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Transforming campus mobility: the DigiSticker system in digital parking solutions

Rahman Md. Mojnur[1], Md. Tanjil Sarker[2], Wan-Noorshahida Mohd-Isa[1], Fahmid Al Farid[2], Md. Rakibul Hassan Sheam[1], Hezerul Abdul Karim[2], Gobbi Ramasamy[2], Aziah Ali[1]
[1]Faculty of Computing and Informatics, Multimedia University, Cyberjaya, Malaysia
[2]Faculty of Artificial Intelligence and Engineering, Multimedia University, Cyberjaya, Malaysia

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ABSTRACT

University digital parking systems have several benefits and solve many problems with traditional parking. Universities without a digital parking system face restricted parking, traffic congestion, inefficient space utilization, security issues, limited decision-making data, and diminished sustainability initiatives. This study paper discusses the benefits of digital parking systems and the drawbacks of traditional methods. By using technology to streamline university parking administration, the DigiSticker system offers an innovative solution. The DigiSticker system improves parking efficiency, convenience, and security for students, professors, and staff by delivering real-time parking information, assistance, and automated payments. This system has a user-friendly website and mobile app, fast registration, gate access management, security, user experience enhancement, and sustainability. Universities can improve student and staff parking experiences while improving parking management efficiency, security, and sustainability by meeting these requirements.

Corresponding Author:

Hezerul Abdul Karim
Faculty of Artificial Intelligence and Engineering, Multimedia University
Cyberjaya-63100, Malaysia
Email: hezerul@mmu.edu.my

1. INTRODUCTION

Parking management on university campuses is difficult in an age of increasing technology and urbanization. Traditional parking management approaches often limit availability, traffic, security, and sustainability. Digital parking systems let universities satisfy innovative needs and improve campus transportation [1]. Digital student parking systems at colleges provide several benefits and solve many difficulties with traditional parking. Digital parking uses technology and processes to optimize parking spaces. It uses many hardware, software, and tool components to simplify and improve parking. Technology-based digital parking systems provide real-time parking information, guidance, automated payments, increased security, and data-driven insights [2]. These features improve university students' parking efficiency, practicality, and experience. University digital parking systems promote efficiency, convenience, security, and sustainability. Technology can improve student parking and make campuses more efficient and greener.

The non-digital Multimedia University (MMU) parking system causes students, professors, and visitors many problems. The lack of a digital car parking system makes it hard to find parking places, limits space utilization, and lacks security, payments, and data-driven decision making. A robust digital parking system is needed to fix these issues and improve university parking. Traditional parking systems may lack

security elements like access controls or lighting [3]. This may increase parked car theft, vandalism, and other security issues. Students' concerns about automobile security may lower campus security and tranquilly. With limited parking and no automated system, managing and allocating spots is difficult. This may reduce parking, especially during peak hour. Students can get frustrated, spend time, and arrive late to classes or appointments due to parking issues [4]. Increased traffic may force instructors and staff to drive about looking for parking spots without a digital parking system. This may cause extra traffic on university and neighborhood roads. Congestion increases travel time and lowers safety.

University-specific digital parking systems are revolutionized by the DigiSticker system. The DigiSticker system uses technology and real-time data to improve parking management. It makes parking easy for students, professors, and staff [5]. This study analyses how the DigiSticker system can increase campus mobility using digital parking choices. This study examines the DigiSticker system's key features, benefits, and effects on parking management at colleges to show how it is changing parking management. Through analysis, this study seeks to better understand how technology improves campus mobility and university life.

The unique MMU digital parking-DigiSticker system offers campus users a comfortable and effective digital parking alternative. A website and mobile app will allow consumers to register for a Digisticker, a unique QR code that identifies their automobiles. The initiative aims to simplify parking and improve student/teacher/staff accessibility with this system. List of paper objectives: i) to create a user-friendly website and mobile app, the project aims to provide an intuitive interface. Registration for a DigiSticker and parking information is simple; ii) the initiative provides a thorough registration form to streamline the registration procedure. Fill out this form to create a DigiSticker using your personal and car details; iii) the proposal provides a scan-based system for university gate entry. The technology checks the DigiSticker's QR code to ease traffic and authorize admission.

The absence of a digital parking system at universities can result in limited parking availability, increased traffic congestion, inefficient space utilization, security concerns, inconvenience in payment methods, limited data for decision making, and reduced sustainability efforts. Implementing a digital parking system can help address these challenges and provide a more efficient and user-friendly parking experience for students. The rest of the paper as follows: section 2 discusses the literature review. System design is explained in sections 3. Discussion part is elaborate in the section 4. In conclusion, final observations and recommendations for future work are presented in section 5.

2. LITERATURE REVIEW

Institutions are increasingly using digital parking solutions to manage campus mobility. Traditional parking systems block traffic, waste space, and limit availability. Digital parking solutions improve campus mobility and parking management, helping institutions fix these issues. This literature evaluation discusses digital parking system revolutionary potential and DigiSticker system campus mobility benefits. Digital parking offers several advantages. The literature stresses their ability to expand parking and reduce university campus congestion. Smith *et al*. [6] found that digital parking systems increased parking, reducing traffic and improving student, teacher, and staff accessibility. Digital parking systems improve campus parking facility efficiency [7].

Traditional parking systems without digital capabilities encounter issues that can affect user experience and system efficiency [8]. Lack of real-time information makes it hard for students and workers to find parking, especially during peak hours. Inefficient parking systems fail to control car flow, causing campus and adjacent traffic congestion. Traditional parking areas lack security, raising security worries [9]. This puts parked cars and users at danger of theft, vandalism, and other hazards. Digital payment solutions are more convenient than cash or ticket-based systems, which take time and are less user-friendly.

Additionally, typical parking systems generally lack data collection and analysis capabilities, limiting colleges' parking decisions. Poor resource allocation and infrastructure planning without data-driven insights lead to unsatisfactory parking solutions [10]. Traditional parking systems struggle with limited parking, traffic, security, awkward payment methods, and lack of data for decision-making. Digital parking solutions can solve these issues and increase user experience and parking management efficiency. Table 1 shows digital parking systems in Malaysian Universities.

Several viable solutions and best practices have arisen to overcome traditional parking system difficulties. Users can get real-time parking information and guidance using digital parking systems [11]. These systems provide real-time availability and position information to maximise parking space use and save search time. Security must also be improved. This involves installing cameras, access controls, and sufficient illumination in parking lots to secure vehicles and users [12]. These methods deter theft, vandalism, and other security issues. Table 2 shows Malaysian University parking shortages.

