attacks, cybersecurity framework

1. Introduction

The internet has played an important role in communication technology and become one of the needs for people to complete their daily tasks. However, Internet usage without control can open the door for cybercriminals to launch cyberattacks. Besides, the growth of the Internet of things technology and sophisticated threats with the evolving software malicious were contributed to the cyberattack (Kim & Alfouzan, 2021; Leszczyna, 2021). A cyberattack is a deliberate attempt by attackers to access an individual or organisation's information system (Sudar, 2021). Cybercriminals or attackers look for vulnerabilities in systems as their targets to perform various types of network attacks. The goal is to disrupt the organization's resources which enables them to disable the system security and steal confidential information for their profit. Many researchers has proposed cybersecurity frameworks that can be applied by organization or individual to secure and protect information from cyberattacks. This paper is organized as follows, types of cyberattacks are discussed in section 2. In section 3, the Cybersecurity Framework (CSF) is discussed. Then, section 4 is devoted to the presentation of the results of the study by comparing the existing cybersecurity frameworks to detect the cyberattack. Finally, the conclusion of the paper is presented.

2. Types of Cyberattacks

Several definitions of cyber-attack have been defined by researchers in the previous literature. Derbyshire et al., (2018) have defined a cyberattack as an

offensive action will be launched against cyber infrastructure including computer networks, procedures, cloud computing, software and people. The comparison between cyberattacks, cybercrime and cyber warfare have been done by (Li & Liu, 2021). Cybercrime involved non-governmental attackers that attack computer systems for the purpose of violating criminal law. While cyberattacks and cyberwarfare have similar characteristics where the attack must have political or security purposes that can cause damage and disrupt the computer network. The aim of a cyberattack is to compromise the data's confidentiality, integrity and availability through various methods to perform attacks that are integrated with technological evolution (Bendovschi, 2015)**.** The various attacks have been identified as Table 1.

Table 1: Types of Cyberattack

Types of attack	Methods
Malware	the attacker will attack the target's system by installing unwanted malicious software with the aim of damaging the resources and stealing the information. The most common types of malware are viruses, worms, trojans, spyware, ransomware and adware (Bendovschi, 2015; Choo, 2018; Li & Liu, 2021; Sudar, 2021)
SQL injection attacks	enable an attacker to modify or delete the confidential data in the databases that can affect the integrity of the system (Choo, 2018; Sudar, 2021)
Botnet	The attacker acts as a botmaster who will control the target systems or IoT devices by installing and generating the malware (Sudar, 2021). The most common types of Botnet are phishing, Denial of Service (DoS), Distributed Denial of Service (DdoS) and Brute Force (Choo, 2011, 2018; Li & Liu, 2021; Sudar, 2021)

3. Cybersecurity Framework

Cybersecurity is the protection against cyberattacks for systems connected to the Internet, including their hardware, software, and data (Srinivas et al., 2019). Practical measures to protect data, networks and information from internal and external threats are included in cybersecurity (Li & Liu, 2021). To manage the risk from cyberattack, cybersecurity frameworks have been developed by researchers and organizations. A cybersecurity framework is a collection of documents that includes guidelines, standards and best practices designed to manage cybersecurity risks. It helps organizations and individuals to protect and reduce the risk of exploitation by cyber criminals and attackers (Srinivas et al., 2019). The Cybersecurity Framework (CSF) developed by the National Institute of Standard and Technology Cybersecurity (NIST) become a main reference for many researchers to create a new framework to protect data and infrastructure from cyberattacks (Gourisetti, Mylrea, Patangia, et al., 2020).

Figure 1 shown the five functions or best practices of CSF that include Identify, Protect, Detect, Respond and Recover.

Figure 1 : Five functions of CSF (Framework Documents | NIST, n.d.)

3. Methodology

This paper uses a traditional literature review to identify existing cybersecurity framework industry from a public database such as Google Scholar. The information was derived from previous studies focusing on the cybersecurity framework.

4. Results

Table 2 : Comparison of cybersecurity frameworks

Author	Framework	Type of attacks detection	Description
(Kim et al., 2021)	Offensive Cybersecurity Framework	APT and fileless cyberattack	This framework was focusing on APT and fileless cyber-attack that target organizations, Cyber-physical Systems (CPS) and persons in IoT technology.
(Sohal et al., 2018)	A cybersecurity framework to identify malicious edge device	Malicious edge device	This framework was focusing on detecting malicious edge devices in fog computing and cloud-of-things environment.
(Balasooriya & Fernando, 2013)	Next Generation Security Framework	Botnet	This framework was focusing on IRC-based Botnets, HTTP-based Botnets, Peer-to-Peer based Botnets and Spam generated Botnets.
(Aziz et al., 2020)	Malware mitigation framework	Malware	This framework focuses on managing the three components (people, process, technology) of a malware mitigation system and provides solutions for mitigating malware

			attacks, particularly in the Malaysian landscape.
(Patel et al., 2015)	Data Security Framework	cyberattack	This framework is suitable for a small or medium organization that adopts specific cloud computing services from a software engineering perspective. It was designed based on "Heuristical Theorizing".
(Ismail et al., 2020)	Botnet Analysis and Detection System (BADS) framework	Botnet	This framework focuses on botnet detection through an encrypted channel using machine learning and provides autonomous management to assist network managers to monitor the security of the system.
(Gourisetti, Mylrea, & Patangia, 2020)	Cybersecurity vulnerability mitigation framework through empirical paradigm (CyFER)	Real world cyberattack	This framework focuses on developing a new mitigation system called CyFER by evaluating different aspects of CSF and C2M2 and testing with a real-world cyberattack targeting industrial control systems in critical infrastructure facilities.

5. Conclusion

The increased global reliance on computers, networks, software, social media, and data makes organisations more vulnerable to cyber-attacks. It have a significant negative impact on businesses. Every organization needs a cybersecurity strategy to protect their data and avoid from cyberattack. Existing cybersecurity frameworks have been reviewed and presented as a guidance, helping IT security leaders manage their organization in dealing with the cyberattack.

Acknowledgement

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Current Advances in 3D Bioprinting Technology for Cartilage Engineering and Repair

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Abstract – *3D printing has recently made significant advancements in the treatment of osteochondral diseases by constructing cartilage structures that repair injured tissue. Herein, We emphasise the prominent polymers to make use of the special qualities of these materials, which are ideal for 3D bioprinted cartilage. The in-vivo assessment of the mimic cartilage, including biodegradability and biocompatibility was addressed. Also, this review provides an outlook on future developments for 3D-bioprinting in cartilage repair.*

**Keywords**: cartilage, bone repair, additive manufacturing, 3D bioprinting

1. Introduction

Articular cartilage is a tough membrane of smooth white elastic tissue that covers the ends of bones to create joints(Li et al., 2018). Unlike most other tissues, this cartilage has no blood vessels, neurons, and even lymphatics. They consist of highly specialised cells called chondrocytes and a dense extracellular matrix (ECM). Water, collagen, proteoglycans, as well as a tiny quantity of non-collagenous proteins and glycoproteins make up most of the ECM. Together, these elements assist in ability of ECM to retain water, which would be necessary to preserve its mechanical strengths. The chondrocytes, which arise from mesenchymal cells, take role in the regulation and regeneration of the ECM. Articular cartilage is important, especially for joint cushioning, stress dissipation, and movement. The articular cartilage may fail or become damaged because of trauma or chronic diseases that affect the exterior of the cartilage or joint. Osteoarthritis (OA) may develop from these tissue flaws later. OA, which is impacted by the wear of the joint, is among the most common joint diseases that are encountered today. Articular cartilage restoration has proven to be challenging in orthopaedic therapy because of the cartilage tissue's poor capacity for self-regeneration.

The current standard in cartilage repair materials are metal and plastic prostheses that can mimic the surface of joints. However, these materials are frequently inflexible, restricting the flexibility and agility of the patient. Friction may cause these implants to wear out quickly, causing injury and irritation in the tissues around them. Furthermore, leaching of metallic particles into to the body via implants may have negative consequences such cell damage and toxicity. Among the several

options being considered, 3D bioprinting has become prominent due to a process that allows for exact manipulation of the construction, mechanical properties, and architecture since it improves the bioactive cues to better replicate real cartilage. In this review, we will examine the most recent 3D printing innovations being constructed for joint cartilage healing.

2. 3D-bioprinting Technology

In cartilage tissue engineering, the 3-dimensional process typically incorporates three essential elements: cells, growth factors, and printed scaffolds, which are constructed. There are many 3D bioprinting methods that may be used to create implants for cartilage repair, including inkjet bioprinting, extrusion-based bioprinting, vat polymerization (VP), and laser aided bioprinting (LAB). The most popular 3D printing method for creating components for cartilage tissue engineering is shown in Figure 1. Inkjet and extrusion-based printers are still the most often employed varieties of printers for cartilage tissue engineering applications.
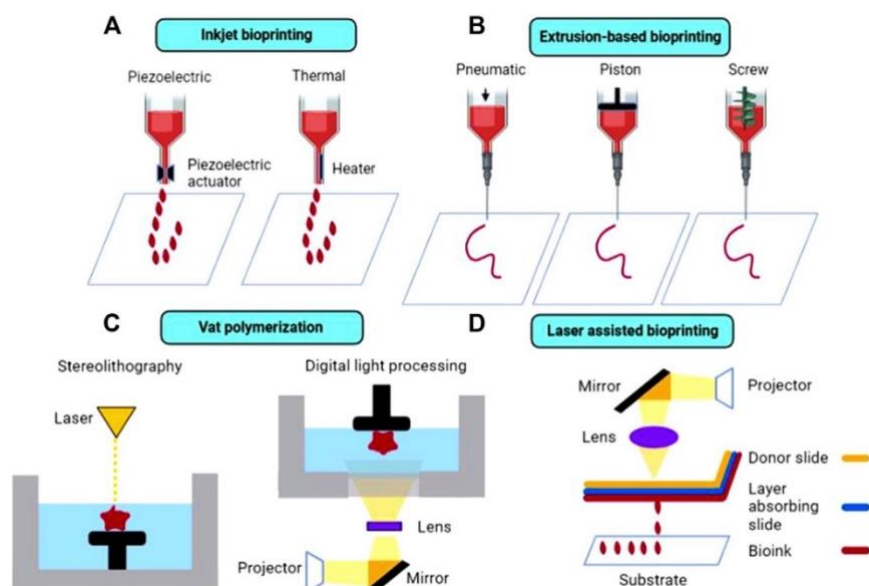
FIGURE 1 Schematic diagram of the most common 3D bioprinting techniques in cartilage tissue engineering, including (A) inkjet bioprinting, (B) extrusion-based bioprinting, (C) vat polymerization, and (D) laser-assisted bioprinting.

Table 1 provides samples of cartilage tissue structures created using various bioprinting processes and biomaterial varieties.

