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SMA Kosgoro Bogor's Student Attendance Accountability Through Finger Print That Led to Appreciation

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A R T I C L E   I N F O

A B S T R A C T

SMA Kosgoro Bogor uses fingerprint technology as a tool to improve accountability of student attendance and monitoring. The implementation of fingerprint technology has enabled the school to have detailed and automated information about student attendance. The purpose of this article is to explain how the use of finger print system at SMA Kosgoro Bogor can improve student attendance accountability. The method used in this research is descriptive qualitative method that produces descriptive data in the form of written or oral observations of people and observable behaviour. The data source of this research uses primary data sources and secondary data. The research subjects were all students of SMAS Kosgoro Bogor. One form of appreciation given is the provision of free tuition scholarships at the beginning of each month that meets predetermined criteria, such as consistent daily attendance, recorded in the school attendance system, designated as a nominee by the homeroom teacher, active in extracurricular activities, speaking well, and behaving politely.

1. INTRODUCTION

Information technology plays a very important role in improving the quality of a company or business. Its work is not limited to the automatic acquisition of information, but also includes the creation of accurate, fast and truly complex systems. As a result, the system can work efficiently, in a flexible way. In educational institutions, the use of information technology is essential to improve the quality of education provided, with the aim of obtaining higher educational degrees.

Keeping and managing attendance records efficiently is important for student assessment. All formal learning institutions place great emphasis on class attendance and it is so important that students who do not meet the set benchmarks for class attendance are not allowed to sit for examinations (Okokpujie et al., 2017). According to Kabir et al. (2021) said that attendance is one of the most important indicators of a person's eligibility, punctuality, and devotion to an institution or group. The success of an organisation is highly dependent on the effectiveness of management in carrying out their duties. This level of effectiveness can be measured through the organisation's performance in managing its workforce (Krisnahadi & Septika, 2021). This emphasises the importance of organisations having a qualified workforce as it is an invaluable asset. According to Susilo and Abdurrahman (2023) success in achieving organisational goals does not only depend on modern equipment, complete facilities, but more on the ability of the individuals carrying out these tasks.

Fingerprints are one of the many types of biometrics used to identify individuals and verify their identity. If the fingerprint of an unknown person is stored, an "unknown" message will be displayed. Through this, parents can be notified of their student's arrival at the college or school (Chandramohan et al., 2017). The development of presence is driven by the need to know who is in a particular place at a particular time for future reference. Attendance is defined as the awareness that people are in the same place at the same time for a planned event. Maintaining and managing proper attendance records is important for student assessment. According to Lamin et al. (2021) implementing an automated system will help reduce teachers' work in recording and tracking student attendance in each class. Many studies have also shown that the use of biometric fingerprints can assist teachers in managing and maintaining attendance records in an orderly and efficient manner. Fingerprints are non-transferable, but also given a high status as proof of student attendance. Based on fingerprint recognition or fingerprint scanning, we present an automated method to verify the match between two human fingerprints.

Based on the above, it is deemed necessary to make changes that can assist schools in monitoring student attendance accurately and automatically, recorded appropriately. The use of finger print applications is expected to increase student discipline and responsibility. Thus, the use of finger print applications in schools has many benefits, including increasing student attendance accountability, reducing fraud, increasing administrative efficiency, increasing data security, and introducing students to sophisticated technology.

Finger Print. Another positive impact is the increasing level of discipline in an organisation or educational institution, as well as increasing attendance results (Kusniati, 2016). The existence of an attendance system in a meeting or educational institution can prevent fraud attempts in recording and reporting attendance. One of the modern technologies currently used to prevent fraud during attendance registration is a fingerprint-based recognition system. Fingerprint identification is one of the most reliable and effective biometric methods. Due to their effectiveness and stability over time, fingerprints have been used for identification purposes for over a century and have recently been automated (i.e. biometric) due to their high IT potential (Harshadbhai & Singh, 2016).   Educational institutions that want to develop and succeed in their environment must move towards the development of the information age by using computer tools to manage data. Information systems play an important role in the world of education today. The use of information systems at the education level can produce many positive benefits, including improved learning quality and performance (Utama et al, 2019).