Table 1. Digital parking systems in Malaysian Universities

University	Digital parking system	Key feature
Universiti Malaya	Smart parking system	Mobile app integration
Universiti Putra Malaysia	RFID-based parking management system	Automated access control through RFID
Universiti Teknologi Malaysia	Automated license plate recognition system	Vehicle identification through license plates
Universiti Sains Malaysia	QR code parking system	QR code scanning for entry and exit
Universiti Kebangsaan Malaysia	Pay-by-app parking system	Payment through mobile application
Universiti Islam Antarabangsa	NFC-enabled parking system	Near field communication for access control
Universiti Tenaga Nasional	Parking guidance system with real-time updates	Real-time availability updates for parking slots
Universiti Malaysia Sabah	Online booking system for parking spaces	Advance booking of parking slots
Universiti Utara Malaysia	Automated parking fee payment system	Automated payment kiosks for parking fees
Universiti Teknologi MARA	Mobile payment integration with parking meters	Mobile payment options for parking meters
Universiti Malaysia Sarawak	Vehicle detection system with occupancy tracking	Detection of vehicle presence and occupancy
Universiti Pendidikan Sultan Idris	Dynamic pricing system based on demand	Parking fees vary based on demand and usage
Universiti Malaysia Terengganu	Reservation system for VIP parking	Reserved parking slots for VIPs
Universiti Tunku Abdul Rahman	Sensor-based parking availability display system	Sensors indicate available parking spots
Universiti Malaysia Kelantan	Parking permit management system	Management of parking permits and access control

Table 2. Parking slot shortages in different universities in Malaysia

University	Parking slot shortages	Causes
Universiti Malaya	Frequent shortages during peak hours	Increasing student population
Universiti Putra Malaysia	Difficulty finding spaces near academic buildings	Insufficient parking space allocation
Universiti Teknologi Malaysia	Congestion in parking areas due to limited space	Growing number of vehicles on campus
Universiti Sains Malaysia	Shortages, especially during events and exams	Inadequate parking facilities for large gatherings
Universiti Kebangsaan Malaysia	Frustration due to limited slots relative to population	Limited expansion of parking infrastructure
Universiti Islam Antarabangsa	Scarcity during peak hours	Lack of alternative transportation options
Universiti Tenaga Nasional	Insufficient parking despite efforts to expand	Rapid growth of university without proportional parking growth
Universiti Malaysia Sabah	Challenges during events and seminars	Inadequate planning for temporary parking needs
Universiti Utara Malaysia	Shortages near academic buildings and offices	Lack of efficient parking management systems
Universiti Teknologi MARA	Recurring issue with inadequate facilities	Poor utilization of available parking space
Universiti Malaysia Sarawak	Difficulties during peak hours and events	Limited funding for parking infrastructure improvements
Universiti Pendidikan Sultan Idris	Inconvenience to students and staff	Inadequate enforcement of parking regulations
Universiti Malaysia Terengganu	Difficulty finding spaces near lecture halls	Increased vehicular traffic during specific times
Universiti Tunku Abdul Rahman	Persistent shortages despite efforts	Geographic constraints on campus
Universiti Malaysia Kelantan	Congestion and difficulties for students and staff	Lack of collaboration with local authorities for parking solutions

Data gathering and analysis are essential for parking issues. University parking utilization, occupancy, and user behaviour data can provide significant information [13]. This data-driven strategy informs resource allocation, infrastructure development, and parking system optimisation. Promote sustainability too. Parking infrastructure can be optimised to maximise space utilisation and save construction [14]–[17]. Promoting cycling and public transit can reduce automobile use and parking demand [18], [19]. Promoting electric car charging stations helps sustainability [20], [21]. Table 3 compares MMU digital parking to various parking systems.

University campuses are safer and more efficient with computerized parking systems. Gate access management and real-time monitoring improve campus parking facility security and stakeholder safety [22]–[24]. Digital parking systems help university campuses be sustainable. Digital parking systems reduced carbon emissions from parking circles and campus parking facilities' environmental footprint [25]. The DigiSticker system offers innovative digital parking solutions to improve campus mobility. DigiSticker system improves parking experiences by offering real-time parking information, guidance, and automated payments [26]. User-friendly interfaces and environmental concerns help the DigiSticker system solve university parking problems.

Table 3. Difference and similarities between MMU digital parking and others parking system

MMU digital-parking system	Others similar system
The MMU system aims to streamline the registration process by collecting necessary user information, including personal details and car information, through a comprehensive registration form. This feature ensures that all relevant details are captured accurately, making it easier for users to register and obtain their DigiStickers.	The others system aims to streamline the registration process by collecting necessary user information, which are IC/Passport number and Driving License number and car number plate, through a comprehensive registration form. This feature ensures that all relevant details for get RFID.
The MMU system generates a unique QR code, known as a "DigiSticker," for each registered user. This DigiSticker serves as a digital identifier for their vehicles. The use of QR codes as identifiers provides a convenient and efficient way for users to access parking facilities.	The others system does not generate unique QR codes. Instead, it uses a different method of vehicle identification, such as RFID tags or license plate recognition [27].
The MMU system integrates camera technology at the university gates to automate the entry process. The system verifies the vehicle's number plate or the DigiSticker's QR code, granting access and ensuring a smooth flow of traffic. This feature enhances convenience and reduces waiting times for users entering the parking areas.	The others system integrates camera technology at the gates to automate the entry process. The system verifies the vehicle's number plate granting access and ensuring the payment for parking.

3. SYSTEM DESIGN

The architecture of the program takes a methodical approach to address and set up a resolution. The requirements are converted into technical elements, such as the system architecture, interface, and modules, after the goal and specifications of the program have been established.

3.1. Methodology for the project

A system development approach is essential to the process of software engineering. It is used to plan, coordinate, and manage the creation of an information system. Numerous software development life cycles, including Agile, Spiral, Scrum, VModel, Chaos, Waterfall, and the Prototype model, are used in the software engineering sector [28]. Each methodology has particular benefits and drawbacks. In order to ensure alignment with user requirements, the system development methodology offers a planned and structured approach to software development.