3D bioprinting	Material	In vivo cell	Finding	Reference
Extrusion-based	hyaluronic acid (HA) and alginate	Chondrogenic gene	Increase cell functioning by increasing gene marker expression.	(Antich et al., 2020)
Vat polymerization	Decellularized cartilage ECM and gelatine methacrylate (GelMA)	Chondrogenic gene	The 3D printed scaffold aided cartilage regeneration in the animal model greatly.	(Chen et al., 2019)
Laser-assisted	Collagen and nano hydroapatite	Mesench-ymal stromal cells	Different cell configurations influence bone tissue regeneration.	(Keriquel et al., 2017)
Inkjet	poly (ethylene glycol) dimethacrylate (PEGDMA) and GelMA	Mesench-ymal stromal cells	With low printhead clogging, 3D bioprinted scaffold greatly improved osteogenic and chondrogenic differentiation for strong bone and cartilage production.	(Gao et al., 2015)

3. Conclusions

3D printing is a well-known form of additive manufacturing (AM) in which structures are produced layer-by-layer, allowing again for creation and implementation of patient-specific implants. However, the discovery of polymer blends that effectively match the mechanical characteristics and biomechanics of natural cartilage, as well as compositions that offer excellent load bearing and wear-resistant characteristics, still requires significant research. In addition, in several in-vivo investigations, greater histology values and essentially superior chondrocyte growth were seen after insertion.

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A New Trend in Development: 4D Printing of Hydrogels in the Medical Field

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Abstract – *4D printing is a newly developed method in additive manufacturing (AM) technology that has the potential to duplicate any physical and mechanical flexibility in a product over time. Due to simplicity and easy to fabricate, a hydrogel-forming polymers, such as biopolymers, synthetic polymers, and nanocomposites, have also been widely studied in 4D printing technology. This review seeks to highlight the versatility, breadth, and viability of the hydrogels produced by 4D printing, which is used in a number of biological sectors. The 4D technology is an advanced method in the field of medicine since it can integrate with the microenvironment of the human body. This study review the most recent developments as well as the prospect for 4D printing using hydrogel in the future was also addressed, along with its difficulties.*

Keywords : 4D printing, hydrogel, biomedical implant, smart material, customization

1. Introduction

Any substance that has been fabricated to interact with biological systems in order to serve a medical purpose, to heal or function, is referred to as a biomaterial. Apart from utilizing metallic material, advanced composite and polymers, are used in customised scaffolds. 3D printing has become a popular technology for creating scaffold biomedical devices, such as implants, prosthetic limbs, and surgical instruments (A.N. Aufa et al., 2021a; Sadali & Hassan, 2020). Compared to conventional manufacturing techniques, it is also a fast technology for creating customised parts; however, the static properties constraint does not satisfy the functional needs of biological tissue which involves complexity of human body contraction and relaxation (A. N. Aufa et al., 2021; Nor et al., 2021).

The concept of 4D printing was created by researchers at the Massachusetts Institute of Technology (MIT). They combined a 1D printed strand of hydrophilic polymers into a 3D form using water as the activation energy (Liu et al., 2020). In other words, this 4D printing technique combines 3D printing with intelligent materials, such as hydrogel, which can absorb a lot of water and expand (Hassan et al.; Norhasnan et al., 2021). After a particular loading, the polymeric materials can rapidly regain their original shape from a deformed state (A.N. Aufa et al., 2021b). Additionally, the development of single-materials that may modify their internal stress by altering their shape and primary stress-bearing point is now possible attributed to 4D printing technology (He et al., 2021; Mohd Bakhori et al., 2022).

2. Hydrogel 4d Printing in Medical Field

In modern technologies like 4D printing, hydrogel is commonly used with other materials due to rigidity and unswervable (Hassan et al., 2020). The most popular hydrogel composite materials and their uses in 4D printing are listed in Table 1.

TABLE 1: The common materials of hydrogel and their application in the 4D Printing technique (Li et al., 2020).

4D Printing Technique	Materials	Applications
Extrusion printing	PDMAAm/PNIPAAm, cellulose nanofibrils, Laponite	Tissue engineering, biomedical devices, soft robotics
Extrusion printing	Polyurethane/PHEMA, polyurethane/PNIPAAm	Foldable robots, electronics, biomedical devices
Stereolithography	PEGDA/PHEMA/2-(2-methoxyethoxy) ethyl methacrylate (MEO2MA)	Soft robotics, tissue engineering, actuators
Stereolithography	PNIPAAm, poly(2-carboxyethylacrylate) (PCEA)	Hydrogel actuators

3. 4d Hydrogel Scaffold for Drug Delivery System

The hydrogel mesh gradually shrinking as the temperature rises as the hydrogel capsule containing less water. The pore of the hydrogel serves as a smart release profile for the drug discharged, minimizing interaction between the water and the medication inside the capsule. In boosting the permeability of the capsule for drug release, Larust et al. (Larush et al., 2017) printed pH sensitive hydrogels using acrylic acid monomer, cross-linker (polyethylene glycol diacrylate), and photo initiator (2,4,6-trimethylbenzoyl-diphenylphosphine oxide [TPO] nanoparticles). The pH response of the solution caused a swelling of the hydrogel, which suggests a faster medication release as well as enhancing drug absorption. In order to crosslink GelMA during the hydrogel formation reaction between cyclodextrin and adamantane, Wang et al. (Wang et al., 2019)   created host-guest supramolecular (HGSM) to be utilized as multifunctional crosslinkers to cross-link GelMA during the hydrogel formation reaction between cyclodextrin and adamantane
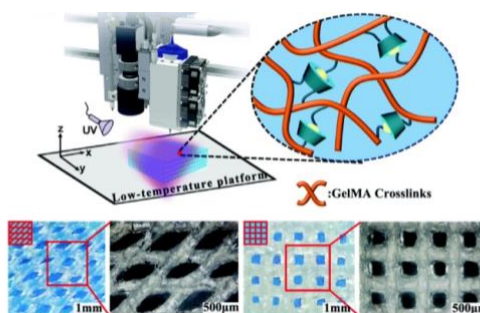

Figure 1: 4D printing of self-healing GelMA hydrogels(Li et al., 2020)

4. Construction 4d Printing Hydrogel for Skeletal Regeneration

Bone defects are frequently caused by diseases or substantial impact on the bone, which might result in fracture. The surgical procedure known as open reduction internal fixation (ORIF) is utilized by surgeons to restore lost bone structure and enhance physiological function. Due to its better osmotic and bone remodeling characteristics following surgery, bone grafting is the most favored approach for bone regeneration. The native anatomical bone has been imitated using a variety of synthetic techniques. The creation of the bone-biomimetic structures has received study attention by utilizing the hydrogel.

GelMA hydrogels not only maintain great biocompatibility and enhanced mechanical strength, but also demonstrate self-healing and 4D printability as ink materials. Xu et al (Xu et al., 2017) synthesised the copolymerization of acrylonitrile, 1-vinylimidazole, and polyethylene glycol diacrylate. Twelve weeks after in vivo, the rat calvaria showed a significant volume of mature bone surrounding the scaffold and an increase in tensile strength.

5. Chondrocytes Regeneration

Hyaline cartilage, elastic cartilage, and fibrocartilage are the three forms of cartilage, which are a smooth, elastic connective tissue (Yang et al., 2022). Compared to bone tissue, cartilage is less capable of self-healing (Champeau et al., 2020). In the knee joint, cartilage can range in thickness from 2-3mm to up to 5mm. Bernal et al. (Bernal et al., 2019) fabricated the 4D bioprinting of GelMA. The study showed that cell viability increased over time, and after 4 weeks of immersion, the cartilage in the in-vitro cell still retained its shape. There were an increased the amount of collagen type I, which makes up most of the fibrocartilage

6. Antimicrobial and Wound Healing Implants

Stents, knee implants, and vascular grafts are examples of the numerous biomedical polymeric implants that are used in the healthcare sector (Malekmohammadi et al., 2021). Antibacterial or biofilm growth on the device's surface is still a problem with biomedical implants, though (González-Henríquez et al., 2019). To be effective against microorganisms, a 4D printed implant must be biocompatible and antibacterial. The hydrogel is an optimal choice for cartilage regeneration since its osmotic force is identical as the aggrecan of cartilage.

7.Conclusions

Despite having many benefits, 4D technology nevertheless has several drawbacks. As a result, 4D printing must be able to incorporate as smart materials. Novel composite hydrogels must also be created to enhance the mechanical and physiological stability of hydrogels, as well as to lessen cytotoxicity and unfavorable responses upon in vivo implantation.

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Effect of Energy-director in Ultrasonic Welding Technology for Joining Composite Materials

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Abstract – *Ultrasonic welding of dissimilar composite s has gained much importance within the industry due to its reasonable price and significant great quality. In this review, the effect of the energy director (ED) that is used in ultrasonic joining was investigated. Several types of ED, such as triangular, semi-circular, rectangular, and flat, were used to improve the bonding characteristics of composites. Because of its simplicity, flat ED is recommended, whereas triangular and semi-circular ED could provide a high lap shear strength. However, there is still no conclusive evident from earlier investigations.*

Keywords: energy-director, ultrasonic welding, composite, thermoplastic

1. Introduction

Composite materials are known as the unique material that may deliver substantial qualities like a light weight and significantly high specific stiffness. Besides, in comparison to traditional metals, it is employed widely in aviation, automotive, maritime, transportation, sporting good, and a range of other applications. This is due to its superior wear resistance, impermeable, resistance to corrosion, and fatigue life when compared to other materials. However, there are still some associated obstacles when used in the industrial such as the inability to recycle, non-biodegradability, brittleness, and difficulty in repairing. Many industries have made the transition from conventional metal to composite structures during the last few decades, yet composite assemblies using traditional mechanical joining are still problematic. It has been reported that employing mechanical fasteners to assemble composites in an aeroplane might increase the overall weight by 19 to 42% (Bhudolia et al., 2020). Thus, the effective and simplified fusion bonding has the capacity to lessen cost of production.

Ultrasonic welding offers a wide range of industrial applications. They are used in the sectors such as car manufacturing, aircraft, biomedical, semiconductor, and electronics. In industries, this technology is the favourite due to its method of mass production. The dynamic vibration in ultrasonic welding causes a temperature rise in the joining zone, and polymers can be transformed with the addition of temperature and pressure. Thus, ultrasonic welding is the best option for integrating thermoplastic polymers, as the thermoset isn't feasible regenerated with the application of heat or force. The primary characteristics that influenced thermoplastic polymer joining were the energy direction, weld time, frequency/amplitude usage, and welding pressure.

In this review, the effect of energy director for joining composite materials are discussed. The current trend of the study in ultrasonic welding technology is also explored in the last part of article.