Fingerprinting is a tool equipped with a system that can read fingerprints accurately, so not everyone can use it because everyone has a unique fingerprint. The use of fingerprint technology has been around since the 1970s. This tool is easy to use and safe to use in an educational environment. The accuracy of fingerprint attendance data is guaranteed because it can only be taken by the data subject and cannot be represented to others. Research on improving administrative efficiency by using image processing technology from the presence of fingerprints has been successfully completed. Using fingerprints has improved the efficiency of school administration. Teacher and employee data can be retrieved quickly and easily according to school needs (Riyadi, et al., 2023). The manual attendance update system and its total time is now replaced with a better system with an automatic attendance system that reduces the burden on teachers to maintain the attendance list and simplifies attendance analysis.

Mishra (2010) has outlined that the use of biometric technology, such as fingerprints, has significant benefits for educational institutions, especially schools. This fingerprint-based attendance system allows the recognition of individual students' fingerprints and verifies their attendance quickly, replacing the manual process that involves attendance sheets and the calling of class attendance numbers. To implement, fingerprint detectors need to be installed in each classroom, and students will be required to swipe their finger over the sensor to mark class attendance. The database will store the fingerprint records of all students in advance. When the fingerprint is swiped, the system will compare it with the existing database and automatically record the attendance of the student concerned in the attendance record securely stored on the server. Thus, this technology simplifies and speeds up the process of recording student attendance. Student attendance using finger print can affect student discipline regarding their attendance. Based on the research results, only most students use fingerprint attendance at school. therefore, the application of student fingerprint attendance must continue to be improved so that it has a significant role in improving student discipline, especially in school attendance. Changing the manual attendance system to a computerised system with the addition

of a Fingerprint system is done so that the level of error or fraud in doing attendance can be minimised and can provide better service, the output results or reports needed are as expected. This new attendance system will facilitate the process of controlling student attendance and be able to provide accurate final attendance reports as needed (Magriyanto and Mustofa, 2020). According to Le (2022), the fingerprint attendance system aims to flexibly and efficiently improve the management of educational institutions using biometric technology. This saves time wasted on naming and provides an efficient method of marking attendance.

Managing student attendance is the responsibility of every school, which must maintain accurate student attendance records. Manual attendance recording system is considered inefficient and time-consuming because it requires additional personnel to process data and count the number of students present. Therefore, a system is needed that can overcome the problem by managing student attendance records automatically and displaying attendance data in an electronic system, which will facilitate attendance management. A study by Anyakorah (2015) showed that the use of biometric technology to record student numbers has eliminated the need for school offices and administrative staff to keep records, thus reducing the administrative work involved in the process. Guidelines for recording school attendance. Research conducted using finger-based attendance has a positive effect on teacher training and student training (Fiiazah et al, 2020).

The attendance system is a system used to record the attendance list of each company member. The attendance system records the identity of company members and the entry and exit times of company members. The attendance system can also provide accurate reporting. Therefore, many schools use student attendance lists to track student attendance. In addition, the attendance register can also provide information about the performance of the school and its students. Fingerprint technology is a tool to facilitate students in doing attendance and avoid handling attendance data that is easy to do if attendance is still done manually (Rintjap, et al, 2014).

Fingerprints have been used in Indonesian education since 2008. The basis for using this fingerprint identification system in schools is efficiency in terms of attendance. This tool can facilitate schools in terms of saving time, energy and can guarantee the truth. Thus, the presence of teachers, education personnel and students can be proven through this tool without any fraud (Diartono, 2010).

Student Attendance. In early 2011, SMA Kosgoro Bogor started to implement fingerprint attendance for all school members, including education staff, teachers, students, employees, and even janitors. However, this is still not well planned and running because students are still waiting for orders to do finger prints. Whereas in reality there are students who attend school earlier than other school members. In 2019, fingerprinting was established as a means of proof of attendance that replaced the pattern of manual recording to digital as outlined in the form of a school principal's decree. To follow up on this, the school provides several Fingerprint attendance detection devices, which are attendance tools that can record the fingerprints of all

students, teachers and education personnel during arrival and return hours. In this way, it is hoped that there will be no more cheating in terms of attendance, because this tool is able to record fingerprints that are unique and not owned by other people even though humans are born twins. In addition, this tool works online and can be monitored from a computer connected to the tool.