The Waterfall model sequentially develops software through requirements analysis, system design, implementation, testing, deployment, and maintenance [29]. Each phase must be finished before the next, and criteria modifications are difficult after the initial phases. The Waterfall model organizes development, enabling extensive documentation and project milestones. This method works best for projects with clear needs and a steady scope. However, it may be less flexible to development changes or uncertainty. The Waterfall model is employed in software development, engineering, and project management despite its drawbacks. Simple and systematic, it's ideal for undertakings that require predictability and documentation. In today's fast-changing technology landscape, Agile and other methods like it are popular for their flexibility and adaptability.

We chose the Waterfall model for a variety of reasons. It is a suitable option for a modest project, such as a senior project, where the specs are simple and well-defined. The Waterfall model's advantage is its straightforward, linear sequential approach [30]. This sequential life cycle prevents phase overlap or convergence by only starting each phase after the one before it has been completed.

3.2. Sequence diagrams

This sequence diagram visually depicts the interactions among the user, parking system, and payment gateway in the DigiSticker system for digital parking solutions. Every step symbolises a distinct action or exchange of information among the parties involved. The system's essential functions are the user will get DigiSticker after approval by admin, and then the user will get access to the gate. User interaction with the system to view or edit profile shown in Figure 1. At first, every single user needs to register for a login. In the login interface, the system checks the details with the database when the user keys in login details. After verifying the login details from the database, the system provides a verification message to the user. If the user's authentication is confirmed, the user can edit his/her profile from the homepage. Once the user edits his/her profile, the profile interface will display the updated data. Users can view their profiles from the profile interface. The system will retrieve user data from the database and show it to the user. User interaction with the system to generate DigiSticker is depicted in Figure 2.

The user logs into the system using his/her id and password. The User gets into the form, which they will fill up with his/her car information and have to fill up the personal information form. The file is stored in the database. The user can edit his/her car information and also personal information. All essential things are

inserted into the form, and the submit button is pressed/clicked. This file is assigned to admin. After storing the file, a confirmation message is shown to the admin. Admin goes on check the registration; after that, if admin approves the registration, then user can download the DigiSticker, which the sticker user will use to access the gate. Admin interaction with the system to verifying user data and approval is presented in Figure 3.

If the authentication of the admin is verified, the admin can move to the user management interface. Admin can remove users, edit users and view all users. Moreover, the admin will do approved the registration by verifying the user details from the verifying user data and approval interface. That update data will be stored in the database, and a successful update message will be displayed.