2. Effect of Energy Director

In the ultrasonic welding of thermoplastics, thermal generation is among the most important components produced at the interface because of the viscoelasticity process. A bulge on the surface of composite is required to produce a good adhesion between the composite layers when ultrasonic energy is induced at the contact area. For this, advanced forms of energy directors (EDs) such as semi-circular, flat or sharp triangular is utilised. Figure 1 illustrates the energy director setup for use in ultrasonic composite joining. ED could improve quality of the weld, while simultaneously accelerating and improving the welding process.
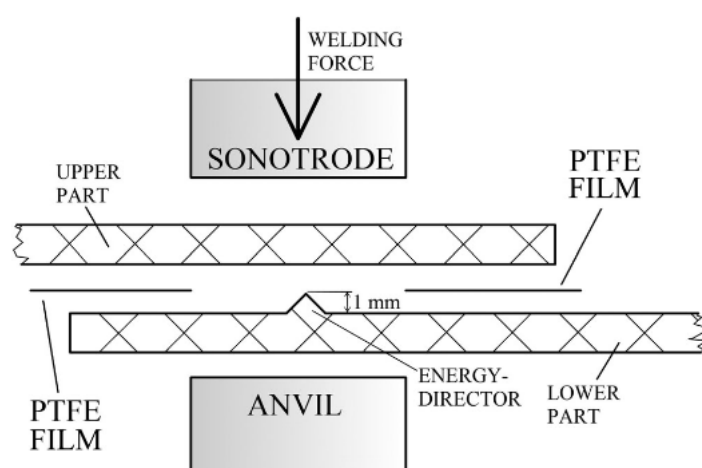
Figure 1: Schematic diagram of the location and geometry of the energy director setup for ultrasonic composite joining.

The composite responses subjected ultrasonic wave during welding process was evaluated by Lionetto et al. (Lionetto & Maffezzoli, 2008). They stated that at lower temperatures, during the initial ultrasonic welding phase of composites, they are in the glass state region and the composite is still stiff. The temperature at the interface layer rises when they are exposed to sinusoidal vibrations. Then, The elastic modulus decreases when it reaches the glass transition temperature (Tg). Further increasing the temperature, less force for composite deformation requires. Here, composites tend to change from glassy to a rubbery state, where molecular components are stimulated. However, the molecular mobility remains difficult due to friction, resulting in composite swelling. Further, as the heat increases above Tg, the modulus of an amorphous polymer decreases leading to a reduction in viscosity. Then, semi-crystalline polymers soften, while amorphous phase flow more freely. The composite still acts in a solid state region until it reaches the melting temperature (Tm). They also said that the polymer chain, heat melt, stiffness, chemical composition, and permeability are factors that contribute to the bonding of composites during ultrasonic welding.

The melting temperature is related to the amount of energy needed for bonding. The higher the melting temperature, the larger the proportion of ultrasonic energy required. In addition, the transmission of ultrasonic energy is influenced by the stiffness of the material, while temperature and flowability of the composites effect the joining properties of different polymers. A melting temperature differential of less than 22°C and chemical compatibility element are required for better welding of dissimilar composites. Further, ED improves the weld joint by making the bond between composite layers stronger. Table 1 displays previously published research on the influence of the ED in ultrasonic welding of dissimilar composites.

Table 1. Summary of published research on the influence of the ED in ultrasonic welding of dissimilar thermoplastic composites.

No	Matrix	Fiber	Type of ED	Finding	References
1	Nil	Glass fiber/ polypropylene (PP)	Triangular, semicircular, and rectangular	Triangular of ED offered a highest bonding of PP	(Liu et al., 2001)
2	Nil	Glass fiber/Nylon 6	triangular, semicircular, and rectangular	Semicircular energy directors were found to weld parts of the highest strength	(Liu & Chang, 2002)
3	Polyphenylene sulfide	Carbon fiber-reinforced polyphenylene sulfide (CF/PPS)	Four triangular ridges and flat	Flat energy directors simplify the ultrasonic welding process.	(Fernandez Villegas et al., 2015)
4	Polyphenylene sulfide	Carbon fiber-reinforced polyphenylene sulfide (CF/PPS)	Flat (0.08, 0.16, 0.24 mm)	High weld strength is enabled using very thin ED.	(Senders et al., 2016)
5	Polyetherimide	Carbon fiber/polyetherimide (CF/PEI)	Flat (0.5, 0.25, 0.06 mm)	Thick energy directors offered a lap shear strength of above 30 MPa.	Palardy et al. 2017(Palardy & Villegas, 2017)

4. Conclusions

Mechanical fusion joining, namely ultrasonic welding, is the most advanced method for joining dissimilar composites. The primary characteristics that influenced ultrasonic welding were the ED, weld time, frequency/amplitude usage, and welding pressure. ED has a significant role in improve the bonding of the composite. However, there is no clear conclusion from earlier investigations.

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Significant Role in 4D Printing of Hydrogel for Tissue Engineering Applications

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Abstract – *Currently, 3D printing is being used to fabricate artificial organs and biomedical devices like fracture fixations. However, the rigid and static structure of 3D printing is unable to replicate the intricate, contract and relax-involved structures of human tissue. To solve this problem, biomedical applications of four-dimensional (4D) additive manufacturing (AM) have begun to fabricate highly printable shapes. Due to its many applications, hydrogel is one of the materials most frequently utilised in 4D printing. This paper reviews the uses of hydrogel 4D printing for tissue engineering in the biomedical industry as well as a brief introduction of the technology. Additionally, a summary of the development of smart hydrogel printing in the future was also provided.*

Keywords: additive manufacturing, tissue engineering, 4D printing, hydrogel

1. Introduction

Since its initial demonstration in 2013, 4D printing has drawn a lot of interest from researchers working on projects involving smart materials and artificial organs in the medical industry. Smart materials were used in 4D printing in order for it to respond to changes in stimuli like osmotic pressure, heat, and other energy sources (A.N. Aufa et al., 2021a; A. N. Aufa et al., 2021). Like 3D printing, layer-by-layer fabrication is a component of 4D printing. The most popular filament material for 4D printing is polymer, which is melted by the heating unit to enable layer-by-layer construction on the building platform (Hassan et al., 2020; Hassan et al., 2019). Compared to 3D printing, 4D printing is a dynamic AM process because of its ability to regain shape in response to the right stimuli (A.N. Aufa et al., 2021b).

2. Skeletal Tissue Engineering

In addition to being incredibly complicated and laborious, tissue-engineered scaffolds contain chemical solvents may be detrimental to biological function(Joshi et al., 2020). Therefore, an efficient, solvent-free technique is required to enhance scaffold creation. Anatomical bone made of calcium ions is very tensile and mechanically strong. Therefore, the hydrogel printed must be compatible with bone tissue's characteristics. Several studies concentrated on the creation of bone tisse hydrogel with the inclusion of poly(-caprolactone) (PCL) and poly (propylene fumarate) (PPF).

3. Epidermis Tissue Engineering

The largest and most prominent soft tissue in the human body is the skin. The majority of 4D printing technologies concentrated on the fabrication of entire skin constructs using skin tissue engineering to treat burns or wounds (He et al., 2021). Collagen strengthens skin tissue, however in 4D printed, it is difficult to print and required a long time to cross-link the collagen. Due of its ability to heal wounds and its antibacterial qualities, chitosan hydrogel is commonly chosen. Alginate, gelatine, Gelatine Methacryloyl (GelMA), and fibrin were the focus of previous research on the production of 4D printing.

Pourchet et al. (Pourchet et al., 2017) produced human skin by bioprinting alginate. The outcome demonstrated that the implant bioprinting was morphologically like human skin. The skin which is made up of the functional skin barrier proteins cytokeratin 10 and filaggrin. The bioprinting's immunohistology study revealed a variety of proteins in the extracellular matrix. Chen et al (Chen et al., 2018) printed a hydrogel made of methacrylic-anhydride-modified gelatine (GelMA) . The Hydrogel transformed into a transparent hydrogel after being submerged in phosphate buffered saline, (PBS) as shown in Fig. 1. The sample swelled with a 400-um microporous structure that may maintain a moist and aponia environment for the wound healing mechanism.
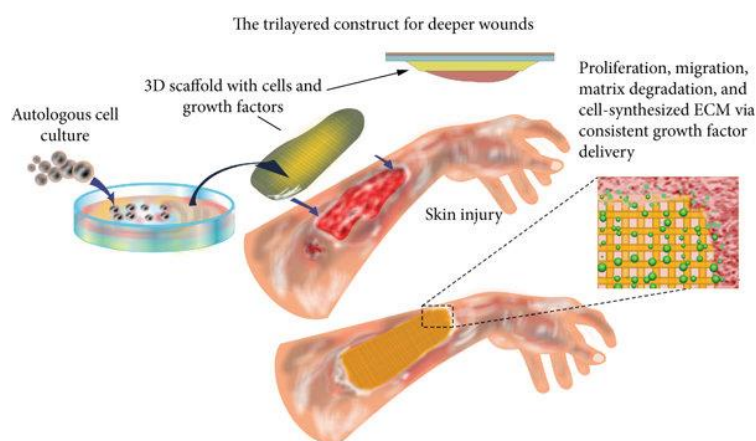
Figure 1: Stem cell technology (Kaur et al., 2019)

4. Blood Vessel Tissue Engineering

Vascular tissue is being produced on a massive scale to satisfy clinical needs as part of the development of regenerative medicine(Champeau et al., 2020). Blood vessels, which can be categorised as arteries, capillaries, or veins, filter most human tissue(Malekmohammadi et al., 2021). They serve as a transport and enable the exchange of nutrients and ions inside of the human body's organs and tissues. Printing microchannels for vascularization or protease-degradable peptides was done by Song et al. The enzymatic destruction of the support structure revealed "angiogenic sprouting" in the endothelial cell-seeded microchannels. Figure 2 shows the vascular network produced in Kolesky et al (Kolesky et al., 2014) using a GelMa/fibroblast hydrogel matrix. As a result, the matrix that was subsequently dissolved
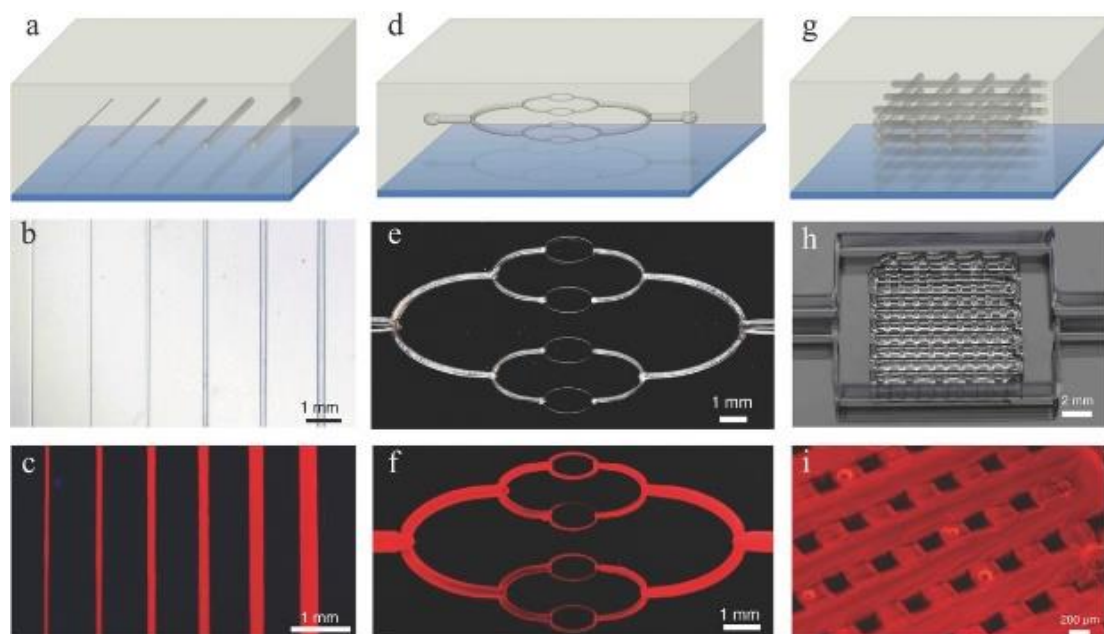
Figure 2: Schematic illustrations, optical images, and fluorescent images of embedded vascular networks that are printed, evacuated, and perfused with a water-soluble fluorescent dye(Kolesky et al., 2014)

5. Conclusions

The use of 4D printing is heavily reliant on the production of tools and systems in the biomaterials and tissue engineering domains. Metals and polymers that respond to stimuli are widely used in the biomedical industry. 4D printing creates incredibly useful, practical, viable, dynamic, and responsive systems for tissue engineering applications by integrating material and responsiveness in a biomedical device. Even the materials are currently well established, there are still certain limits in the medical industry that needed to be explored.

