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Preface

This e-book describes the research papers presented at the International Conference on Emerging Computational Technologies (ICECoT 2021), organised by Faculty of Computer and Mathematical Sciences (FSKM), UiTM Cawangan Melaka. The main discussions of the conference is on the technological advances that help shape the skills that are required to cope with the Fourth Industrial Revolution (IR 4.0). Considering that this is our first attempt at organising a conference, we are therefore greatly honoured that the Universitas Negeri Semarang (UNNES), Indonesia, Mahasarakham University (MSU), Thailand and University of Hail (UoH), Saudi Arabia have all agreed to become our partners by contributing several reseach papers as well as providing reviewers to assess the quality of the papers.

Out of the numerous research works that had been submitted and reviewed, the Editorial Board have selected 22 papers to be published in the e-book. The discussions of these papers pertain to the use of technologies within the broad spectrum of Computer Science, Computer Networking, Multimedia, Information Systems Engineering, Mathematical Sciences and Educational Technology. It is hoped that the research findings that are shared in this e-book can benefit those who are interested in the various areas of computational technologies; such as graduate students, researchers, academicians and the industrial players, to name a few.

As the Project Manager, I would like to thank all of the committee members from the bottom of my heart for their tireless efforts in ensuring the success of ICECoT 2021. Without their continual support and excellent teamwork, this conference would not have come to fruition. In fact, holding this major event has been a good learning experience for us all, and I sincerely believe that our future conferences will become more outstanding if the same spirit is maintained.

Dr. Noor Aishikin Adam

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NFC-Based Merit Point Attendance System (MPAZ)

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Abstract—College hostels can be students' prime accommodation, especially for those who live far away from the university. Number of rooms available at college hostels are limited. Due to the large number of students' application for college hostels, the merit points-based on event attendances are used for the eligibility of college residency. The event attendance arrangement and merit points are generally done manually. Commonly organizers allot certain merit points to an event by distributing coupons and attendance sheets to participating students in the occasion. Thus, the merit points may be miscalculated. The tedious keying processes may be disputed for typing errors during data entry. In addition, due to the Covid-19 pandemic, the distribution of paper coupons and attendance sheets in crowded areas deters people from keeping a social distance of more than one meter and avoiding physical contact. The Malaysian Ministry of Health (MOH) recommends avoiding congested areas, confined spaces, and close conversation during the pandemic. Therefore, the aim of this project is to transform event attendance arrangement and traditional merit points collection into computerized, contactless, and paperless processes by implementing the Merit Point Attendance System (MPAZ). MPAZ is a near-field communication (NFC) based merit point attendance system to assist with college hostel residency qualification. The waterfall SDLC methodology is used for this project consisting of analysis, design, develop and test phases. The development of MPAZ includes several devices such as NFC reader (ACR122U), NFC cards, a server, and a wireless access point (AP). In conclusion, the college unit staff and students can utilize the MPAZ website to use and review the accumulated merit points and eligibility for college residency. Future works will include the development of mobile applications and the integration of biometric authentication in order to authenticate users, making the MPAZ system more secure.

Keywords—attendance system, event management, merit point, near field communication (NFC)

I. INTRODUCTION

While the technological era has progressed rapidly, it is still underutilized in certain areas of the vast developing world, where it could help to speed up the completion of tasks. An attendance is the act of travelling to or being present at a location or event on a regular basis. Monitoring attendance is a top priority for academic institutions, which use this data to assess the effectiveness of student success. In the conventional attendance system, students need to physically sign the paper-based attendance sheet. The distribution of physical paper in a crowded environment hinders social distance between individuals, potentially escalating disease transmission during the Covid-19

pandemic. The Malaysian Ministry of Health (MOH) recommends social distancing steps such as maintaining a physical distance of one meter between individuals and avoiding 3C areas which are crowded places, confined spaces, and close conversation [1], [2]. Therefore it is crucial to assess existing attendance procedures and take the required steps to prevent the disease from spreading and having negative consequences to society's health [3].