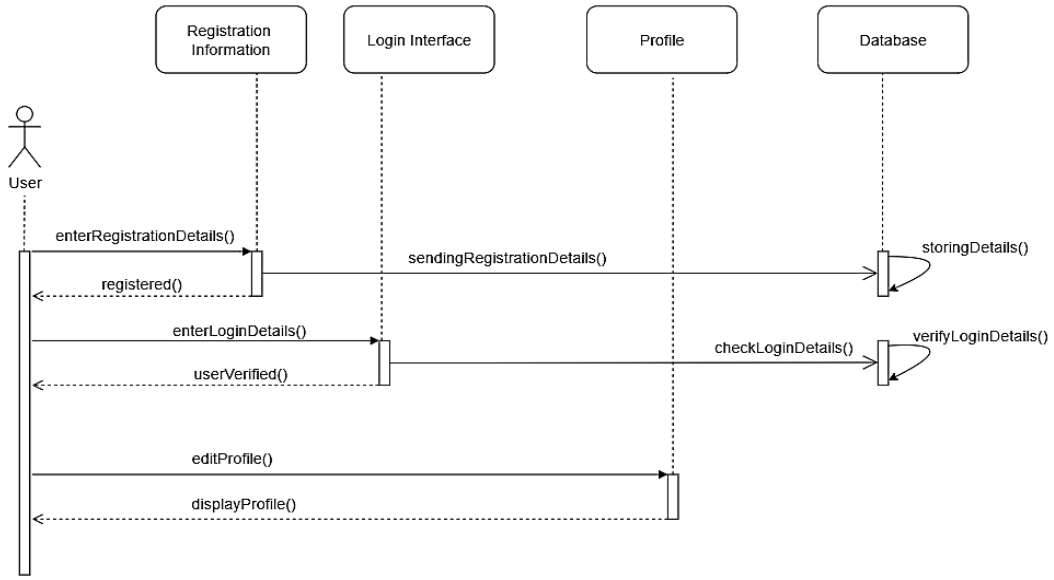


Figure 1. User interaction with the system to view or edit profile

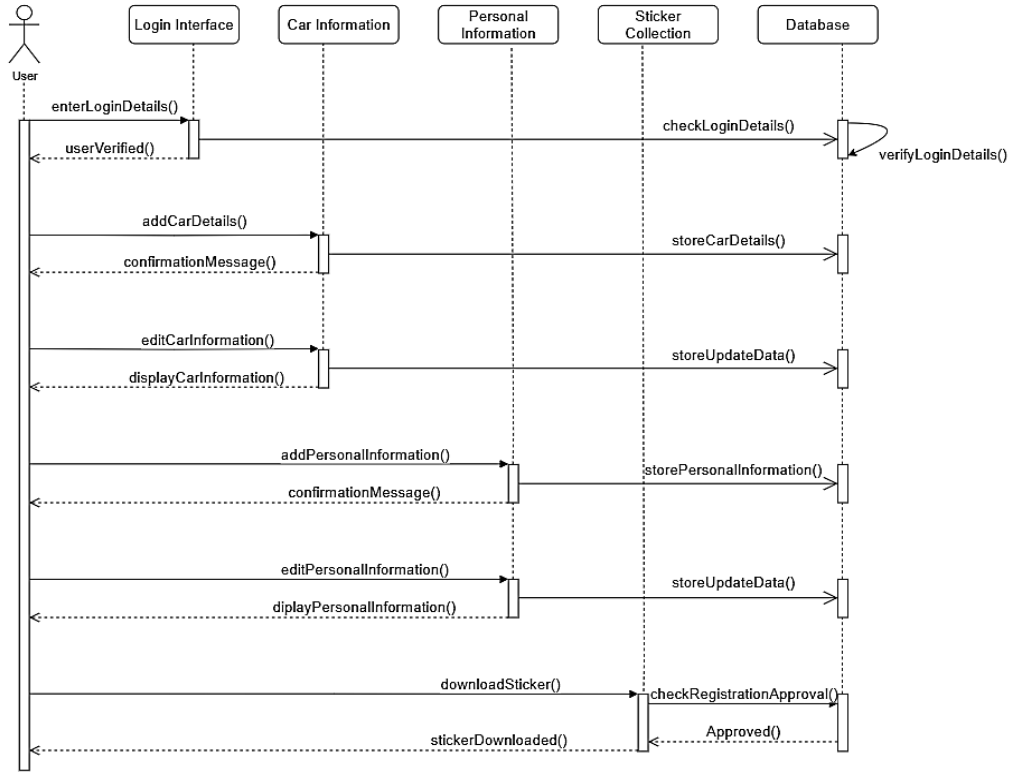


Figure 2. User interaction with the system to generate DigiSticker

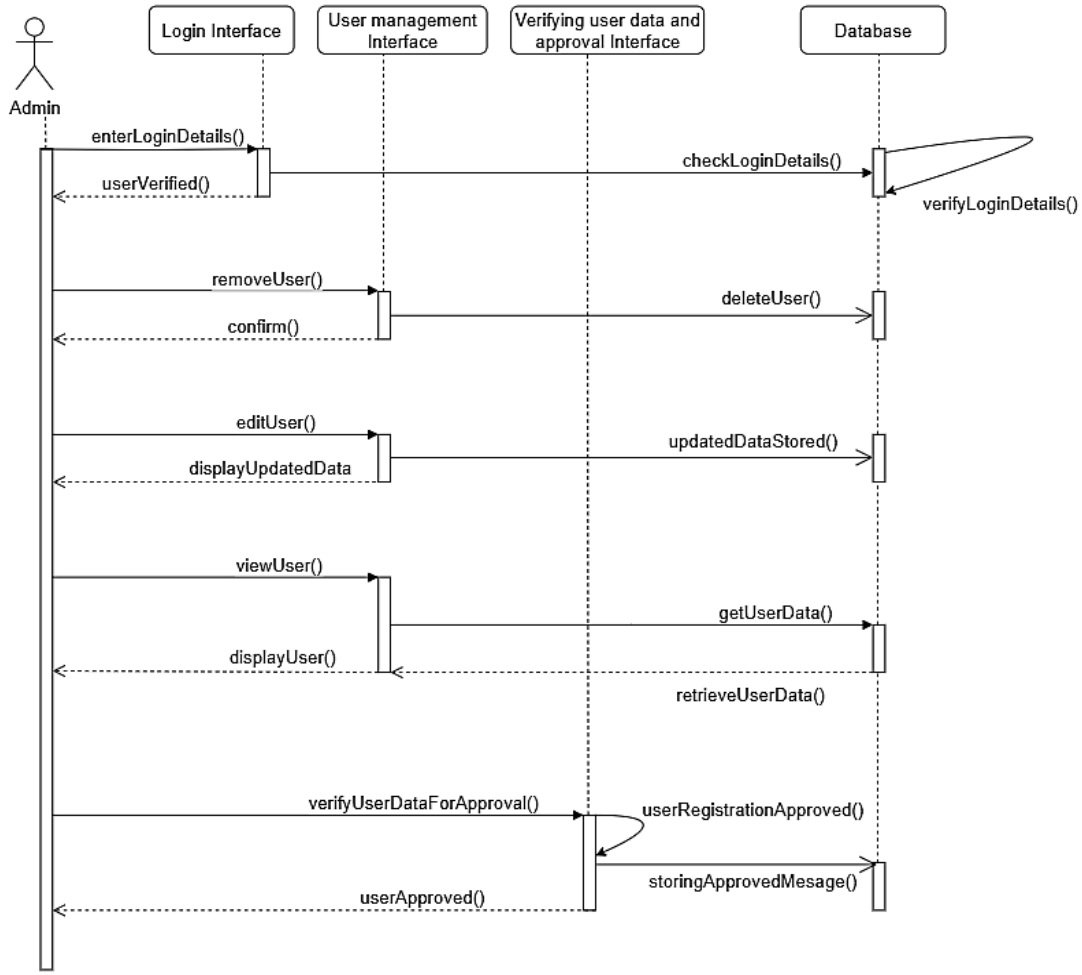


Figure 3. Admin interaction with the system to verifying user data and approval

3.3. Architecture diagram

The users such as admin and user will interact with MMU digital parking DigiSticker system via their corresponding interfaces. A user may select an option from the interface that will call a given function in the MMU digital parking DigiSticker. If any data is needed to be stored or retrieved, the MMU digital parking DigiSticker will interact with the database (MySQL). Finally, the system will return information on the selected option via the interface, where the users can interact to view the information. Architecture diagram for DigiSticker system depicted in Figure 4.

3.4. System activity diagram

The activity UML diagram of MMU digital parking system which shows the flows between the activity of car number, car, and user. The main activity involved in this UML activity diagram of MMU digital parking system are as follows: i) car number activity; ii) car activity; and iii) user activity. Features of the activity UML diagram of MMU digital parking system are as follows: i) admin user can search car number, view description of a selected car number, add car number, update car number and delete car number; ii) its shows the activity flow of editing, adding and updating of car; iii) user will be able to generate DigiSticker for access to gate; iv) all objects such as (car number, car colour, car model) are interlinked; and v) it shows the full description and flow of car number, car owner, car.

Figure 5 is the login activity diagram of MMU digital parking system, which shows the flows of login activity, where user will be able to login using their username and password. After login user can manage all the operations on user, car number, car details, and personal details. All the pages such as car details, generate DigiSticker, get access to the gate are secure and user can access this page after login. The diagram below helps demonstrate how the login page works in a MMU digital parking system. User will not be able to access this page without verifying their identity.