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User Experience on The Efficiency of Digital Library

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Abstract – *Digital library is one of the services that is provided by academic institutions. However, digital libraries still face issues such as interface, network issues or efficiency. The purpose of this study is to evaluate the efficiency of the digital library. A total of 40 postgraduate respondents from Universiti Teknologi Malaysia were participated in this study. The efficiency of the digital library was measured by task completion; time taken and task easiness using a survey questionnaire. The findings show that the majority of respondents used the digital library based on a weekly basis and the participants found the digital library is efficient even though some participants are having difficulty using the Advanced search.*

Keywords: user experience, digital library, efficiency

1.   Introduction

Residing from a 21st century era where technology has taken a leap, almost everything is available through a click away. Even for book lovers, the hassle of physically acquiring books or materials and borrowing or purchasing a book from a library, has now become a click away via digital libraries. Digital libraries may have been around for quite a period but are getting rather common now. The digital library is a collection of services, collection of information objects, supporting users with information objects, organization and preservation of those objects, availability directly or indirectly, and electronic/digital availability. The primary objective of digital library is to improve the access as well as it also includes the cost saving, preservation, keeping peace with technology and information sharing (Kalisdha & Suresh, 2017). However, digital libraries still face issues such as interface, network issues or efficiency. The purpose of this study is to evaluate the efficiency of the digital library. This paper is organized as follows: Section 1 provides an introduction of the project. Section 2 describes the related works while Section 3 on the methodology. Section 4 discusses the results and finally Section 5 on Conclusion.

2.   Related Works
2.1   Digital Library

For centuries, libraries have been the distributors and keepers of journals, books, articles, and other materials. With so much of materials, a digital library serves a purpose mainly in the development of collecting, storing, and organizing materials in digital form (Bamgbade et al., 2015).The beginning of digital libraries was in the 1990s which was later introduced to better innovation and development by technology (Xie et al., 2020). A digital library as opposed to a traditional library, is a collection of digital

content that could be anything of text, audio or video stored in electronic format such as full-text journal articles, e-books, examination papers, sound recordings, music collections, online databases, theses and dissertations (Berni & Borgianni, 2021).

2.2 User Experience

Don Norman coined the term "user experience" or known as UX which is how a user interacts with and experiences a product, system or service (Norman, 1988). The international standard on ergonomics of human-system interaction, ISO 9241-210, defines UX as "a person's perceptions and responses that result from the use or anticipated use of a product, system or service" (DIS, 2010). The ISO definition summarizes somehow what is stated by the literature including all the users' emotions, beliefs, preferences, perceptions, physical and psychological responses, behaviours, and accomplishments that happen before, during and after the experience.

UX is the result of a system, product, or service's brand image, manifestation, function, system performance, interactive behaviour, and auxiliary capability. The UX also stems from the user's internal and physical state, which comes from the user's previous experience, attitude, skill, ability, and personality, as well as the environment. The basic model of UX can be demonstrated as illustrated in Figure 1. UX is the user's own, subjective experience, emotions, and reactions as a result of the interaction with an artifact.
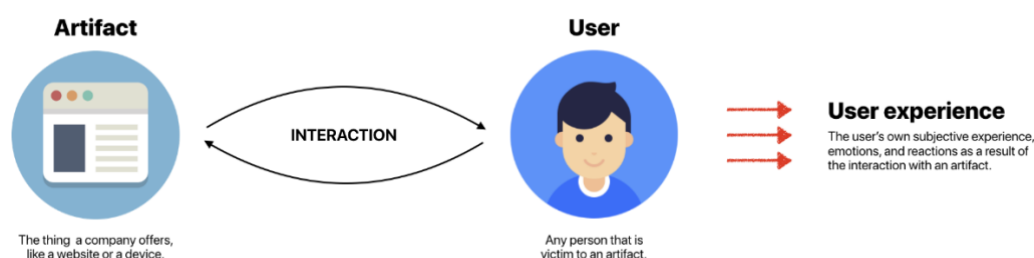
Figure 1: User Experience (Norman, 1988)

2.3 Efficiency

Efficiency is closely related to UX where efficiency can be defined as the characteristic of any product or service to work fast and swiftly. Any service which is organized and practical, may be deemed as efficient (Sasongko et al., 2016; Samadi & Masrek, 2015). The efficiency can be measured by quantifying the elements of performance such as time, accuracy rate and steps to complete tasks (Veitch, 2019; Omotayo & Haliru, 2020; Joo, 2010).

3. Methodology

The population of this study consisted of postgraduate students from three faculties at UTM Kuala Lumpur. The postgraduate students were chosen because the nature of their learning process requires them to engage heavily with digital libraries. As compared to undergraduate students, postgraduate students are required to do academic research and publish their research work either in journals or conference proceedings. In the process, they will rely heavily on the digital library for obtaining academic literature for supporting their research activities. In this study, the efficiency

of user experience using the UTM digital library was measured by task completion; time taken and task easiness. In order to measure the efficiency, four tasks were assigned to participants:

Task 1: Find research papers with the keyword 'machine learning'.
Task 2: Find research papers with the keyword 'machine learning' again and refine the search to papers after the year 2010, and open access papers.
Task 3: Apart from IEEE, find two other academic databases.
Task 4: Download any paper from any database.

4. Findings

As shown in Table 1, a total of 40 respondents were involved in this study and the majority are males (55%) and majority are postgraduate students from FTIR (70%). As for the level of education pursued, 27 students equivalent to 67.5% indicated Masters while the remaining 13 students equivalent to 32.5% marked PhDs. With regards to the frequency used of the digital library, the majority indicated they have been using the digital library on a weekly basis (45%) and only 7.5% used it on a daily basis. Quite many students only sometimes access the digital library (37.5%).

Table 1 : Demographic Profile of Respondents

Characteristic	Item	Frequency	Percentage (%)
Gender	Male	22	55
	Female	18	45
Study level	Master	27	67.5
	Doctoral	13	32.5
Nationality	Local	28	70
	Foreigner	12	30
Age	20 - 25	7	17.5
	25 - 30	19	47.5
	30 - 35	7	17.5
	35 - 40	7	17.5
Faculty	FTIR	28	70
	AHIBS	3	7.5
	MJIIT	4	10
	Others	5	12.5
UTM library usage	Everyday	3	7.5
	Weekly	18	45
	Monthly	4	10
	Sometimes	15	37.5

Task Completion
Table 1 shows the findings on task completion where respondents were able to complete Task 1, 2 and 4 with a completion rate higher than 80%. However, for Task 2 where the respondents expect to use the Advance Search to refine the search results, the completion rate was lower than 80% which is 77.5% and nine respondents were not able to complete this task.

Table 1 : Task completion

Answer	Task 1	Task 2	Task 3	Task 4
Yes	92.5	*77.5*	87.5	90
No	7.5	**22.5**	12.5	10

Time Completion
Table 2 shows the time taken to complete the tasks. Findings show that respondents need more time to perform Task 2, 3 and 4 where almost one-fifth of respondents need more than 90 seconds to complete this task. This suggests that maybe respondents are not very efficient to use the Advance Search and filter to refine the search results. Respondents also need more time to find other databases and download any paper from any database.

Table 2 : Completion Time Taken

Answer	Task 1	Task 2	Task 3	Task 4
< 30s	45	27.5	27.5	32.5
< 60s	27.5	27.5	22.5	30
< 90s	10	20	30	17.5
> 90s	17.5	**25**	**20**	**20**

Task Easiness
Table 3 shows the findings on task easiness. Consistent with the previous findings, Task 1 is the easiest task. Task 3 which expects respondents to find two other academic databases is the most difficult task most probably because the respondents find difficulty to locate the proper menu.

Table 3 : Task Easiness

Answer	Task 1	Task 2	Task 3	Task 4
Most difficult	5	10	**15**	10
	5	20	15	5
	12.5	15	17.5	22.5
	32.5	30	27.5	32.5
Easiest	45	25	25	30

5. Conclusion

The objective of this paper is to evaluate the user's experience on the efficiency of the digital library. A total of 40 postgraduate respondents were involved in this study. Based on the findings of four tasks that were assigned to participants, several recommendations are identified. Basically, the participants' interactions with the digital library and digital resources are relatively mature and high. However, some participants maybe not be familiar with using the Advance Search to refine the search results. Besides that, quite many respondents seldom access the digital library. Drawing upon the findings of the study, among recommendations, the authorities of the libraries should have alternatives to increase or intensify the amount of digital library use among users, in particular, the postgraduate students by providing training and promotional campaigns to users.

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Project Cost Overruns in Plant Modification Project

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Abstract *–Achieving cost accuracy in plant modification projects have always been a challenge. Considering today's low oil price, it is crucial for operators to optimize their CAPEX spending, improve on the cost performance and gain high return on investment (ROI). Unfortunately, plant modification project execution involves many challenges due to constraints and unknowns in the existing plant facilities. The aims of this study are to determine the causative factors of project cost overrun and effective steps to mitigate cost overrun in managing Plant Modification project.*

Keywords: cost overruns; cost control; cost management; and project cost

1. Introduction

Over the years, project completed within the approved budget has declined. Various factors were identified as the main contributor resulting higher cost at completion against the approved budget. Cost management specifically cost control is therefore particularly important for ensuring cost efficiency. Despite the implementation of cost control strategies and software, it is also necessary to define reduction measures to address or at least enhance the cost performance of a project.

Achieving cost accuracy in plant modification projects have always been a challenge. Considering today's low oil price, it is crucial for operators to optimize their CAPEX spending, improve on the cost performance and gain high return on investment (ROI). Unfortunately, plant modification project execution involves many challenges due to constraints and unknowns in the existing plant facilities.