For students, a college hostel is a must, particularly if they come from different states in Malaysia. Due to the small number of rooms available at the college hostel, continuing students must earn enough merit points by attending specific university events to qualify for remaining as a college resident. Students must accumulate points manually under merit point scheme, which can lead to misplacing or losing collected paper-based coupons. Conventionally, the attendance sheet is passed around to any student who attended a university event. According to [4], this process takes time and there is a fair chance that you will lose the attendance sheet. Taking attendance by calling names or signing on paper, however, is inefficient and time-consuming [5].

Ideally, the event attendance process should include a contactless system that can track student attendance based on their secured identity, allowing their merit point to be calculated automatically without the need for physical contact. The merit points and event attendance arrangement are generally done paper based at Universiti Teknologi Mara Kampus Jasin (UiTM Jasin), with organizers allocating certain merit points to an event and then distributing paper coupons and attendance sheets to students who attended the event. At the end of the semester, the accumulated paper coupons with merit points are submitted to the college unit staff to calculate manually. The calculated value will then be updated for each student into a student information website known as the *iStudent*. Due to the huge number of students' applications for college hostels, the merit points may be miscalculated, and the tedious keying process can result in a typing error. If points are miscalculated, students who earn less cumulative merit points than the minimum threshold would be refused college hostel.

Students at UiTM Jasin were given a survey to see how they manage and use the current merit point attendance system. According to the survey, about 76 percent of students said it was difficult to collect and hold the coupons they were given. It indicates that the current merit point system is inefficient. Furthermore, 72 percent of students said that

losing the coupon was one of the reasons they were unable to get college hostel residency. The existing merit point system is still centered on paper distribution, which is the root of this problem.

Proper computerized system is required to prevent the issues discussed from arising. The current merit point system could be strengthened by fully utilizing the student card, which is already NFC-enabled instead of a paper-based system. Therefore, Merit Point Attendance System (MPAZ) ensures that the merit point can be credited automatically into the student's account.

II. LITERATURE REVIEW

A. Event Attendance System

Merit point is a point collected by students to stay in college hostel. Usually, merit points are collected by students engaging in any event conducted by their universities. According to [6], students must apply for a place in the campus hostel via an online system, and candidates are selected based on their merits and contributions to their campus society. In general, attendance is a tool for counting the number of people who turn up for an event or class, or for keeping track of their consistency. According to [7], a manually collected student attendance system has several flaws, including time consumption and data inefficiency. As a result, a computerized attendance recording system is implemented to overcome the shortcomings of manual management attendance systems.

The computerized attendance recording method is designed to automatically record student attendance, arrange attendance records, calculate student attendance percentages, and maintain attendance records [7]. When compared to manual methods of attendance taking, the computerized attendance recording method makes it easier for administrators to use data and produce reports. The use of a computerized attendance tracking system reduces redundant data entry, human involvement, repetitive work, and unintentional human errors [7]. Furthermore, this approach includes a user-friendly feature that aids in the efficient management of attendance data and improves the speed at which data can be accessed and processed [8]. Since all attendance data is stored in the computer and reports can be generated easily using machines, the system reduces the amount of paperwork associated with it. Wireless systems can be used to design and develop the computerized system.

B. NFC Technology

Short-range wireless technology has developed into a major element that simplifies everyday life with basic applications such as tracking, payment, and connectivity, among others. Bluetooth, NFC, RFID, Wi-Fi, and ZigBee are only a few examples of short-range wireless technologies available today. NFC has two-way contact, and the tags from NFC cannot be read at the same time, making it more reliable and secured than RFID [9].