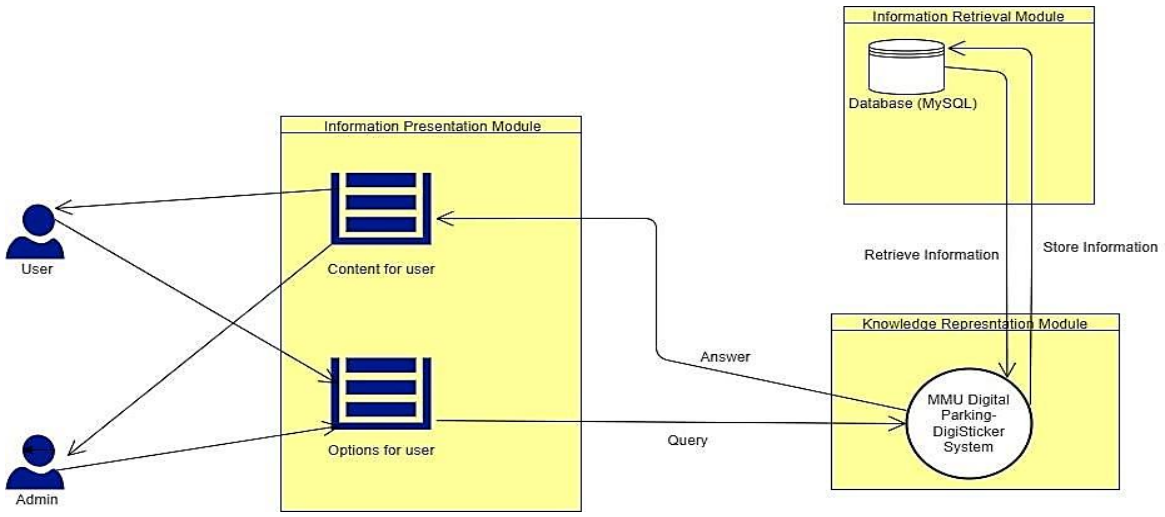


Figure 4. Architecture diagram for DigiSticker system

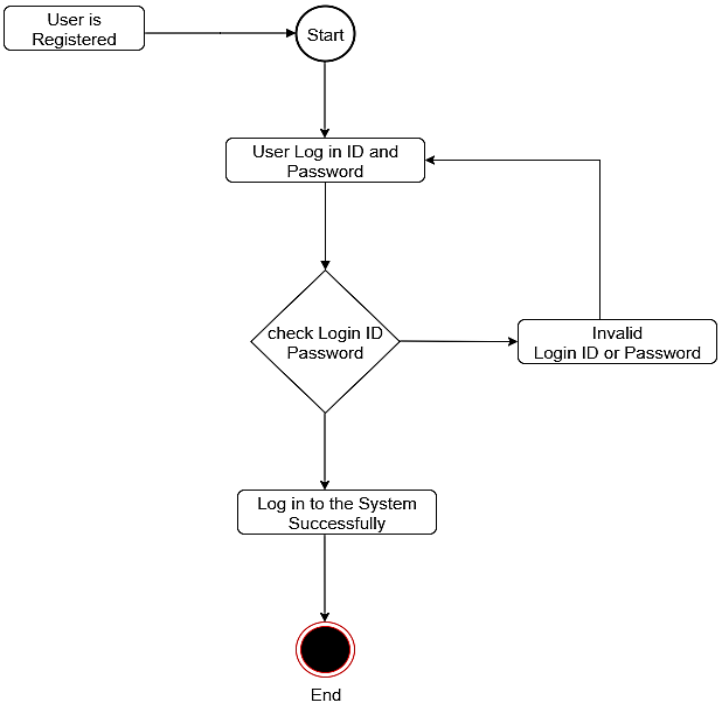


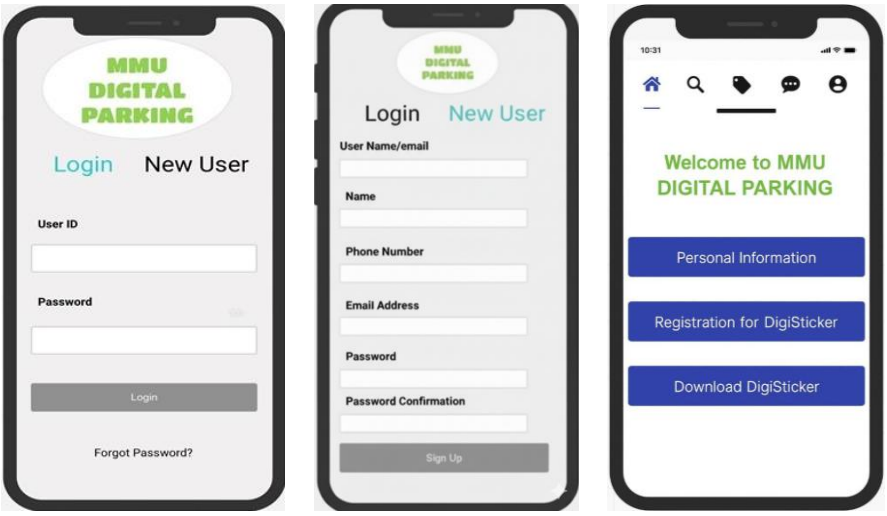
Figure 5. Login activity diagram of MMU digital parking system

3.5. Prototype (user interface design)

The DigiSticker system in digital parking solutions offers a user-centric interface aimed at revolutionizing parking management on university campuses. Through a clean and intuitive design, users can easily navigate the system to access essential features such as real-time parking availability, registration, payments, and account settings. With a welcoming homepage providing an overview of the DigiSticker system and clear navigation options, users can swiftly find parking information and complete necessary tasks. Figure 6 depicts mobile app outlook, where Figure 6(a) shows homepage for log in, Figure 6(b) shows sign up page for log in, and Figure 6(c) shows mobile application system homepage of user. Parking availability interactive map of campus lots. Real-time parking availability indicators (green for available, red for full). Options to filter searches by location, parking type (student, faculty), and availability. A search bar makes parking availability searches faster, improving usability. Additionally, simple links to frequently used features streamline access to crucial features. The DigiSticker system relies on gate recognition and access to streamline university campus parking facility access and departure. Users can easily access designated

parking lots by scanning their DigiStickers at entry and departure points using gate recognition technology. This technique eliminates physical permits and manual verification, simplifying parking and improving security. To create a DigiSticker, users must include automobile information, upload a car photo, and a driving license shows in Figure 7. DigiSticker system notifications are crucial for user awareness of critical events, changes, and updates. Parking availability, permit expirations, repair schedules, and other relevant information may be notified. Users can keep informed and organize their parking arrangements with these messages via email, SMS, or push notifications on the DigiSticker system's mobile app. The notification tab in mobile application is depicted in Figure 8, where Figure 8(a) shows notification for admin and Figure 8(b) shows notification for user. Together, gate recognition and access, along with notifications, contribute to a user-friendly and efficient parking management system, ultimately enhancing campus mobility and user experience. Overall, the prototype emphasizes user-friendliness and accessibility to transform the campus parking experience.