The oil and gas sector has been playing a significant role in aggregate economy of the country in term of its contribution to revenue generation, capital formation and employment creation which ultimately support the gross domestic product (GDP) and the socio-economic development of Malaysia. Department of Statistic Malaysia (DOSM) reported that in Q2 of 2020, 22.3% of Production sector's GDP contributed by manufacturing sector which include petroleum and chemical industries (DOSM 2020). Therefore, it is crucial to identify main cause resulting in cost overrun of Plant Modification project.

2. Causative Factors of Cost Overrun

Cost overrun factors can be categorized into several groups, (Pall et al. 2019) suggested to categorize based on eligibility of compensation:
    a) non-compensable factors include inevitable events due to involvement

of external stakeholders or nature and
b) compensable factors such as events that can be prevent.

Meanwhile (Syed M. Ahmed et al. 2013) had categorized the factors based on causative factor:
a) Trigger by internal - events caused by project stakeholders internally.
b) Trigger by external – inevitable events caused by other parties.

Based on extensive literature review, other researchers had also refined and categorized the factors into several groups based on the relevant factors of the cost overrun factors.

Table 1- Groups of cost overrun causative factors.

Sources	Groups of causative factors
Le-Hoai *et al.* (2008)	Owner, consultant, contractor, material/labour, project and external
Ameh *et al.* (2010)	Environmental, construction, construction item, cost estimation and financing
Aziz (2013)	Owner, designer, contractor, miscellaneous
Derakhshanalavijeh & Teixeira (2017)	Owner, consultant, contractor, project, and material/labour
Niazi & Painting (2017)	Client, contractor, consultant, labour, material/equipment and external
Zewdu & Aregaw (2015)	Cost estimation, construction item, project participant, environmental and financing
Polat *et al.* (2014)	Contract, time, cost, quality, human resource, communications and risk

Based on interview conducted, this study identified most frequent cost overrun is due to scope of work. Inadequate feasibility study contributes to unclear scope of work of a project. This factor will then cause inaccurate cost to estimate due to high uncertainties or risk. It will also cause scope growth during the execution stage which also result in higher project cost at project completion. Incomplete feasibility study or project definition also trigger project owner to keep on adding new scope at later stage, worst if the new scope added after contract awarded.

The second causing factor is lower budget sanctioned by project owner. Plant Change project is always seen or treated as small and simple project which does not require proper planning. This assumption is proven wrong, though the value might acquire small budget and less complex as compared to other Capital project, however, still requires proper project management process specifically the cost control to ensure project budget is suffed. Budget sanction amount should consider including the uncertainties of project scope especially when project is executed in live plant. Project management cost should also be allocated based on manpower plan, since Plant Modification project also require almost same effort as Capital project. Lower cost contingency is another factor identified as main contributor to cost overrun of Plant Modification project. In relation to incomplete scope of work, more risks are identified unfortunately only some were quantified and included in budget sanction. Budget owner usually allocate certain percentage of contingency without referring to the quantified risk.

Request for cost estimate development frequently comes at the very last minute to meet the budget cycle submission deadline. Thus, the preparation done in limited time without proper site visit for validation and survey. Since the scope of work is also not properly defined, most of the times cost engineers are only able to prepare factor estimate for the submission. Due to this, cost contingency should base on the probability from Cost Risk Analysis. A study by Rui recommended to develop detail project development to quantify risk based on project specifications to obtain good cost performance (Rui et al. 2017).

3. Cost Overrun Mitigation Steps

Due to incomplete scope of work produced during the Front-End Engineering Design (FEED), a peer review is conducted by other engineers to ensure the deliverables are complete and technically acceptable to proceed with the next project stage. To control the scope creep as request by project initiator a timeline for any additional scope request is agreed. With this, project scope is freeze prior to bidding exercise.

Lower budget allocated without consideration of sufficient contingency to manage the potential risks identified. Hence, both project team and project owner agreed to share the cost performance indicators and carry equal responsibility to manage the project cost. Cost challenge session during the annual budget cycle is an opportunity to the project team in providing basis with detail justification of the budget amount requested. Cost engineer's involvement in cost optimization exercise able to give advice to Finance on the rationale of any budget cut rather than prorate budget cut to meet the annual Capital budget.

Cost Risk Analysis (CRA) has been conducted to quantify all risk and contingency based on the scope developed from FEED. Thus, all contingency is justified in detail and acceptable by budget owner.

Cost engineers refer to their own cost database captured from previous projects instead of subscribed international database. The own developed database is integrated, being shared among them, and frequently updated. Cost engineers has also included cost of common scope such as structural demolition or pipe rack repair in their estimate even the scope is not mentioned in the FEED pack. Material takes off developed by discipline engineers is used as basis of their estimation.

This result is aligned with a study recommended that to avoid cost overruns, it is necessary to determine the mitigation steps to either eliminate or reduce the impact (Ullah et al. 2018). Ullah also mentioned critical mitigations including allocation of contingency or management reserve to avoid a potential over-run of costs, minimize cost estimation errors by delegating prediction tasks to more qualified professionals could improve the efficiency and precision of forecasting performance, incorporating a change management strategy reduce and develop comprehensive cost breakdown and identify a reasonable budget for the project. Another study recommended to develop detail project development to quantify

risk based on project specifications to obtain good cost performance (Rui et al. 2017).

4. Conclusion

It is crucial to mitigate the occurrence from the early projects' stages. Gated process control at project definition stage ensured a project has been well defined. Project definition rating index, PDRI allow projects with passing scores to proceed to the next stage or else the project will need to refine identified deliverables before proceeding to the next stage. Availability of digitalization and data analytics are great tools to be applied in project viability. These able to support management team to improve decision making based on facts dan data.

Many factors were identified resulted in cost overruns. Nevertheless, project team will always be able to control the occurrence with proper cost planning, estimation, budget and an efficient cost and monitoring. It is significant to ensure the four processes are integrated seamlessly. Project information and cost data should be flowing through the processes among cost control personnel. By practicing this, cost control team will be able to detect early indicators to cost overruns and implement immediate action. Mitigation actions is more effective once the issues or problems contributed to cost overruns were identified. Specific action relates to the issue able to avoid cost overruns if it is taken based on early indicators and able to reduce the cost overrun magnitude or impact.

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Gender Differences in Computer and Internet Ethics Among University Students in Malaysia

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Abstract – *Computers and the Internet become important tools for students during the COVID-19 pandemic as physical teaching and learning are shifted to the online platform. Even though computers and the Internet provide support for students learning, the increase in unethical activities such as academic dishonesty and cyber-bullying among students are concerning. The main purpose of this study is to examine gender differences in computer and Internet ethics among Malaysian students. The Mann-Whitney U test was conducted to examine the gender differences in each construct. The result from an online survey of 340 students from public and private universities in Malaysia reveals that there are differences between male and female students in intention toward Internet ethics and fear of consequences. Thus, awareness of computers and the Internet ethics and values should be increased. It is suggested that a topic on computers and the Internet ethics and values is embedded in the courses.*

Keywords: Computer and Internet ethics, gender differences

1. Introduction

In this technologically advanced era, most businesses depend on computers and the Internet for their daily operations, especially during the COVID-19 pandemic. Computers and the Internet become a necessity for students as teaching and learning are shifted to the online platform during the pandemic. Although, the widespread use of the Internet has benefits for students and academic staff, unethical activities using the computers and Internet also increasing among students. Plagiarism, cyber-bullying, digital and software piracy, and hacking (Yoon, 2011) (Lin et. Al, 2022) (Karim, Zamzuri & Nor, 2009) are some common examples of unethical activities done by students.

Even though gender is a common variable used in research regarding ethics, there is a debate about whether women are more ethical than men. Some studies conclude that women are more aware of ethical issues as compared to men (Acilar & YÖRÜK, 2010) whereas some researchers found that gender has no significant impact on an individual's ethical judgement (Glover, 2002).

Covid-19 pandemic recently changed the education landscape where all students worldwide have to rely heavily on the use of computers and internet for their study. Many students are not aware that they do some unethical misconducts when they are using computers and internet. Thus, this study is conducted to examine the differences between male and female students in intention to perform computer and Internet ethics.

This paper is organized as follows. The following section describes the methods used in this study. The results are then presented and discussed in the subsequent section.

2. Methodology

2.1 Survey

A cross-sectional survey was conducted through an online survey questionnaire. The questionnaire was designed in Survey Monkey and was distributed to public and private university students aged 18 to 24 residing in Malaysia through online platforms such as email, WhatsApp, and Facebook messenger. Participants were asked to choose their level of agreement for each statement regarding the intention toward internet ethics. Prior to the analysis, the negatively worded items were reverse coded as 1 (Strongly Agree) to 5 (Strongly Disagree). A total of 340 usable responses are collected in the survey with a response rate of 82.73%.

2.2 Questionnaire

In total the questionnaire has five sections, the first section is about demographic information which includes gender, religion, ethnicity, education level, institution type, field of study, and family income. The second section is about knowledge and awareness to know how much aware the respondent is about internet ethics. In the third section, the respondent is asked a large set of questions and all these questions are about plagiarism and academic dishonesty. The fourth section of the study is about copyrighted media, which is one of the key ethical problems. The last section is about the misuse of IT resources.

2.3 Analysis

The analysis in this study was done using Statistical Package for Social Sciences (SPSS version 25.0). All data were checked for data entry errors, missing data, and inconsistencies. The missing values were imputed using the mean values of the data. Descriptive analysis and Mann-Whitney U test or Wilcoxon rank sum test were carried out to examine the gender differences based on the median scores of each construct (Mann & Whitney, 1947) (Wilcoxon, 1945).

3. Result

3.1 Descriptive Analysis

The study involves mostly female respondents (60.9%) and 39.1% male respondents. The respondents are mostly Muslim (85.0%) and Malay (80.6%), which is the major religion and race in Malaysia. Most of the respondents have a degree (48.8%) or diploma (45.0%) and are from public universities (68.8%) in Malaysia.

Table 3.1 presents the descriptive analysis of the 7 constructs by gender comparison. Most constructs have a similar means for male and female students except Fear of Consequences, Perceived Behaviour Control, and Intention.

Table 1: Descriptive Statistics by Gender

Constructs	Male		Female	
	Mean	SD	Mean	SD
Knowledge and Awareness	2.31	0.79	2.26	0.67
Fear of Consequences	2.27	0.83	2.11	0.71
Perceived Usefulness	2.29	0.93	2.21	0.83
Attitude	2.13	0.92	2.25	0.94
Subjective Norms	2.80	0.79	2.79	0.73
Perceived Behaviour Control	2.23	0.81	2.07	0.62
Intention	2.95	0.83	2.80	0.76

3.2. Gender Differences

Table 3.2 and Table 3.3 present the differences in the response based on internet ethics for male and female students and the Mann-Whitney U test, respectively. Since the data are ordered based on 1 – strongly agree to 5 – strongly disagree, the increase in mean rank shows the disagreement in the ethical statement regarding internet ethics (Note that: all items in Intention, Subjective Norms, Attitude, and Perceived Usefulness are reverse coded prior to analysis). The differences in response in internet ethics based on gender are high in Fear of Consequences, Perceived Behaviour Control, and Intention. However, the Mann-Whitney U test indicates that only Fear of Consequences and Intention have significant differences between gender, while Perceived Behaviour Control is considered the same for male and female students.