NFC technology is a short-range high frequency wireless communication technology that allows data to be shared between devices that combine RFID and interconnection technologies, with a maximum rate of 242kb, over 5cm to 10cm distance [10]–[13]. NFC is a contactless communication technology based on RFID that was standardized in ISO/IEC 18092 [14] and allows for easy device-to-device communication [15]. The three modes of

NFC are peer-to-peer, reader/write [11], and card emulation [12], [16]. In peer-to-peer mode, data can be transmitted bi-directionally between two active NFC devices. While in reader/writer mode, small data can be transmitted unidirectionally between an active and passive NFC devices, for example, an active NFC reader and a passive NFC tag [11]. In emulation mode, data can be transferred from mobile devices to an NFC reader [12][16]. Since NFC is used in close physical proximity of 10cm or less, the risk of information leakage or unauthorized access is reduced [11]. This condition allows for its usage in various of application for example payment, ticketing [16], remote access security [17] and smart home [18].

III. SYSTEM DESIGN & DEVELOPMENT

The development of MPAZ includes several devices such as NFC reader (ACR122U), NFC cards, a server, and a wireless access point (AP). Adobe Dreamweaver was used to construct a read/write mode NFC-based merit point attendance system for a college hostel named MPAZ, and WampServer was used to create the database. The MPAZ website and NFC reader are integrated using JAVA socket programming. This allows the NFC reader (ACR122U) to connect and respond to the MPAZ website. The hardware and software used in MPAZ is shown in Table I and Table II, respectively.

TABLE I. HARDWARE REQUIREMENTS

No.	Hardware	Description
1	Processor	Intel Core i5-2430M
2	RAM	4.00 GB
3	Hard disk	432 GB
4	NFC Reader	NFC Reader ACR122U
5	NFC card	Mifare S50 RFID card

TABLE II. SOFTWARE REQUIREMENTS

No.	Software	Description
1	Windows 7 Premium	64-bit operating system
2	Microsoft Word 2013	Documentation
3	Database	WampServer (phpMyAdmin, MySQL)
4	Coding workspace	Adobe Dreamweaver
5	Server	Windows Operating System

There are three types of users for this project, which are an administrator, an event manager and students. The administrator is the one who manages the system and can add or delete event manager and student(s) in the system. Administrator (presumably the college unit staff) can also perform the function of an event manager. The event manager can be anyone who have been approved and added to the system by the administrator. The event manager creates an event, sets the merit point for the event, and also collects the attendance at the end of each event. Students can use their NFC based student card and scan it to NFC reader to get their attendance and merit points. The aim of collecting merit points and attendance is for college unit staff to decide whether a student is eligible to remain in the college hostel.

The MPAZ is set up in a client-server wireless network environment. Fig. 1 shows the physical design of the MPAZ system. When a Near Field (NF)-based student card is tagged to an NFC reader, the attendance database for merit points located at the server is automatically updated.

IV. FINDING & DISCUSSION

The event manager will view and activate the event using the MPAZ system after logging in. Fig. 3 shows the main page of MPAZ website

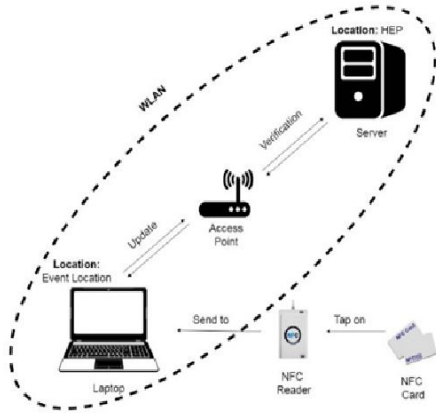


Fig. 1. MPAZ physical design

Fig. 2 represents the MPAZ system's flow. The event manager must first pick the event and then navigate to the page that will collect student attendance and add merit points using the NFC card. To identify a user in the system, a student's NFC card must touch or be in close physical proximity of less than 10cm to the NFC reader. The data from the NFC reader will then be sent to the database. The system will process the data to verify that the student has enrolled or attended the event. When the checking is completed, the system will credit the student's account with merit points.