Student attendance data is one of the most important parts of the school management system. Apart from being evidence of student attendance at school, student attendance data is also used as a measure of student achievement. Manual recording of student attendance is done by recording student attendance using a form that must be filled in by the teacher at the beginning of learning at school (Fajrin and Nurina, 2011). With the introduction of fingerprinting application, the process of recording student attendance becomes more accurate and efficient. Each student is identified by their own fingerprint, making it difficult for others to control or impersonate them. It also eliminates the need for time and manual labour. That way the attendance of teachers, education personnel and students as well as other school citizens will be recorded accurately. The use of this tool also greatly facilitates administrators in recapitulating attendance (Kartawijaya, 2018). The data collected into the system can also be utilised by picket teachers in recapitulating students who are absent every day.

In addition, the implementation of fingerprint technology has enabled schools to have detailed and automated information on student attendance. This information is in electronic form, making it easier to manage data and monitor student attendance. Therefore, SMA Kosgoro Bogor uses fingerprint technology as a tool to improve organisational efficiency and the quality of student monitoring, which ultimately contributes to providing high-quality education.

Research conducted by Fitri Ayu and Ari Mustofa (2019) in their work entitled "Attendance Application System Using Android-Based Barcode Scanner Technology" shows the importance of attendance practices as part of the training to be achieved by students and teachers, who are the main part of the academic world. The use of the old manual attendance system is no longer needed, because it is less efficient and applicable. Therefore, it is necessary to develop a more innovative and better Android-based digital watch application to replace the manual recording process. This finding is consistent with research conducted by Sitinjak et al. (2022) in Madrasah Aliyah, which shows that the collection of attendance data using manual methods, such as signing in the attendance book and manual collection, is no longer supported and is getting more sophisticated.

2. RESEARCH METHODOLOGY

This research was conducted at SMA Kosgoro Bogor which is located at Jalan Pajajaran No. 217 A, Kec. Bogor Utara, Bogor City, West Java. The method used in this research is descriptive qualitative method that produces descriptive data in the form of written or oral observations of people and observable behaviour. Data Sources This research uses primary data sources and secondary data. The qualitative descriptive method seeks to examine the

extent to which awards can motivate students to attend on time. The research subjects were all students of SMAS Kosgoro Bogor.

Preparation Stage. At this stage, the implementation team prepares the equipment to be used, namely finger print equipment. Determination of fingerprint sampling time. The sampling activity is carried out for one month, which is divided into 2 important parts, namely the sampling period in July 2023 and the implementation of finger prints on all students in August 2023. After all student data is recorded in the system, the next step is to conduct a trial to see the effectiveness of the finger print machine. Especially for class X student data, in addition to student identity, parents' mobile phone numbers are also added to the system which allows finger print data to be conveyed to parents. The obstacles that arose were recorded and then recapitulated and resolved by the team. The next stage is to socialise to parents/guardians by demonstrating how students do finger print at the parents' meeting that has been routinely held. The school also socialised and educated students on the importance of accurate attendance and discipline in finger printing as proof of attendance. Students are given an understanding of the consequences of unauthorised absences or manipulation of attendance data. Student data collected in the database will also be used as input in mid-semester or end-of-semester assessment activities and school exams.

Implementation Stages. The implementation stage consists of several parts that are interrelated with one another. There are 6 finger print machines available for students, and each student is free to finger print on any machine. At this stage, every day students finger print on any machine. If students encounter problems in doing finger prints, for example, there is a disturbance in the form of exfoliation of finger skin or other things that make student fingerprints unreadable by the system, they are required to report to the picket. Furthermore, the picket officer will forward the information to the pustekom team (handling) to find a solution. The solution given in cases like this is to manually record student attendance in the attendance system. In general, when there are students who cannot do finger print for various reasons, the students concerned record their attendance time on a piece of paper which is then submitted to the picket teacher to be forwarded to the homeroom teacher. Student data that has not been inputted will be entered manually by the homeroom teacher so as not to deprive students who have the opportunity to be discussed at the appreciation plenary meeting. Student attendance data for each month obtained information that the fastest student to attend and do finger print is at 05:07 WiB.

Assessment Stages. The assessment stage is carried out by reading student data presented in the database of the attendance system application (sisdik). Each student's data in each class will be recapitulated by the homeroom teacher according to the criteria for determining the latest attendance at school. Students who consistently arrive at school no later than 6.10am and are never absent or always present will be included in the recap of students who have the potential to win awards from the school. The fact that has been presented so far is that students who fall

into the category of the most disciplined students in their class tend not to change when students move up the grades. This shows that certain students tend to be more stable in maintaining their attendance at school, whether they are in the disciplined category or not. After the data has been collected at all grade levels by each homeroom teacher, a plenary meeting is then held led by the head of student affairs to determine students who meet the criteria for the disciplined student category. The number of students who received appreciation is strived to continue to increase compared to the previous year. For information, in the first year, 2019, only one disciplined scholarship was awarded regardless of grade level. After the pandemic and taking into account existing funding sources, it was determined that the disciplined student scholarship recipients would be two per grade level or six students per month. This was done so that more students would be motivated to attend school early.