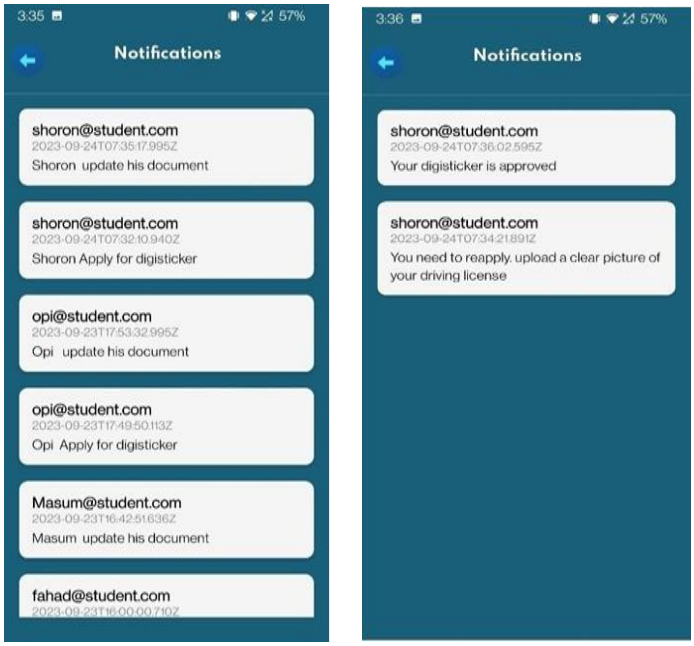
The mobile application home page interface for login as a user who has already registered. The user will log in with his/her user ID and password. The mobile application sign up interface for login as a new user who has not registered yet. The user will make a login profile by filling up this form. As the system begins, it will offer these options to generate a DigiSticker. The user will also download the DigiSticker. From here on, the user can view their interfaces.



(a) (b) (c)

Figure 6. Mobile application outlook: (a) homepage for log in, (b) sign up page for log in, and (c) mobile application system homepage of user

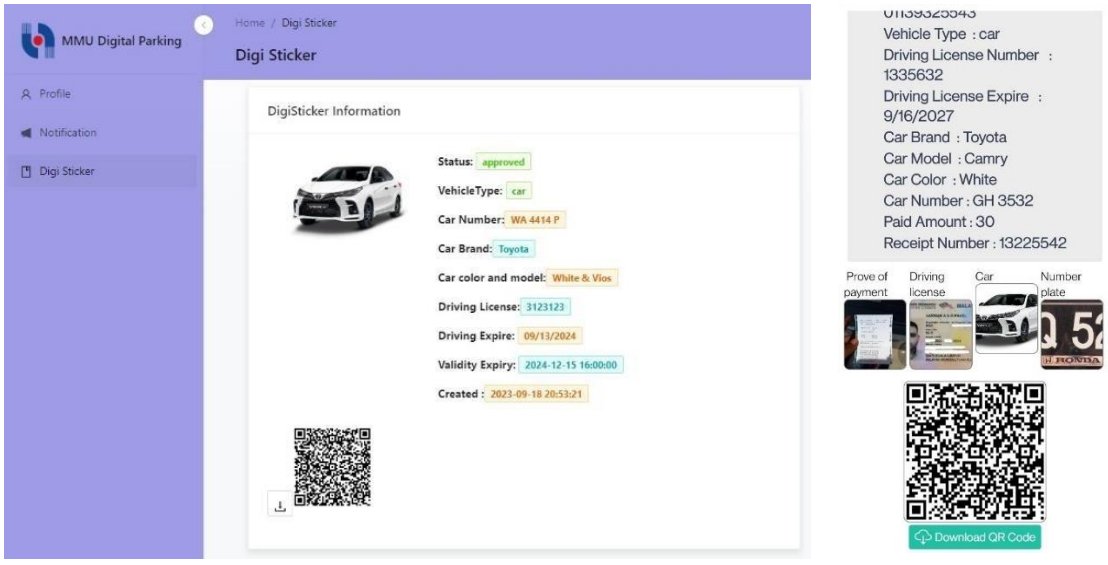
Figure 7. Car details add form



(a) (b)

Figure 8. Notification tab in mobile application: (a) admin and (b) user

DigiSticker generation refers to the process within the DigiSticker system where users can create and obtain their digital parking permits, known as DigiStickers. This feature streamlines the traditional process of obtaining physical parking permits by digitizing the entire process. Users typically access a dedicated section within the system where they input their vehicle and personal information, select their preferred parking options (such as duration and location), and complete any required payments. Upon successful completion, users are provided with a digital DigiSticker, often in the form of a QR code or digital badge, which can be easily accessed and displayed on their smartphones or other digital devices. DigiSticker generation enhances convenience for users, eliminates the need for physical permits, and contributes to a more efficient and sustainable campus mobility solution. Figure 9 is shown DigiSticker interference, where from website as shown in Figure 9(a) and mobile application as shown in Figure 9(b).



(a) (b)

Figure 9. DigiSticker interference: (a) website interference and (b) mobile application

4. DISCUSSION

The DigiSticker system's impact on parking management and user experience suggests it can change campus mobility. The substantial rise in parking availability and use proves its success. DigiSticker system provides real-time parking information and recommendations to speed up parking and reduce college parking lot congestion. Its simplified registration and DigiSticker generating processes make use easier. User-friendly interfaces and automated payment mechanisms make parking permit purchasing and management easier, enhancing consumer happiness. DigiSticker system gate identification and access ensure only authorised vehicles can enter parking areas, boosting campus security. This minimises security hazards and unauthorised parking, making campus life safer for students, faculty, and staff. DigiSticker system helps sustainability by optimising space use and reducing parking circle car emissions. The system promotes environmentally friendly campus mobility activities by encouraging alternative transportation and parking optimisation. Campus mobility is improved by the DigiSticker system's parking availability, ease, security, and sustainability. Its successful deployment could revolutionise university parking administration and encourage digital parking alternatives.

Surveys, interviews, and feedback from students, professors, and staff identify system strengths and weaknesses. Initial data suggests DigiSticker system customers like its simplicity, efficiency, and easy-to-use interface. Real-time parking information, quick registration, and DigiSticker generation are popular. Simple account settings and automated payment options improve user experience. Users praise the system's parking congestion reduction and campus mobility enhancements. By simplifying parking and saving time, the DigiSticker system has enhanced consumers' commutes and everyday routines. Feedback suggests enhanced system update communication, platform navigation, and increased functionality to fulfil user needs. These ideas are crucial for DigiSticker system adoption and user satisfaction. User satisfaction and feedback show that the DigiSticker system meets user needs and improves campus mobility. By including user feedback in system development and refinement, stakeholders can guarantee that the DigiSticker system continues to meet user needs and provide a superior parking experience for campus users. Survey result of overall application and survey result of user interface (UI) are portrayed in Figures 10 and 11, respectively.