Table 2: Mean Rank

Construct	Mean Rank		Differences in Mean Rank (Male – Female)
	Male	Female	
Knowledge and Awareness	173.07	168.85	4.22
Fear of Consequences	183.02	162.46	20.56
Perceived Usefulness	174.71	167.79	6.92

Attitude	164.54	174.33	-9.79
Subjective Norms	170.30	170.63	-0.32
Perceived Behaviour Control	179.14	164.95	14.18
Intention	182.58	162.74	19.85

Table 3: Mann-Whitney U test

Construct	Mann-Whitney U	Wilcoxon W	Z
Knowledge and Awareness	13,423.50	34,951.50	-0.39
Fear of Consequences	12,101.00	33,629.00	-1.93*
Perceived Usefulness	13,205.50	34,733.50	-0.65
Attitude	12,973.00	21,884.00	-0.91
Subjective Norms	13,739.50	22,650.50	-0.03
Perceived Behaviour Control	12,617.00	34,145.00	-1.34
Intention	12,158.50	33,686.50	-1.87*

Notes: *$p < 0.1$

5. Conclusion

The research reveals that there are significant differences between male and female students in intention to perform Internet ethics and fear of consequences. Female students have an intention toward Internet ethics and are more fearful of any consequences regarding Internet ethics as compared to male students. In other words, female students are more likely to make ethical choices regarding Internet ethics than male students. These results are consistent with other studies (Acilar & YÖRÜK, 2010). Since most of the courses nowadays rely on computer and internet, therefore awareness of computers and the Internet ethics and values are very important. It is suggested that a topic on computers and the Internet ethics and values is embedded in the courses.

There is a limitation in this study as the survey was only conducted among undergraduate students. The inclusion of postgraduate students can provide additional information regarding this study.

Acknowledgement

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Enhancing Project Communication through 5D BIM

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Abstract – *Project communication is very important in stakeholders management. Thus, this can be very challenging to manage at portfolio level as the stakeholders are handling hundreds project concurrently. This study aims at analysing communication challenges between stakeholders, with the objectives of how unreliable project information is communicated to stakeholders as a result of poor communication, identifies challenges contributing to the issues, and identify how 5D BIM could enhance the way stakeholders disseminate project information. The broad literature evaluation of case studies on project communications and stakeholder management that was used as the framework for the research technique. In light of the fact that project nature is becoming increasingly tough and demanding, it is critical for project organisations to place greater emphasis on effective communication in addition to project progress and performance.*

Keywords: 5D BIM; project management; project communication; and stakeholders

1. Introduction

An effective communication in a project means information is available when needed and the right information is passed to the stakeholders on timely manner. The communication flow can be difficult depends on the project's complexity. It can be done in a formal and informal way depending on the need and scenario. Organizational, contractual, or technical matters shall be issue thru formal route which usually involves external stakeholders. Communication is the backbone of project management, which necessitates integrating and informing the entire team on the project's cost, scope, timeline, and overall quality standards (Zulch, 2014). Communication within the project management team could be more casual and informal and usually more effective as compared to the earlier. According to a conceptual definition communication is information conveyance through messages that have many meanings and are sent from one person to another, or from one group to another.

Almost certainly, more errors occur in a project as a result of poor communication than any other factor. For one reason or another, ideas and instructions are frequently misconstrued, misread, misheard, or simply disregarded; in other words, the communication system has failed. Each communication entails the presence of a sender and a recipient. The sender is responsible for ensuring that the communication is unambiguous and clear, while the recipient is responsible for ensuring that the message is appropriately received, interpreted, confirmed, and acted upon. Communication is the major technique to get information across stakeholders, so it is highly vital in a project (Saxena & McDonagh, 2021).

Most stakeholders believe that communication management is critical to a project, however there are project managers do not follow or prioritise the communication procedures and practises that are formalised in the organization's project management methodology(Muszyńska, 2015). Realizing the importance of communication in a project, this paper examines issues on project information flow as a result of poor communication, identifies challenges contributing to the issues, and identifies how 5D BIM enhance dissemination of project information among stakeholder.

2. Literature review

A communication event occurs when information is transmitted, and a common understanding is generated from one party to another; this event requires the participation of both the sender and the receiver. The process that begins when a sender transmits information to another receiver is referred to as encoding. The latter refers to the person who receives the information and decodes the information he or she received. Information is sent through a medium as communication carrier. Noise may cause the information sent to be incompletely decoded, resulting in the information received being unclear or distorted. As a result of this, the receiver may ask for clarification or confirmation, which is referred to as feedback. (Lunenburg 2010). The whole communication process described is illustrated in Figure 1.
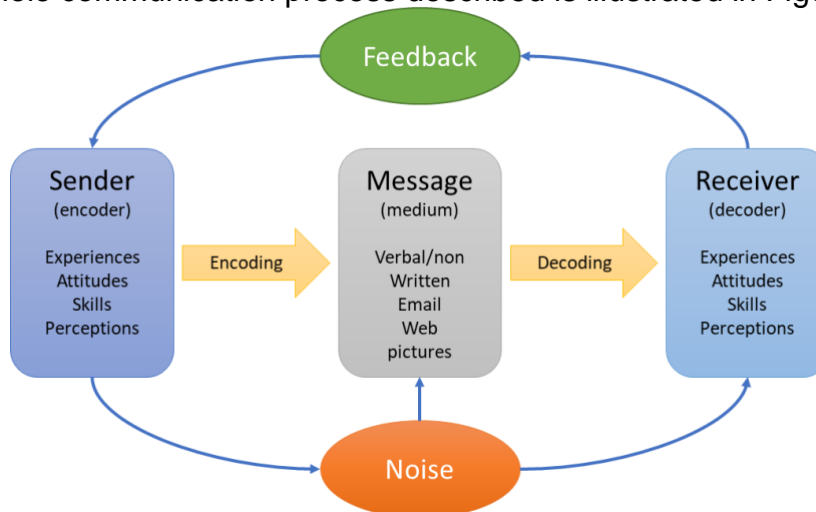
Figure 2 - Communication process

Any interruption or disturbance occurs through the communication process induce ineffectiveness of the process. Information should be exact, clear, and understandable, the chosen medium should be acceptable and facilitate good communication (Lunenburg, 2010). Project management team adopted various of method and tool for communication which give different impact to the project and stakeholders as the information receiver. Most project organization adopted same communication practices starting with communication planning. Although communications plans are not a common practise in the projects, 91 percent

respondents stated that their existence benefited the communications process (Carvalho, 2008).

2.1. Issues on project information flow

Issues will arise in project information flow when stakeholders unable to deliver precise information timely to the right person. Communication problems identified in managing construction were the information quality, incompetent and people attitude and organizational structure (Pozin et al. 2018).

On construction projects, poor management and leadership skills, inadequate training and undertrained workers, a lack of support for advanced communication technologies, malfunction and/or use of antiquated technology, inadequate communication skills, inappropriate channels for communication, an ineffective reporting system, a lack of concentration and work pressure, unclear goals and objectives and responsibilities, and unclear ethical and cultural norms are the main causes of poor communication (Chidiebere 2018).

Frequent issues in project communications are due to unavailability of communication plan (Carvalho 2008). The communication plan is a life document that requires updates as the project progress to ensure the document relevancy to project phase (Danku et al. 2019).

2.2. Challenges in disseminating project information among stakeholders

One of the most difficult tasks a project manager faces is establishing trust among team members. The second issue is to maintain the level of trust that has already been developed in order to prevent it from being lost. Members of the team keep their genuine sentiments hidden and are not interested in assisting one another. One of these factors is the fact that team members come from a variety of cultural backgrounds, which facilitates successful communication (T Dreesen et al., 2016). In psychology, trust is a psychological notion or statement that is subjective (i.e., non-objective in nature). A person's capacity to develop and sustain relationships is an interpersonal talent that may be developed through time via interaction with others (Newman et al., 2019).

Managing stakeholder interactions inside and around each project activity requires striking a balance between divergent stakeholder demands and expectations. The primary communication challenges with stakeholders are caused by information distortion, information delays, miscommunication between critical stakeholders, conflicts between the client and contractors or internal conflicts within the project team, a lack of a single point of contact, and a lack of trust among stakeholders (Rajhans, 2018).

Some stakeholders are working independently and keeping project information at their own system result to scatter project information. Working as a team is crucial rather than in silos. All stakeholders need to improve capability and management skills especially those involve in complex and large-scale projects. Collaboration between

stakeholders must be highly emphasised in order to build trust and make successful decisions without wasting resources (al Nahyan et al., 2019).

Inadequate support for the use of communication technologies can complicate rather than simplify the communication process. Communication technologies should enable shareholders to instantly send precise information. Technical assistance must be given to educate shareholders on how to effectively use this new instrument. Failures in technology have a direct impact on communication in today's technologically dependent society. Information is continually disseminated via the use of technology, even more so when distance between shareholders is a restriction (Hussain et al., 2018).

In project communication, the use of a variety of terms and approaches, as well as the absence of a communication procedure and training, are all considered to be important obstacles, resulting in non-standard practises among stakeholders (Abdul Rahman & Gamil, 2019). The primary barriers to project communication are a lack of awareness of the business advantages of communication and confusing with project management jargon terminology used to deliver project-related information ((PMI), 2016).

3. How 5D BIM Enhance the Project Information Flow

Organizations adopted BIM have a competitive advantage. These benefits include increased cooperation and productivity through simplified process, decreasing rework and early identification of possible issues, as well as better management and liberalization of data created by modelling. BIM processes able to increase data integration from numerous sources and close gap created by digital initiatives which led to better simulations and precise projects (Pereira De Sa and Alfaro 2021).

BIM able to provide clear and precise information which enhance communication and improve stakeholders management (Maliha, Tayeh, and Abu Aisheh 2021). This reduce conflicts among stakeholder from various background and assist them in making decisions from the unified model. Adopting BIM has improved in information transfer of final works inspection protocol and defect management system at housing construction sector (Dubas and Pasławski 2017).

BIM enabled projects has achieved success in social collaboration thru the combination of organizational context, foundational platform, and behavioral context which ensure continuous interaction and positive relationship among stakeholders (Khairil Izam Che Ibrahim and Belayutham, n.d.). BIM gives significant positive impact and improve the quality of communication within various parties despite the differences in locations (-Prof -Ing Dipl -Kfm Dieter Jacob, n.d.). BIM provide connections between construction tasks and stakeholders who need the information (Törmä et al. 2020).