3. RESULTS & DISCUSSION

The reason for the development of attendance is the need in the digital age to know who is in a place at a certain time for future reference. Attendance is defined as the awareness that people are in the same place at the same time for a planned event. Maintaining and managing proper attendance records is important for student assessment. All educational institutions including SMA Kosgoro Bogor place a high value on class attendance, which is very important and students who do not fulfil the required class attendance are not allowed to take exams. Traditional attendance tracking system is prone to human error and time-consuming for both students and teachers during class hours. The existing manual attendance recording system has a number of disadvantages, including lack of time sheets, data loss, wasted time, insecurity, and inefficiency. Therefore, by using the unique characteristics of fingerprint technology, a smart solution to the existing challenges is needed to replace the traditional attendance system. Through this paper, the author wants to design, design, and implement a fingerprint-based attendance management system for students. This type of process development uses attendance management software. To record and analyse students' fingerprints, Kosgoro's sisdik (information system) software is used to create a personal and graphical fingerprint scanner with a MySQL server.

In addition to being used as an indicator of appreciation for disciplined students, the use of finger print applications as evidence of student attendance can produce several positive character values, including: 1) Discipline: through the use of finger print application, students are taught to be disciplined in doing finger print every time they attend school. This can help students develop good habits in obeying the rules and their responsibilities as students; 2) Responsibility: by using the finger print application, students are required to be responsible for their own attendance, ensuring that they finger print correctly and on time. This will help students understand the importance of respecting their time and obligations as students; 3) Honesty: finger print application can help encourage students' honesty in recording their attendance. Since fingerprint is a unique identity that is difficult to fake, students are expected not to try to cheat or manipulate attendance data; 4) Discipline: through the use of finger print application, students are taught to be disciplined in following set procedures and rules. They have to follow

the correct steps to do finger print and comply with the rules that apply at school; 5) Accuracy: the finger print application allows recording student attendance with a high level of accuracy. This helps students and picket teachers to be more precise and accurate in carrying out their tasks, including attendance recording.

The use of finger print application as a means of proof of student attendance can provide benefits in shaping good student character. However, it is also important to pay attention to other factors that can influence students' character building, such as a good teaching approach, the role of teachers as role models, and a positive learning environment.

Figure 1. Finger print machine used by students

Source: Researcher, 2023

Figure 2 Example of student attendance chart read by the system
Source: Researcher, 2023

Figure 1 shows the finger print machine used by students to take attendance every day. There are 6 finger machines available for all 847 students with a data recording speed of about 2 seconds so it takes about 5 minutes to complete the recording of student attendance every day. To maintain the stability of the finger print machine and also due to the age factor of the machine, 3 machines have been replaced. The data collected in the finger print database system is then displayed in graphical form, as shown in Figure 2.

The data recorded in this system is then processed into handbook data by each homeroom teacher to then be used as a basis for determining prospective students who can be proposed to be discussed at the homeroom teacher plenary meeting at the end of the current month. In the plenary meeting held, each class that is included in the nomination list, the homeroom teacher is required to attend as part of the commitment in supporting activities carried out by the school. If there is a student from one of the nominated classes and the homeroom teacher does not have the opportunity to attend, then the student concerned is declared invalid and will not be discussed in the homeroom teacher plenary meeting. The school will strictly reprimand the homeroom teacher who has the opportunity to attend for various reasons.

Figure three below shows the daily student attendance record for each class. This will make it easier for homeroom teachers to use the data as a basis for presenting prospective students who will be discussed at the homeroom teacher plenary meeting. Students who are constrained by fingers that interfere with attendance records can report these conditions to the picket and homeroom teacher so that students still get their rights to compete for the appreciation that will be given.
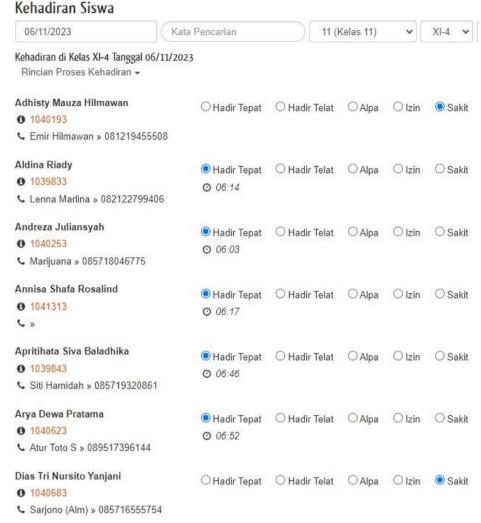
Figure 3 Example of student attendance recapitulation of class XI-4
Source: Researcher, 2023