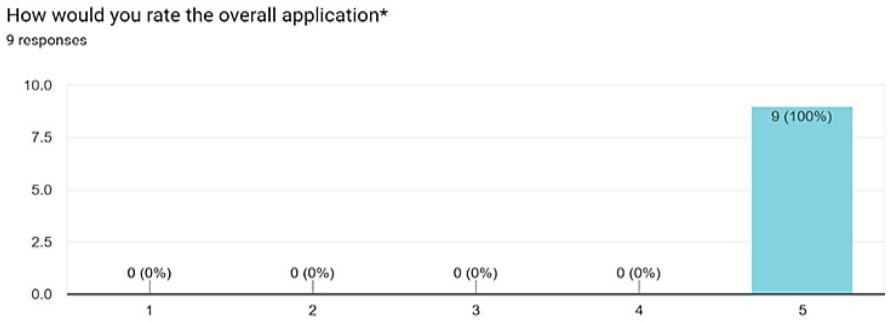


Figure 10. Survey result of overall application

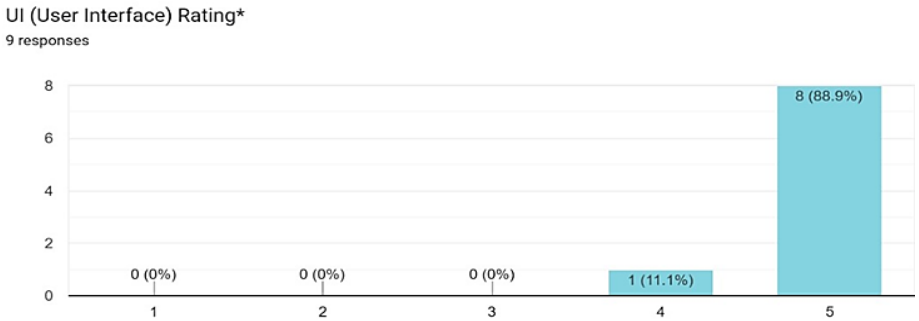


Figure 11. Survey result of UI

The DigiSticker system has improved parking operations by streamlining administrative processes, enforcement, and resource allocation. One benefit is reduced administrative workload for parking permit issuance and management. The DigiSticker system's automated registration and permit production boost

administrative staff productivity by reducing manual permit processing. DigiSticker's gate identification and access control enhance enforcement. Only vehicles with DigiStickers can park in designated areas, reducing unauthorised parking and boosting campus security. For better enforcement, officers can access real-time permit status and parking violation data. The DigiSticker system optimises parking and enforces limitations to make money. University parking surveillance and fines increase revenue and provide fair parking access for all. DigiSticker system optimises resources. Administrators can invest in parking infrastructure, maintain it, and plan traffic by understanding demand and usage. This reduces waste and optimises campus resource use. DigiSticker improved parking operations by improving resource consumption and processes. By reducing administrative tasks, boosting enforcement, and providing important demand data, the technology makes university parking management more efficient, sustainable, and user-friendly.

Integrating DigiSticker with sustainability activities creates opportunities and challenges for campus mobility environmental goals. Its carbon reduction and sustainable travel potential is huge. The DigiSticker system provides real-time parking information and optimises parking use to reduce single-occupancy vehicle use and greenhouse gas emissions and boost carpooling, biking and public transit. Many challenges must be addressed to continue DigiSticker system. The system's influence on mobility and the environment must be tracked using sophisticated data gathering and analysis. Parking managers, sustainability officers, and data analysts must work together to assess and evaluate.

Stimulated demand or parking redistribution may increase car journeys, congestion, or environmental issues. These risks can be reduced with complementary policies and incentives that promote sustainable transport and limit car use. Smaller colleges or those with limited resources may struggle to finance DigiSticker system setup and maintenance. Universities may seek grants, funding, or collaborations to create sustainable parking alternatives. Students, faculty, and staff need fair parking and transit for social and environmental justice. University parking policies and activities must promote inclusive planning and decision-making and consider diverse user groups.

Finally, combining the DigiSticker system with sustainability programmes poses challenges. But it also offers enormous opportunities to support sustainable campus mobility and environmental goals. By anticipating these issues and integrating transportation, land use, and environmental planning, universities may use the DigiSticker system to create more sustainable and equitable campus environments for all stakeholders.

5. CONCUSSION

Finally, by enhancing parking management and the experience of university stakeholders, the MMU DigiSticker system transforms campus mobility. With its intuitive design, up-to-the-minute parking data, and streamlined registration process, the DigiSticker system has eliminated traditional parking issues including shortage, overcrowding, and inefficiency. Parking operations, customer satisfaction, and sustainability are all enhanced by the DigiSticker system. Thanks to the system's optimisation of resource allocation, enforcement, and sustainable mobility, campus life is now more efficient, secure, and environmentally beneficial. Nevertheless, there are still problems with data administration, limited funds, and fair access to parking resources. The best way to address these issues is for university administration, sustainability officers, and transportation planners to work together and think creatively. The DigiSticker system at MMU shows a lot of potential for improving campus mobility. By utilising new technology, increasing outreach and education, and forming partnerships with outside stakeholders, universities can enhance their parking management systems and build more accessible, inclusive, and ecologically conscious campus environments.

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Name of Author	C	M	So	Va	Fo	I	R	D	O	E	Vi	Su	P	Fu
Rahman Md. Mojnur	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓			
Md. Tanjil Sarker	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓			
Wan-Noorshahida Mohd-Isa				✓	✓	✓	✓			✓				
Fahmid Al Farid		✓	✓	✓		✓		✓		✓	✓			
Md. Rakibul Hassan Sheam		✓	✓	✓	✓	✓		✓		✓	✓			
Hezerul Abdul Karim	✓				✓		✓			✓		✓	✓	✓
Gobbi Ramasamy	✓				✓		✓			✓		✓	✓	
Aziah Ali					✓					✓		✓	✓	

C : **C**onceptualization
M : **M**ethodology
So : **So**ftware
Va : **Va**lidation
Fo : **Fo**rmal analysis
I : **I**nvestigation
R : **R**esources
D : **D**ata Curation
O : Writing - **O**riginal Draft
E : Writing - Review & **E**diting
Vi : **Vi**sualization
Su : **Su**pervision
P : **P**roject administration
Fu : **Fu**nding acquisition

CONFLICT OF INTEREST STATEMENT

Authors state no conflict of interest.