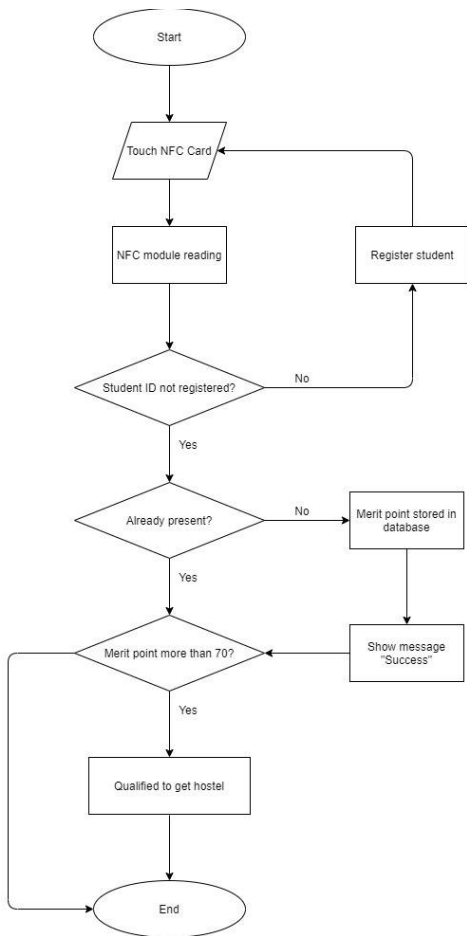


Fig. 2. MPAZ System flowchart



Fig. 3. Main page interface

The list of events available in the system is shown in Fig. 4. The event manager can only choose one event at a time, and the one that they are currently managing.

Event ID	Event Name	Enter
CSN193	Faculty Sportday	Enter
CSN275	Debate 2.0	Enter
CSN297	Debate	Enter
CSN231	Fifa 19 Tournament	Enter
CSN227	Jamcix	Enter

Fig. 4. A list of events

When a student touches the NFC reader, the machine immediately collects the attendance and grants the merit points. Fig. 5 depicts the user interface for collecting student attendance and modifying merit points using an NFC card.

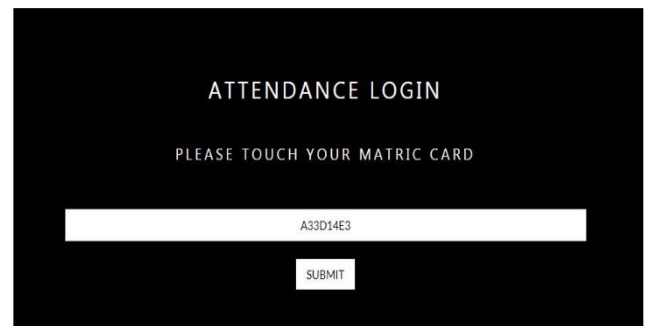


Fig. 5. An attendance login page

Fig. 6 shows the event manager tab after selecting a particular student. It will list all the information regarding the student's activities in the current semester, as well as the merit points received.

Matrix Number	Event Number	Time	Date	Merit Point	
2015123456	CSN193	22:50:00	2018-11-21	5	Delete
2015123456	CSN275	22:50:00	2018-11-21	5	Delete
2015123456	CSN297	22:53:00	2018-11-21	5	Delete
2015123456	CSN231	22:53:00	2018-11-21	5	Delete
2015123456	CSN227	10:22:00	2018-11-22	5	Delete
Total Merit Point				25	

Fig. 6. Details of selected student’s activities

Fig. 7 shows a list of all enrolled students. The event planner will look up students’ information to see how many activities they have attended. This page is to make it easier for the event manager to keep track of all students’ events during the semester.

Matrix Number	Student Name	
2015123456	Zulhairi	Select
2015104848	Irfan	Select
2015104849	Zaryani	Select
2015102841	Zulhaiman	Select
2015103001	Aiman	Select

Fig. 7. Students’ list

Fig. 8 represents the generated list of students who are qualified to stay at college hostels for the next semester. This interface only displayed the list of eligible students with more than 70 accumulated merit points. The college unit staff can print out the list as required.