Meanwhile, this system can provide a smart solution to the problems of existing traditional systems by providing a secure, flawless, accurate, fast, efficient, and reliable and effective method by avoiding the use of paper and pen. This can save time during attendance and also help eliminate attendance fraud. Student attendance at school is very important in the management of the education system. To ensure accountability of student attendance, schools use the Education Information System (Sisdik) to record all student data in detail. This system is an effective tool for monitoring student attendance and recording data accurately. In Sisdik, each student has personal data including name, student identification number, class and other information.

These data become the basis for recording student attendance. The system is designed to facilitate student monitoring from the school, teachers and parents. In addition to recording student attendance, Sisdik can also collect data by class. This allows the school and teachers to quickly see the list of students present in each class. The system therefore provides organized and easily accessible information, which makes it easy to monitor and manage student attendance. Education information systems such as Sisdik become a useful tool to ensure that students attend school regularly. Through this system, schools have accurate and complete records of student attendance, which helps improve responsiveness and discipline in the education sector.

The head of the class uses the attendance data recorded in sisdik as a basis in the decision-making process when selecting students for training. Students who are often late can be considered good examples of discipline. The students who qualify as the best students in each class are then convened in a plenary meeting of the class walikelas to determine the best among the nominees at each grade level.

Awards or appreciation for selected students are given in the form of 1 month free tuition, rotating trophies, certificates, and other prizes. This award aims to inspire other students to behave in a disciplined manner and become role models for others. In addition to the first attendance criteria, the school also sets standards for students who are selected as the most disciplined students. Here are some additional criteria agreed upon by the homeroom teacher and principal to determine the most qualified students:

1. Actively participating in extracurricular activities: Students who are actively involved in extracurricular activities such as clubs, organizations, or other social activities can reflect the student's positive engagement in school and society.
2. Behave well in speech and action: Students who demonstrate good, polite, and respectful behavior in interactions with teachers, school staff, classmates, and others in the school environment. Positive attitude and behavior outside the classroom is an important aspect that is always observed by the teacher.
3. Rated favorably by teachers and classmates: The opinion of teachers and classmates is also an important factor. If students receive appreciation, support and recognition from their teachers and peers for their positive behavior and contributions.

By setting these additional criteria, the school can identify students who not only have good attendance but also behave well, are active in extracurricular activities and are given good grades by the school community. The process of selecting and determining which students are eligible for the disciplined student award is determined through a plenary meeting involving all the vice principals and the school principal. The following are the steps in the process:

1. Candidate Selection: Initially, the homeroom teachers of each class select candidates who meet the criteria for the disciplined student nomination, including the criteria of early attendance, participation in extracurricular activities, good behavior, and good grades from teachers and classmates. Data is obtained from the sisdik finger print application.

2. Nomination Collection: Nominations from each class are collected and prepared for the regular mayoral plenary meeting at the end of the current month.

3. Plenary Meeting: The plenary meeting is a meeting that involves several parties, such as the principal, homeroom teachers, subject teachers, and counseling teachers. At the plenary meeting, the participants will discuss and consider the nominations of the most disciplined students from each class.

4. Determination of Award Recipients: After an in-depth discussion, a plenary meeting through the principal will decide on the student who is eligible to receive the disciplined student award, which may include a trophy, a certificate of appreciation, and a 1-month tuition-free scholarship. This decision is usually based on predetermined criteria and evaluation of the student's achievements and contribution in creating discipline in the school.

5. Announcement of Award Recipients: the award recipients are determined in the Principal's Decree, the announcement will be made on Monday at the beginning of each month. The school also invites parents to be present to receive the award from the school as a form of appreciation and to strengthen the relationship between the school, students and parents. Parents who attend will receive an award from the school as a great parent.

This award ceremony is not only an important moment in appreciating students and parents, but also motivates students to maintain discipline and quality behavior both in the school environment and outside of school.

