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Attendance Data Collection Using NFC Tags

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Abstract: In the field of contemporary wireless technology, near-field communication (NFC) stands out as an important force, enabling contactless transactions and the seamless exchange of information between electronic devices. This research explores the innovative integration of NFC into the attendance input process, which is linked to a website-based attendance system. NFC's adaptability, which was initially prominent in payment cards, has expanded across industries, empowering smartphones, tablets, and wearable devices. This study contributes to the ongoing development of NFC technology, proposing a renewable solution for student attendance systems. With a vision of increased efficiency, this research anticipates increased utilization of time and resources, thereby providing a promising path for the advancement of attendance management. Attendance tracking is a critical aspect of educational and organizational management, with traditional methods often plagued by inefficiencies and inaccuracies. This research explores the implementation of Near Field Communication (NFC) tags as a modern solution for attendance data collection. The study aims to assess the effectiveness of NFC technology in improving accuracy, efficiency, and real-time access to attendance information. The research employed a mixed-methods approach, incorporating a pilot study in an educational setting. NFC tags were distributed to participants, allowing for contactless attendance registration. Data was collected through observations, user feedback, and system logs. Additionally, a comparative analysis was conducted between NFC-based attendance tracking and traditional methods. Findings indicate a substantial improvement in accuracy and efficiency with NFC tags compared to traditional methods. Real-time data access provided administrators with up-to-the-minute attendance information, enabling timely interventions and streamlined record-keeping. User feedback highlighted the ease of use and convenience of the NFC-based system.

Keywords: NFC, Attendace, Student

1. Introduction

Nowadays, the use of wireless technology is no longer a new thing, where researchers are competing to discover and develop various kinds of technology for wireless-based information exchange, where the use of wireless technology can reduce the use of space and facilities in every data transmission carried out. One form of wireless technology is Near Field Communication (NFC) technology, where NFC is a short-range wireless connectivity technology that allows two-way interaction between electronic devices. With NFC technology, users

can carry out contactless transactions and exchange information without wires.[1]. NFC is a short-range wireless technology that makes users' smartphones, tablets, wearable devices, payment cards, and other devices smarter. Near-field communications are the ultimate in connectivity. With NFC, users can transfer information between devices quickly and easily with a single touch—whether paying a bill, exchanging business cards, downloading coupons, or sharing research papers. Near-field communication (NFC) is a short-range wireless connectivity technology that allows NFC-enabled devices to communicate with each other. These devices include mobile phones, tablets, laptops, and wearable devices.[2] NFC started in the payment card industry and has continued to expand to include applications in various industries around the world. It also allows users to share content, create or confirm wireless connections, pair devices, connect Bluetooth-enabled devices and smartphones to other devices and computers, and create a connection between two machines or network devices. NFC technology can operate in one of three main modes: reader/writer, peer-to-peer, or card emulation.[3]

The form of innovation that researchers convey in this research is the use of near-field communication technology for the attendance input process [4], which is connected to a website-based attendance system. This technology has been widely used in recent years, both for payments, data collection, and security systems. The innovation offered is a form of renewable technology that is still being developed by other researchers, with the hope that this research can improve the existing attendance system assessed by a better level of efficiency in the use of time and resources.

2. Research methods

2.1. Research Model

A research model typically refers to a conceptual framework or structure that guides the design and conduct of a research study. It outlines the key components of the research, including the variables being studied, their relationships, and the overall approach to data collection and analysis. The research model provides a roadmap for researchers to systematically investigate a particular phenomenon or answer specific research questions.

This research refers to the prototype model of with stages as in Figure 1. This research begins with a process for determining goals and quick planning to identify needs and modeling (quick design modeling) of the system being designed. The next stage is the construction of a prototype, which is related to hardware use and programming. After the hardware and program have been created, the next stage is system testing for evaluation (deployment delivery and feedback).[5].

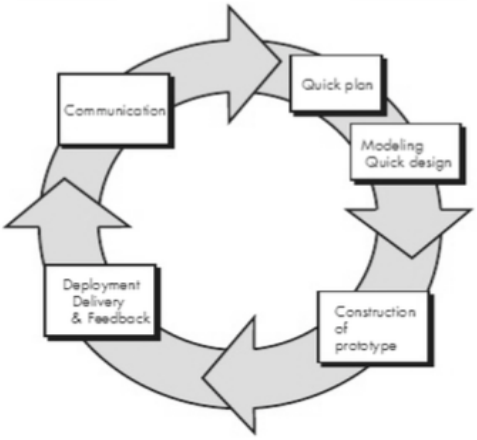

Figure 1. *Prototype Model*

The variable observed is the system's ability to recognize the account owner, in this case, the student who will be absent. Meanwhile, data collection techniques were carried out by conducting literature studies, experiments, testing tool functionality, testing facial recognition accuracy measurements, and summarizing the overall results.[4]

2.2. Research design

Research design refers to the overall structure and plan of a research study. It outlines the framework for collecting, analyzing, and interpreting data. A well-thought-out research design is crucial for ensuring that the study effectively addresses the research questions or objectives. The specific elements and considerations within a research design can vary depending on the nature of the research, discipline, and research objectives. A well-designed research study enhances the credibility and trustworthiness of its findings, contributing to the advancement of knowledge in the chosen field. Near Field Communication (NFC) is a short-range wireless communication technology that enables data exchange between devices when they are in close proximity, typically within a few centimeters. NFC operates on the principles of electromagnetic induction and radiofrequency identification (RFID).

The system design for this research is as follows:1. Design and manufacture a system for reading and writing information to the NFC Card for the attendance data management process.2. Design and manufacture of an attendance/attendance data reception system that also displays alternate entry times to determine whether students are attending on time.3. Designing and producing the final report from the attendance summary Data collection in this research was based on testing the functionality of the

presence system with NFC. Then test the server's acceptance of sending attendance data from the system to the database..