4. Conclusion

Apart from having communication plan in place, this paper finds that effective communication is crucial in driving project progress towards successful delivering on time, within budget and meeting project scope. Project managers to ensure the right communication tools or medium should be wisely chosen depending on the stakeholders and project environment. It is also necessary to inculcate effective communication skills among key project team members to make the process easier overall. Aside from that, implementing new technology or digital tools might aid in increasing data transparency among stakeholders and accommodating the demand for agility in projects, among other benefits. This paper explore how researches identified the ability of 5D BIM in enhancing the flow of project information among stakeholders. As a result of successful and harmonic communication, a sense of trust will emerge among the stakeholders.

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Performance of Adaptive Thresholding Pre-processing for Vehicle Counting

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Abstract – *Due to massive increase in the number of vehicles over the recent years, traffic congestion has become a major problem in the contemporary world. An automatic, efficient, low-cost reliable system for real-time monitoring and management of congestion is required to resolve frequent traffic jams. In a video-based vehicle detection system used to count moving vehicles, it is difficult to achieve accurate vehicle count due to varied daytime illumination. Noise, variation in contrast and different lighting indexes on pixels in the videos also result in erratic vehicle count. This research evaluates the performance of vehicle detection and counting systems under different lighting conditions. The study covers the application of two adaptive thresholding techniques i.e. Mean and Gaussian to counter the adverse effects of different light and illumination conditions in the traffic videos. Performance enhancement in the vehicle count is demonstrated after carrying out simulation in Python integrated development environment (IDE) using computer vision OpenCV libraries. The adaptive thresholding mean and adaptive thresholding Gaussian, archives an overall average accuracy of 89.4% in the vehicle count that has been performed.*

Keywords: *Adaptive thresholding, image pre-processing, vehicle counting, object detection, OpenCV.*

1. Introduction

Vehicle count is a prerequisite for the effective management and control of increasing traffic density due to the influx of private vehicles on roads. In some sectors, vehicle count is still being done manually or mechanically where it is inefficient and prone to human error. A cost effective, automatic system for a reliable and verifiable real-time vehicle count is therefore preferred based on digital image processing systems.

Modern video-based methods have been incorporated for the vehicle count with the deployment of roadside cameras to capture images; later processed by digital image processing techniques to count the vehicles. However, these systems also have certain inherent shortcomings such as error in detection and counting due to environmental factors, causing inaccuracies due to the limitation of the applied algorithms. A reliable counting and classification of vehicles is a challenging task due to varying image resolutions, motion blurs, varied illumination and different light intensities exposures etc.

Images exposed to different illuminations and varied light intensities cannot be detected accurately, as tangible objects. This may lead to inaccurate results. Pre-processing techniques are used for the correction of images with varied illumination

and different light intensity exposure. Computer vision applications for vehicle detection and counting use adaptive thresholding as a pre-processing technique for the input videos. Adaptive thresholding is applied to change the representation of an image for an easier and meaningful analysis. The output is the enhanced image, to enable better accuracy in vehicle count.

In this paper, we evaluate how existing adaptive thresholding techniques perform in terms of accuracy and processing time under different illuminations for vehicle detection and counting. From the literature, large size moving objects and unstable lights causes uneven light distribution in certain images, resulting in inaccurate vehicle detection and counting. The moving vehicles cannot be subtracted from the background images accurately for counting purposes.

2. Adaptive Thresholding for Vehicle Counting in Image Processing

Thresholding deals with the problem of images exposed to different light levels during the day. It is the simplest method to create a binary image from grayscale image. Meanwhile, this method works by adjusting images in varied illuminations and light intensities. Binary threshold is the conversion of an image into a binarized form i.e., if the value of the pixel is lesser than the threshold value, pixel value is converted into "zero" which is represented as black colour. If the value of the pixel is greater than the threshold value, pixel value is converted into "one" which is considered as white pixel. Choosing a fixed threshold value and comparing each pixel to a fixed value is the basic thresholding method known as global thresholding.

The use of global thresholding is not preferred in the varied intensity images as these images have diverse lighting conditions and uneven intensities in different areas. Due to the varied brightness levels and inconsistent intensity, we may lose significant information, which may lead to inaccurate vehicle count results. On the contrary, local thresholding is a separation of pixel values like white as background and black as foreground, after it has been compared with the threshold value.
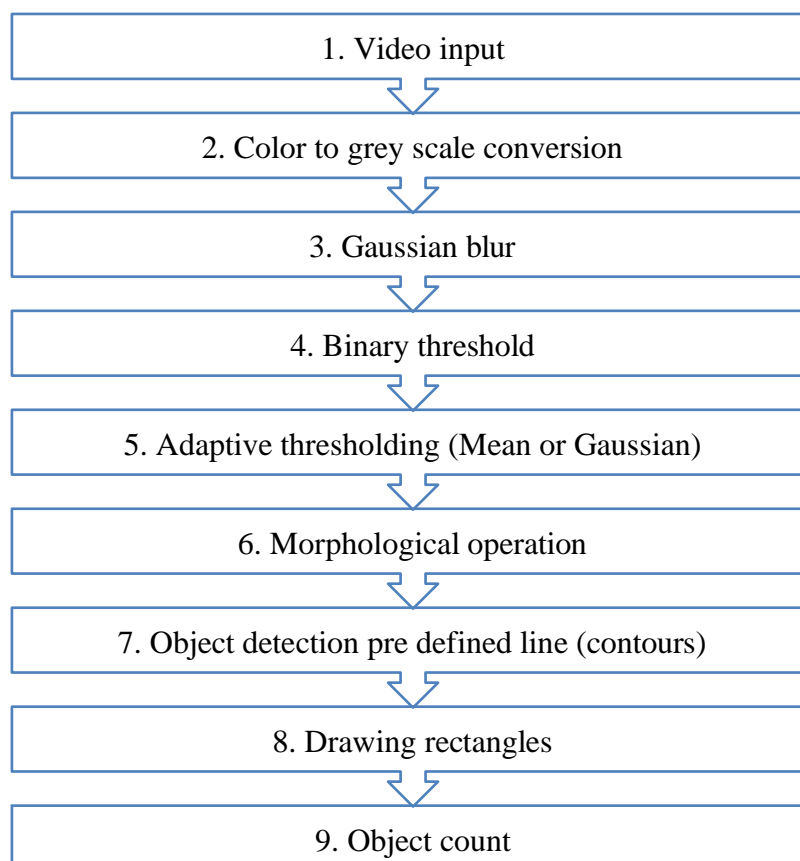
Adaptive thresholding is a technique when a different threshold value is computed for each pixel by calculating the average of a rectangular window of pixels centred around each pixel (Payel Roy, 2014), (Siti Norul Huda Sheikh Abdullah, 2016). This technique is implemented to adjust the images exposed to different light levels. Local and global thresholding compromise accuracy as they only consider intensity of pixels and ignore the neighbourhood information of the pixel values. By using adaptive thresholding pre-processing technique, more accurate vehicle detection and counting can be achieved by dividing the video frames into rectangular segments. Thresholding of each rectangle window can then be updated according to the chosen rectangle. (Li-Yong Ma, 2018).

Adaptive thresholding technique was used to solve the illumination variation problem in text documents (Kittipop Peuwnuan, 2016). However, from our review, adaptive thresholding technique performances have not been studied for vehicle count from traffic videos. Hence the main deliverable of this research is to analyse the accuracy

and processing time of vehicle count using the adaptive thresholding method. Implementation of vehicle count through adaptive thresholding method is then analysed in terms of accuracy and the performance trade-off in terms of processing time. Our main aim is to accurately count the number of vehicles in videos with varied illumination conditions by using adaptive thresholding image processing techniques.
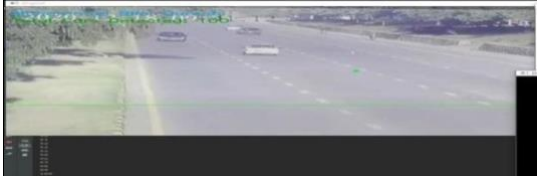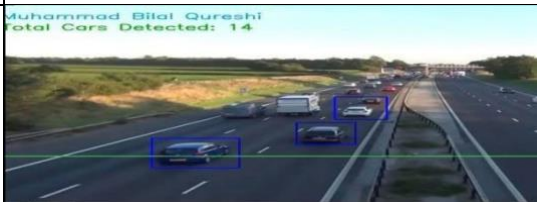
3.   Methodology

1. Video input
2. Color to grey scale conversion
3. Gaussian blur
4. Binary threshold
5. Adaptive thresholding (Mean or Gaussian)
6. Morphological operation
7. Object detection pre defined line (contours)
8. Drawing rectangles
9. Object count

Figure 1: Vehicle Count Process Flow with Adaptive Thresholding (Mean and Gaussian)

A personal computer with Intel TM processor core i5 2500K CPU 3.30Ghz, 3301 Mhz, 4 Core, BIOS with 8GB RAM and Radeon RX 470 GPU with 8-GB RAM was used to run this work. Traffic videos used in our simulation were retrieved from the Internet shown in Table 1. PyCharm is an integrated environment for Python used to run OpenCV computer vision library were used to process the digital videos or images. The OpenCV is an open-source platform comprising innumerable algorithms for computer vision. The Figure 1 shows the process flow for the vehicle counting simulation performed.

Table 1 : Dataset used for Vehicle Counting

Data Set	Images acquired from data set	Day/Conditions
Video 1		Afternoon/Low Lighting
Video 2		Noon/Good Lighting
Video 3		Morning/Good lighting
Video 4		Afternoon/ Low light

4. Results

The results in Figure 2 and Table 2 shows that the Adaptive Thresholding Mean gives a good accuracy result with a lower processing time for vehicle counting in comparison to Adaptive Thresholding Gaussian. It is also observed that the daytime light conditions in the morning gives a lower accuracy for the Adaptive Thresholding Gaussian. Video 2 at noon time gives a low accuracy most probably due to image quality where the sunlight has immersed the vehicles object in the background, resulting a lower accuracy. Moreover, Adaptive Thresholding Gaussian has shown a marginal improvement compared to Adaptive Thresholding Mean for images in the afternoon; low light images. Overall, it can also be observed that the image processing time for Adaptive Thresholding Gaussian is 3-4 times higher than Adaptive Thresholding Mean.
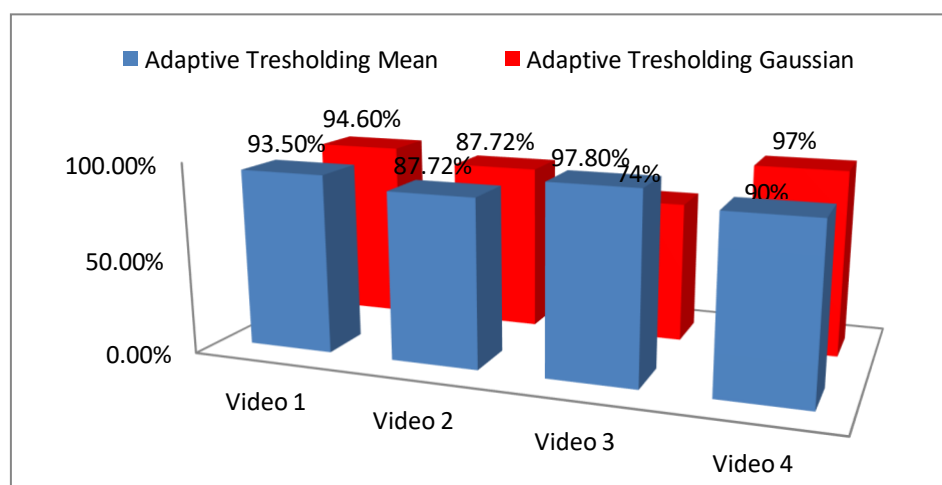
Figure 2: Comparison of Vehicle Counting Accuracy with Adaptive Thresholding