4. CONCLUSION & SUGGESTIONS

Recording student attendance from manual to digital will assist schools in making decisions related to tuition assistance. Fingerprint machines can provide accurate evidence of student attendance and are difficult to manipulate. By using fingerprints as identification, fingerprint machines can ensure that only registered students can take attendance. The results of finger print recordings can be communicated to parents through the additional WA Blast application. This makes it easier for parents to monitor their children's attendance at school or parents are given access to directly view their children's attendance data via the web. Periodically in a week parents will receive a recap of student attendance from the school. With the implementation of finger print as evidence of student attendance, it is expected to encourage the formation of a disciplined character in each student. In addition, the school also hopes that students have the responsibility as students to mobilize their friends to be more disciplined while being students of SMA Kosgoro Bogor.

As a private school, ideally the school should continue to innovate in the form of services to stakeholders, which will ultimately improve the school's good image in the eyes of the community. The school has implemented various efforts to improve student discipline and give appreciation to students who have achievements. One form of appreciation given is to utilize fingerprints as a means of proof of attendance given at the beginning of each month. Students

who receive disciplined student appreciation must meet the following criteria: consistent in daily attendance, recorded in the school attendance system, designated as a nominee by the homeroom teacher, active in extracurricular activities, well-spoken and polite behavior. Other schools can do the same by utilizing the school operational assistance provided by the government in terms of procuring finger print machines and devices needed to support digital-based attendance.

REFERENCES

[1] Anyakorah, V. O & Ugwoke, N. F. (2015). Biometric System for Class Attendance, hal 261-262

[2] Ayu, Fitri & Mustofa, Ari. (2019). Sistem Aplikasi Absensi Menggunakan Teknologi Barcode Scanner Berbasis Android. IT Journal Research And Development. 4. 10.25299/itjrd.2020.vol4(2).3642.

[3] Chandramohan, J., Nagarajan, R., Kumar, M. A., Dineshkumar, T., Kannan, G., & Prakash, R. (2017). Attendance Monitoring System of Students Based on Biometric and GPS Tracking System. International Journal of Advanced Engineering, Management and Science, Vol. 3 No. 3, pp. 241–246.

[4] Diartono, D. A. (2010). Integrasi Sistem Presensi Finger Print dan Sistem SMS Gateway untuk Monitoring Kehadiran Siswa. Jurnal Teknologi Informasi DINAMIK, Vol. 15 No. 1, hal. 73–82.

[5] Fajrin, T., & Nurina, A. F. (2011). Analisis Sistem Presensi Dengan Sidik Jari Siswa SMK Negeri 2 Karangayar. Journal Speed – Sentra Penelitian Engineering dan Edukasi, Vol. 3 No. 3, hal. 78–83.

[6] Fiiazah, I., Safitri, F. O., Nurul, R., & Herzegovina, L. (2020). Penggunaan Fingerprint untuk Meningkatkan Kedisiplinan Guru dan Siswa. Jurnal Administrative Science, 1(2), 110–121. https://doi.org/10.54471/idarotuna.v1

[7] Harshadbhai, P. A., & Singh, S. (2016). Study on Fingerprint Based Attendance System. In International Journal of Recent Research Aspects (Vol. 3 No. 4 pp. 15-18). https://www.sparkfun.com/products/11792   https://doi.org/10.24001/ijaems.3.3.16

[8] Kabir H, Roy S, Ahmed T, Alam M. (2021). Smart Attendance and Leave Management System Using Fingerprint Recognition for Students and Employees in Academic Institute. International Global Journal of Computer Science and Technology, 10(6): 268 -276.

[9] Kartawijaya, F. (2018). Pengaruh Absensi Fingerprint terhadap Disiplin Tenaga Kependidikan di SMP PGRI 20 Jakarta. Seminar Nasional Inovasi Dan Tren (SNIT).

[10] Krisnahadi, Tama & Septika, Baiq. (2021). Implementasi Strategi Pengembangan Sumber Daya Manusia Dalam Peningkatan Produktivitas Karyawan Pada Era Revolusi Industri 4.0. JISIP. (Jurnal Ilmu Sosial dan Pendidikan). Vol. 5. No. 2. DOI:10.58258/jisip.v5i2.2001.

[11] Kusniati, L. (2016). Penggunaan Face Recognition untuk Meningkatkan Disiplin Kehadiran Pegawai Negeri Sipil. Jurnal Manajemen Pendidikan. Volume 25, Nomor 1.