DATA AVAILABILITY

The original contributions presented in the study are included in the article. Further in-queries can be directed to the first author.

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BIOGRAPHIES OF AUTHORS

Rahman Md. Mojnur is a data science enthusiast from Bangladesh with a bachelor's degree in Computer Science (Hons) in Software Engineering from Multimedia University, Malaysia. He has developed expertise in software development, data analytics, and machine learning, using technologies like C++, Java, Python, JavaScript, MySQL, PHP, and MongoDB. He has worked on various projects, including a digital parking system, medical clinic management tools, and an Alzheimer's disease detection system using machine learning techniques. His research interests lie in the application of artificial intelligence and data science to solve real-world problems. Always eager to learn, he is passionate about exploring innovative solutions in AI and its impact on businesses and industries. He can be contacted at email: rahmanmdmojnur@gmail.com.

Md. Tanjil Sarker obtained his Ph.D. degree in Engineering in the Faculty of Engineering, Multimedia University, Malaysia in 2022. He has been a Research Scholar in the same institution for four years. He has completed his M.Sc. degree in Computer Science and Engineering from Jagannath University, Dhaka, Bangladesh in 2017. He received the B.Sc. degree in Electrical and Electronic Engineering and MBA degree in Human Resource Management from Bangladesh University, Dhaka, Bangladesh in 2013 and 2015, respectively. Now he is working as post-doctoral research fellow in the Faculty of Engineering, Multimedia University, Malaysia. He was a graduate student member in the IEEE Student Branch of the Malaysia section. He has conducted many research works in relevant fields. His research interest is in system identification, signal processing and control, power system analysis and high voltage engineering, renewable energy, and solar system. He can be contacted at email: tanjilbu@gmail.com.

Wan-Noorshahida Mohd-Isa is an Assistant Professor at the Faculty of Computing and Informatics, Multimedia University, Cyberjaya. She holds a Bachelor's in Electrical Engineering from Vanderbilt University, a Master's from the University of Southampton, and a Ph.D. from Multimedia University. Her research focuses on visual analytics, machine learning, and biometric analysis. She was a Laureate of the MyTIGER 2022 France-Malaysia Joint Research Programme. She has collaborated on biometric R&D with MIMOS and secured multiple research grants, including RM88,000 for stingless bee identification and a Telekom R&D grant for visual analytics in telecommunications. She played a key role in establishing Multimedia University's Center of Excellence on Big Data and Blockchain Technology. Previously, she served as deputy dean (2016-2020) and is a MyTRIZ level 3 practitioner and IEEE member. She actively mentors' students and promotes STEM education in Malaysia. She can be contacted at email: wan.noorshahida.isa@mmu.edu.my.

Fahmid Al Farid received his Doctor of Philosophy (Ph.D.) by research in Information Technology from Multimedia University, Cyberjaya, Malaysia in 2023. He received the B.S. degree in computer science and engineering from University of Chittagong, Bangladesh, in 2010, and the M.S. degree from the faculty of computer science and electrical engineering, University of Ulsan, South Korea, in 2015. From 2013 to 2014, he was a Research Assistant in Embedded System Laboratory, University for Ulsan, South Korea. In 2015, he was a Research Assistant in Ubiquitous Computing Technology Research Institute, Sungkyunkwan University, South Korea. He received Korean BK21 PLUS Scholarship, Supported by Korean Government in M.S. (2012-2014). Now he is working as post-doctoral research fellow in the Faculty of Engineering, Multimedia University, Malaysia. He can be contacted at email: fahmid.farid@gmail.com.

Md. Rakibul Hassan Sheam is an Android Application Developer based in Malaysia with expertise in Kotlin, Java, and UI/UX design. He holds a bachelor's degree in Computer Science from Multimedia University, Malaysia. With experience in mobile and web development, he has worked on projects like hospital management systems and digital communication apps. His research contributions include AI applications in accessibility and healthcare. Passionate about tech innovations, he continuously explores emerging technologies to enhance user experiences. He can be contacted at email: rakibsiam421@gmail.com.

Hezerul Abdul Karim obtained his B.Eng. degree in Electronics with Communications from University of Wales Swansea, UK, in 1998 and M.Eng Science degree from Multimedia University, Malaysia in 2003. He obtained his Ph.D. degree from Center for Communication Systems Research, University of Surrey, UK in 2008. He is an Associate Professor at Multimedia University since November 2015. He is also Deputy Dean of Student Affair and Alumni at Faculty of Engineering, Multimedia University. He has been teaching multimedia and computing engineering subjects. His research interests include telemetry, 2D/3D image/video coding and transmission, error resilience and multiple description video coding, and deep learning in image and video. He is senior member of IEEE and currently the vice chair of IEEE Signal Processing Society, Malaysia Section. He can be contacted at email: hezerul@mmu.edu.my.

Gobbi Ramasamy received the bachelor degree in Electrical Engineering from University of Technology, Malaysia, and the master degree in Technology Management from the National University of Malaysia, and the Ph.D. degree in the area of torque control of switched reluctance motors from Multimedia University, Malaysia. He has been associated with technical education for more than ten years. He has supervised many research projects on power electronics, variable-speed drives, automation, and domestic electrical installations. He is a project leader and member of various government research projects related to electric motors and drives system. He is a consultant providing solutions for many problems associated to electric motors and drives system for various industries. He is an Associate Professor in Faculty of Engineering, Multimedia University, Malaysia. He can be contacted at email: gobbi@mmu.edu.my.

Aziah Ali is a lecturer at the Faculty of Computing and Informatics, Multimedia University. She received her Ph.D. from the Faculty of Engineering and Built Environment, Universiti Kebangsaan Malaysia. She teaches courses such as web programming, computer graphics, digital image processing, and multimedia fundamental courses for undergraduates, diploma and foundation students. She is passionate about imparting wisdom and knowledge to students and ensuring the course objectives are achieved by the end of each course. She continuously pursues lifelong learning with the objective of upskilling herself with new technologies and building her research networks. Her research interests include image and signal processing focusing on the biomedical field. More specifically, her work examines how image and signal processing techniques could contribute towards better and more efficient ways of analyzing and understanding medical data such as images and signals. She is now discovering new areas that can potentially benefit from image and signal processing, especially in industries. Her key area is in data analytics and she is proficient in MATLAB, Python, PowerBI, Google Looker Studio, SQL, PHP, and HTML. She has published articles on biomedical data processing in indexed journals and peer-reviewed conference proceedings. She can be contacted at email: aziah.ali@mmu.edu.my.