(Mean and Gaussian)

Table 2 : Accuracy and Processing Time for the Vehicle Counting

Data Set	Accuracy (%)		Time to Process (s)	
	Gaussian	Mean	Gaussian	Mean
Video 1 (p.m)	**94.6**	93.5	203	**52**
Video 2 (noon)	87.72	87.72	492	**159**
Video 3 (a.m.)	74	**97.8**	193	**58**
Video 4 (p.m.)	**96.9**	90	175	**58**

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Challenges and Issues for Adoption of Blockchain in Healthcare

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Abstract – *Blockchain is a decentralised and distributed technology that may be used as a strong tool for several applications in our daily life. Among other important application areas, healthcare is the prominent applications area where blockchain is expected to give a strong impact. It is becoming increasingly important for healthcare organizations to embrace digital innovation with the increasing digitalization nowadays. The emergence of blockchain technology illustrates digital innovation's disruptive impact and, at the same time, poses challenges and issues to healthcare organization. This paper is all about exploring the blockchain adoption for healthcare organization in terms of challenges and issues. This paper identifies challenges and issues for adoption of blockchain in healthcare environment by using a traditional literature review. The findings of the challenges and issue of the blockchain adoption study can be valuable to the healthcare organization and may assist healthcare organization who are considering blockchain technology in their environment.*

Keywords: Blockchain, Healthcare, Secure, Challenges, Adoption, Issues, Digitalization.

1. Introduction

Blockchain is seen as a ledger system that manages data and their transactions using blocks that are time stamped via cryptography and operates in a decentralized manner over any computer networks. The idea of a blockchain was first presented by cryptographers Stuart Haber and W Scott Stornetta in the Journal of Cryptology in a paper entitled "How to Time Stemp A Digital Document" from 1991 (Tveita & Borander, 2018). Blockchain has attracted intensive attention in both research and applications in recent years as an emerging decentralized architecture and distributed computing paradigm underlying Bitcoin and other cryptocurrencies. The key advantage of this technology lies in the fact that it enables the establishment of secured, trusted, and decentralized autonomous ecosystems for various scenarios, especially for better usage of the legacy devices, infrastructure, and resources (Yuan & Wang, 2018).

In recent years, with the rapid development and popularization of Bitcoin and other cryptocurrencies and of changing realities and resistance to innovative practises, healthcare is characterised as a traditional industry that is significantly difficult to measure. In recent years, global attention has been drawn to health issues such as privacy, quality of care, and information security (Miah & Prokofieva, 2019). Blockchain research and applications have also shown an unprecedented trend of explosive growth. As such, blockchain can offer a new solution in traditional centralized systems to the long-standing problems of high operating costs, low efficiency and potential data storage security risks (Yuan & Wang, 2018). Blockchain is a novel and fundamental technical framework and is expected to bring profound influence on the areas of finance, economics, science and technology, and even politics. There are several issues and challenges has been discussed related on adoption of

blockchain in healthcare (Tripathi, Ahad, & Paiva, 2020). Therefore, this paper will review current issues on blockchain adoption in healthcare environment.

2. Blockchain in Healthcare

The decentralised, open, and permissionless features of the blockchain could provide a special answer for the healthcare industry. A wider range of applications for the technology open the way for wearables and the advancement of medical research, among other elements of healthcare (Deloitte, 2018). One advantage of using blockchain in healthcare, which is built on peer-to-peer networks, is that it updates in real-time, eliminating the need for intermediaries and their costs (Zhang, Schmidt, White, & Lenz, 2018). A recent survey by Deloitte reveals that the traditional industry is aggressively investigating new possibilities for the use of the blockchain to fulfil its vital needs. Giving patients the ability to manage their own identity enables the informed consent process to be integrated while maintaining the privacy of each patient's personal health information (Miah & Prokofieva, 2019). There is very few high-quality research on people's attitudes toward e-health (N, MF, & F, 2017). Today, there is a demand for high-quality health-care facilities that are supported by advanced and cutting-edge technology. Blockchain would play a critical role in transforming the healthcare sector in this case. Furthermore, the health-care landscape is shifting toward a patient-centred approach that emphasises two key elements: always-accessible services and appropriate healthcare resources. (Haleem, Javaid, Singh, Suman, & Rab, 2021)
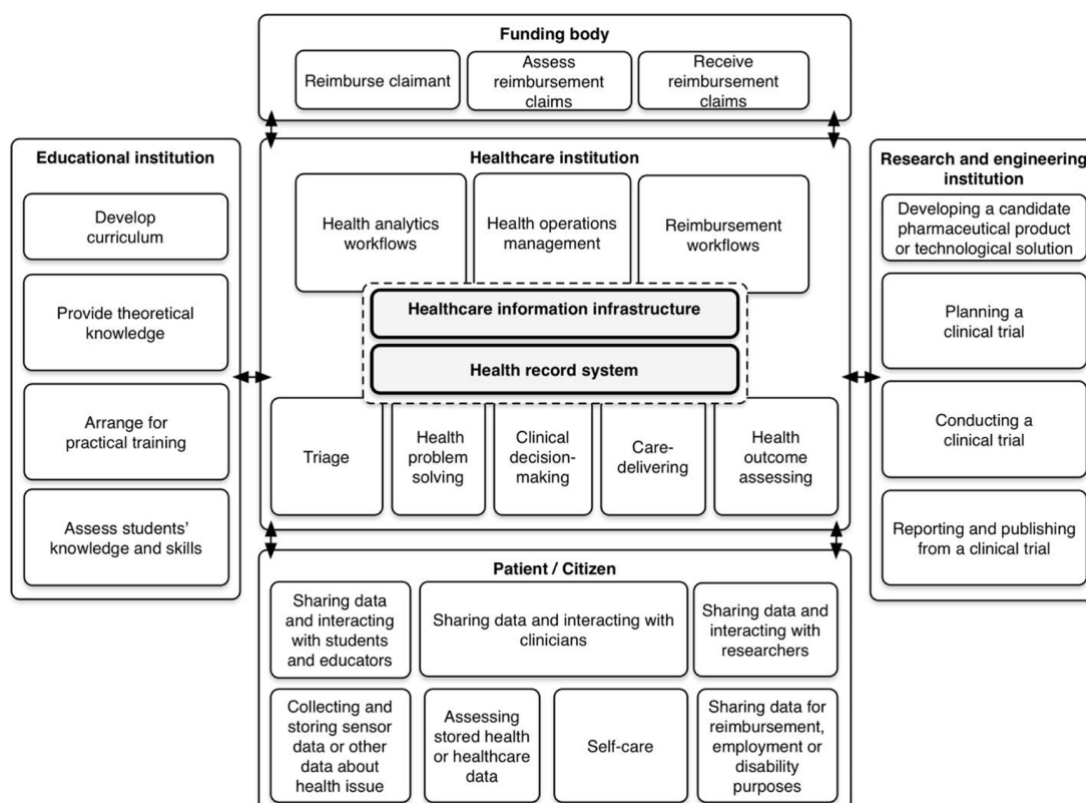

Figure 3: Map of the health sector (Hasselgren, Kralevska, Gligoroski, Pedersen, & Faxvaag, 2020)

2.1 Blockchain-based management of personal health records (PHR)

In the area of personal health records, blockchain technology is currently the most popular. Data from wearable monitoring or medical IoT devices is now being used to construct these records since it allows for data access and sharing as well as laying the groundwork for better, quicker decision-making, medical professionals, hospitals, and other healthcare organizations have had to increase demand for medical record digitalization during the past ten years (Singh, Kumar Sharma, Mehrotra, Bhatt, & Kaurav, 2022)

2.2 Blockchain-based management of Electronic Health Record (EHR)

Healthcare data management should be prioritized through healthcare transformation, which can be facilitated by integrating various systems and increasing the EHR's accuracy (Singh, Kumar Sharma, Mehrotra, Bhatt, & Kaurav, 2022). On the other side, EHRs place a premium on the patient's entire health, going beyond the standard clinical data gathered in the hospital to offer a holistic view of the patient's therapy. By far, the most appropriate technology for managing personal electronic health records is blockchain technology.

3. Methodology

This study's methodology is based on a review of previous literature in journals, conference proceedings, and expert author articles. Health websites and public repositories are being investigated for data collection. All databases, including IEEE, Springer, and Science Direct, are searched, and research papers from the previous five years are examined (N, MF, & F, 2017)

4. Challenges and Issues in Healthcare

Based on literature conducted there are 15 challenges related of adoption in healthcare as shown in Table 1.

Table 1: Challenges and Issues for Adoption in Healthcare

Authors	Issues
Harahap, N. C., Handayani, P. W., & Hidayanto, A. N. (2021)	Security and Privacy Concerns
	Distribution of Infrastructure is unequal
Bazel, M. A., Mohammed, F., & Ahmed, M. (2021)	
	Immutability
Rani, B. V., & Parmindersingh. (2022), N, M., MF, S., & F, S. (2017).	Scalability
	Interoperability
Heart, T., Ben-Assuli, O., & Shabtai, I. (2017)	Lack of Expertise
Khatri, S., Alzahrani, F. A., Ansari, M. T. J., Agrawal, A., Kumar, R., & Khan, R. A. (2021)	Speed
	Ensuring Data Accuracy
	Legislation aspects: Privacy laws and regulations
Haleem, A., Javaid, M., Singh, R. P., Suman, R., & Rab, S. (2021)	Integrating with current systems healthcare

Hasselgren, A., Kralevska, K., Gligoroski, D., Pedersen, S. A., & Faxvaag, A. (2020) Attaran, Mohsen (2022)	Modification of data
	Consumer Issues
	Participation Adoption
	Financial cost of the system, storage cost
	Managing access control

5. Conclusion

The study demonstrates the current state of blockchain integration and adoption, particularly in the field of health. Furthermore, blockchain adoption has a high potential for the development of secure, more decentralised patient-centred solutions with exceptional levels of data processing and management. Numerous options exist for the medical sector to gain from blockchain adoption technology. Healthcare services may evolve to the next level in the future by reduce the likelihood of the challenges and issues in blockchain adoption such as lowering the costs of gathering, configuring, and processing healthcare in this technology, much like how the internet altered healthcare and brought about the telemedicine. Many research studies propose novel architectures, platforms, and associated models, but they are less likely to integrate blockchain components to automate blockchain-based operations. Furthermore, blockchain technology is still in its early stages of development and is primarily used in the implementation and incorporation of procedures, but it is being used exponentially and in circumstances that are thought to be rational and required.

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