[12] Lamin, N. Z., Jusoh, W. N. A. W., Zainudin, J., & Samad, H. (2021). Implementing Student Attendance System Using Fingerprint Biometrics for Kolej Universiti Poly-Tech Mara. IOP Conference Series: Materials Science and Engineering, 1062(1). https://doi.org/10.1088/1757-899X/1062/1/012037

[13] Le, N. T. T. (2022). Fingerprint Based Attendance Management System for Boarding Students. International Journal of Advances in Engineering and Management (IJAEM), 4, 1543. https://doi.org/10.35629/5252-040515431546

[14] Lonkar, P., Gawade, K., Oberoi, A., Varghese, B., & Professor, A. (2021). Student Attendance with Fingerprint Reader. International Research Journal of Engineering and Technology, Vol. 8 No.5, pp. 2881–2884. www.irjet.net

[15] Magriyanti, A. A., & Mustofa, Z. (2020). Implementasi Sistem Informasi Presensi Kehadiran Siswa Menggunakan Fingerprint Terintegrasi Dengan SMS Gateway. Jurnal Teknologi Informasi dan Komunikasi, Vol. 11, No. 1, hal. 56-66

[16] Manggala, Caslim Budi. (2012). *Integrasi Sistem Presensi Finger Print Dengan Sistem SMS GATEWAY Untuk Monitoring Kehadiran Siswa (Studi KAsus Global Jaya International School).* S1 thesis, Universitas Mercu Buana.

[17] Mishra, K. A & Acharya, D. 2010. Wireless Fingerprint Based Student Attendance System, hal 2-3

[18] Okokpujie KO, Osaghae EN, Okesola OJ, John SN, Okonigene R. (2017). Design and Implementation of a Student Attendance System Using Iris Biometric Recognition. International Conference on Computational Science and Computational Intelligence. DOI: 10.1109/CSCI.2015.96

[19] Olasupo, A. O., Ademiluyi, O. S., Usman, M. A., Abdullah, K.-K. A., Olubanwo, O. O., Ayo, F. E., Ojumadu, U. H., Salami, E. O., & Ibironke, T. E. (2022). *A Fingerprint Based Students Attendance Management System For Olabisi Onabanjo University.* Fudma Journal Of Sciences, 6(1), 253–265. https://doi.org/10.33003/fjs-2022-0601-896

[20] Rintjap, A. S, Rua, S., & Lantang, O. S. (2014). Aplikasi Absensi Siswa Menggunakan Sidik Jari di Sekolah Menengah Atas Negeri 9 Manado. Teknik Elektro Dan Komputer, Vol. 3 No. 3.

[21] Riyadi, S., Andriyani, A. D., Masyhur, A. M., Damarjati, C., Mutiarin, D., Jusman, Y., & 'Uyun, S. (2023). Improving Administrative Efficiency Using Image Processing Technology Through Fingerprint Attendance System. E3S Web of Conferences, 425, 04005. https://doi.org/10.1051/e3sconf/202342504005

[22] Sitinjak, N. M., Batubara, R. O., & Silaen, S. Y. (2022). Rancang Bangun Sistem Absensi Guru Sekolah Madrasah Aliyah YASPI Dengan Sistem QR Code Berbasis Web. Jurnal Sains dan Teknologi Widyaloka (JSTekWid), 1(2), 196-202.

[23] Susilo, A. E., & Abdurrahman, A. (2023). Manajemen Sumber Daya Manusia Untuk Meningkatkan Kinerja Karyawan Melalui Absensi Digital. Jurnal Educatio FKIP UNMA, 9(1), 318–326. https://doi.org/10.31949/educatio.v9i1.4629

[24] Utama, Hendri & Wachidi, Wachidi & Somantri, Manap. (2019). Implementasi Sistem Informasi Manajemen Di Sekolah Menengah Kejuruan (SMK) Muhammadiyah 1 Padang. JMKSP (Jurnal Manajemen, Kepemimpinan, dan Supervisi Pendidikan). 225. 10.31851/jmksp.v4i2.2915.

[25] Yusup, M. F., & Sari, E. D. K. (2022). Implementasi Absensi Fingerprint Siswa Terhadap Kedisiplinan Siswa di MAN 1 Kota Bekasi. Jurnal Al Marhalah, Vol. 6 No. 1, hal. 116–126.