Matrix Number	Student Name	Total Merit	
2015103001	Aiman	135	View
2015123456	Zulhairi	75	View

Fig. 8. A list of qualified students for a college hostel

Fig. 9 illustrates the upcoming event's interface. Students will see the upcoming event that the event manager uploaded to the website. Students also see the "event name," "event info," "event venue," "event start date," and "event end date" at this interface.

College campuses are nothing if not eventful, students have tons of activities and extracurriculars to choose from every day. To draw a collegiate crowd, we offers more than just free refreshments, Lectures, study groups, and job fairs are all par for the campus programming course. Here are some available event at the UTM campus (asin):

Event Name	Event Details	Event Location	Start Date	End Date
Faculty Sportday	Playing Games	Padang Kawat	2018-11-23	2018-11-25
Debate 2.0	Youth Power	Dewan Kuliah	2018-12-01	2018-12-01
Debate	Freedom Of Speech	Dewan Kuliah	2018-11-22	2018-11-22
Fifa 19 Tournament	Group Stage	Cafe Kolej	2018-11-22	2018-11-23
Jamclax	Present	Perpustakaan	2018-11-23	2018-11-24

Fig. 9. The interface of the upcoming event

Fig. 10 represents the student's overall merit point. This interface is to assist students in keeping track of their past and current activities as well as viewing their overall merit point during the semester.

Matrix Number	Event ID	Time	Date	Merit Point
2015102841	CSN193	09:26:00	2018-11-22	5
2015102841	CSN275	09:44:00	2018-11-22	5
2015102841	CSN227	10:11:00	2018-11-22	5
Total Merit Point				15

Fig. 10. Students’ total merit points

Fig. 11 lists the qualified students with the total merit points of all activities that had been participated. It indicates that the system automatically calculates and verifies the merit point. The staff can print out and use this report to check students who are eligible to get a college accommodation for the following semester.

Matrix Number	Student Name	Total Merit	
2015103001	Aiman	135	View
2015123456	Zulhairi	75	View

Fig. 11. List of qualified students with total merit points

V. CONCLUSION

With the MPAZ system, students' merit points calculation and accumulation are more reliable and secure. With a scan of their NFC card to an NFC reader given by the event manager at the end of an event, students will get their merit points instantly. In the conventional approach, students must manually collect the points, which can lead to misplacing or losing the collected coupons, and students can cheat by stealing coupons from other students. The system minimized the amount of fraud because it used NFC technology to ensure that only students who attended the event earned merit points. No merit points will be awarded to students who did not attend the event. On the student's website, students can keep track of the activities they have attended, and the merit points they have received, ensuring that the merit point belongs to the rightful owner. With MPAZ, students do not need to use their student activities card to receive coupons at every event that they attend. As physical paper-based coupons and attendance sheets are replaced by MPAZ, the use of paper will be decreased. Furthermore, this system provides a solution in proficiently managing attendance during Covid-19 pandemic.

Future work recommendations include designing a mobile application version of the MPAZ framework to allow for easy access to information from anywhere. Queuing to scan NFC cards can attract a large number of students at the same time, resulting in a crowd [19]. Therefore, a mechanism

for scheduled queuing for students can also be included in the MPАЗ applications to control crowds. Another recommendation is to combine NFC technology with biometric authentication in order to authenticate users, making the MPАЗ system more secure.

Electronics and Mecha Writer's Handbook. Mill Valley, CA: University Science, 1989.

- [19] A. A. Basir, N. N. A. Rashid, S. A. Halim, and A. G. Buja, "Developing smart queuing (SMARTQ) application using geofencing," *Int. J. Technol. Manag. Inf. Syst.*, vol. 1, no. 2, pp. 10–19, 2019.

REFERENCES

- [1] Ministry of Health, "COVID-19: Management guidelines for workplaces," COVID19, 2020. [Online]. Available: https://www.moh.gov.my/moh/resources/Penerbitan/GarisPanduan/COVID19/Annex_25_COVID_guide_for_workplaces_22032020.pdf. [Accessed: 07-Sep-2020].
- [2] A. Povera and E. Landau, "Adhere to SOPs to avoid getting infected," *New Straits Time*, 2020. [Online]. Available: <https://www.nst.com.my/news/nation/2020/05/592307/adhere-sops-avoid-getting-infected>. [Accessed: 28-Aug-2020].
- [3] H. Seyedin, A.-M. Zanganeh, M. Mojtabaei, R. Bagherzadeh, and H. Faghihi, "A model of reopening businesses to decrease the health and economic impacts of the COVID-19 pandemic: Lessons from Iran.," *Med. J. Islam. Repub. Iran*, vol. 34, no. 1, pp. 684–688, 2020.
- [4] H. U. Zaman, J. S. Hossain, T. T. Anika, and D. Choudhury, "RFID based attendance system," in *8th International Conference on Computing, Communications and Networking Technologies, ICCCNT 2017*, 2017.
- [5] T. S. Lim, S. C. Sim, and M. M. Mansor, "RFID based attendance system," in *2009 IEEE Symposium on Industrial Electronics and Applications, ISIEA 2009 - Proceedings, 2009*, vol. 2, pp. 778–782.
- [6] J. Entol, Y. Chow Ho, and T. C. Ong, "Student Satisfaction On Hostel Facilities In Politeknik Kuching Sarawak," *Online J. TVET Pract.*, vol. 2, no. 1, 2017.
- [7] U. Patel and S. Priya, "Development of a student attendance management system using RFID and face recognition: a review," *Int. J. Adv. Res. Comput. Sci. Manag. Stud.* 2(8), 109–119., vol. 2, no. 8, pp. 109–119, 2014.
- [8] D. A. Gupta, "Student attendance management," *J. Sci. Eng. Res.*, vol. 2, no. 11, 2011.
- [9] R. Chopade, P. Deshmukh, K. Kamble, and D. Nazarkar, "NFC Based Health Care System," 2016.
- [10] G. Chavira et al., "Services through NFC technology in Aml environment," in *Proceedings of the 10th International Conference on Information Integration and Web-based Applications and Services, iiWAS 2008, 2008*, pp. 666–669.
- [11] M. S. Chishti, C. T. King, and A. Banerjee, "Exploring half-duplex communication of NFC read/write mode for secure multi-factor authentication," *IEEE Access*, vol. 9, pp. 6344–6357, 2021.
- [12] D. K. Ayyar, "NFC based secure mobile health care system," *J. Eng. Res. Appl.*, vol. 8, no. 1, pp. 72–74, 2018.
- [13] N. A. Rostam, N. F. Zulkiffli, N. H. Ghazali, N. H. Ahamed Hassain Malim, M. Mahinderjit Singh, and M. H. Husin, "The acceptance study of NFC technology: A survey of models and user acceptance," in *2nd International Symposium on Technology Management and Emerging Technologies, ISTMET 2015 - Proceeding, 2015*, pp. 53–57.
- [14] A. Asaduzzaman, S. Mazumder, S. Salinas, and M. F. Mridha, "A security-aware near field communication architecture," in *Proceedings of 2017 International Conference on Networking, Systems and Security, NSysS 2017, 2017*, pp. 33–38.
- [15] D. Sethia, D. Gupta, and H. Saran, "Security framework for portable NFC mobile based health record system," in *International Conference on Wireless and Mobile Computing, Networking and Communications, 2016*.
- [16] Y. Ji, L. Xia, J. Lin, Q. Wang, L. Lei, and L. Song, "Chord: Thwarting relay attacks among near field communications," in *Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)*, 2019, vol. 11449 LNCS, pp. 329–348.
- [17] M. A. Ali Khan, M. H. Ali, A. K. M. F. Haque, F. Sharmin, and M. I. Jabiullah, "IoT-NFC controlled remote access security and an exploration through machine learning," in *International Conference on ICT and Knowledge Engineering, 2020*, vol. 2020-Novem.
- [18] J. Pacheco and K. Miranda, "Design of a low-cost NFC door lock for a smart home system," in *IEMTRONICS 2020 - International IOT*,