3. Result

3.1. Admin Page

An admin page typically refers to an administrative or management interface of a website, application, or system. This page is designed for users with administrative privileges to access and control various settings, configurations, and features of the system. The admin page is crucial for managing and maintaining the overall functionality and security of a website or application. This research has been carried out and produced a system in the form of a student attendance data collection system at Nur Azizi Tanjung Morawa Private High School using NFC/RFID, where the system has a display like the following:

1. Admin

The following is a page managed by the admin for managing student attendance data.

Figure 2. *Login Page*

A login page is a crucial component of many websites and applications, serving as a gateway for users to access personalized content or perform specific actions. When designing a login page, you want to prioritize usability, security, and a positive user experience. Provide fields for users to enter their username/email and password. Use secure methods to handle and store passwords, such as hashing and salting.

The login page serves as the initial access point to a secured system, website [6], or application. Its primary function is to authenticate users, ensuring that only authorized individuals can gain access to protected resources, The primary function of a login page is to verify the identity of users. Users typically provide credentials such as a username and password, and the system checks these against stored credentials to confirm identity. Admin can view student data as follows :

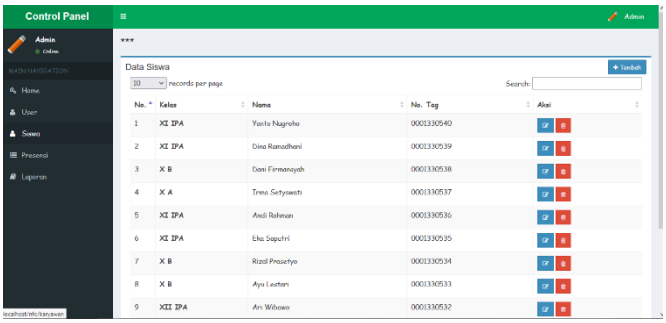

Figure 3. *Student Data*

Contains student data and NFC tags for student attendance, where this data is needed by students to collect attendance data. Admin can also view the report by selecting a date for the report.

to see today's attendance via the following page:

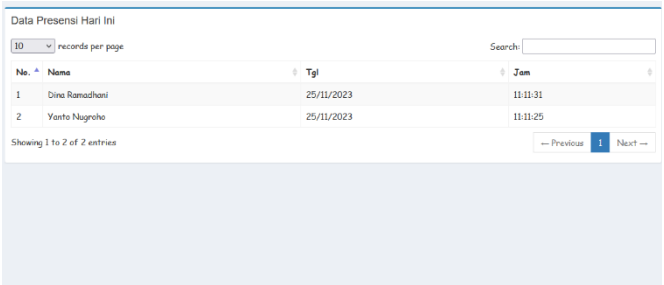

Figure 4. *Today Data*

admin can select reports based on date via the following page :

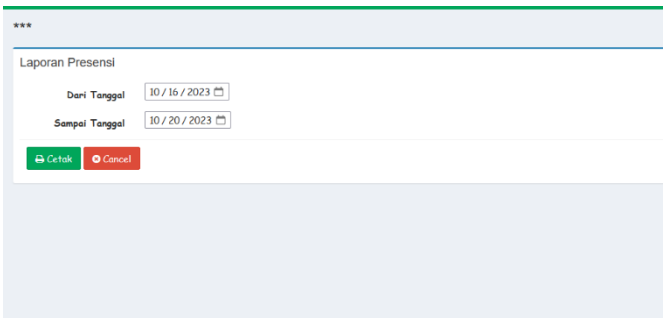

Figure 5. *Report Date*

After selecting the report date, the following display will appear:

Laporan Presensi 16-10-2023 s.d 20-10-2023

No	Nama	Tgl	Jam
1	Yanto Nugroho	16/10/2023	12:10:34
2	Dina Ramadhani	16/10/2023	12:10:28
3	Dani Firmansyah	16/10/2023	12:10:31
4	Irma Setyawati	16/10/2023	12:10:21
5	Andi Rahman	16/10/2023	12:10:41
6	Eka Saputri	16/10/2023	12:10:27
7	Rizal Prasetyo	16/10/2023	12:10:48
8	Ayu Lestari	16/10/2023	12:10:56
9	Ari Wibowo	16/10/2023	12:10:10
10	Nurul Hidayah	16/10/2023	12:10:52
11	Iqbal Fauzi	16/10/2023	12:10:55
12	Rini Susanti	16/10/2023	12:10:23
13	Denny Kurniawan	16/10/2023	12:10:42
14	Rina Fitriani	16/10/2023	12:10:40
15	Irfan Maulana	16/10/2023	12:10:12
16	Nita Puspita	16/10/2023	12:10:16
17	Dodi Saputra	16/10/2023	12:10:37
18	Yuni Safitri	16/10/2023	12:10:27
19	Agus Hermawan	16/10/2023	12:10:41
20	Maya Sari	16/10/2023	12:10:27
21	Fahmi Putra	16/10/2023	12:10:59
22	Dini Novianti	16/10/2023	12:10:45
23	Arif Setiawan	16/10/2023	12:10:37
24	Nia Indah	16/10/2023	12:10:54
25	Fikri Ramadhan	16/10/2023	12:10:39
26	Dewi Utami	16/10/2023	12:10:57
27	Budi Santoso	16/10/2023	12:10:52
28	Siti Aisyah	16/10/2023	12:10:25
29	Rizky Pratama	16/10/2023	12:10:33
30	Anisa Rahayu	16/10/2023	12:10:28
31	Ridho Sanjaya	16/10/2023	12:10:31
32	Hendriawan	16/10/2023	12:10:27
33	Budi Syahputra	16/10/2023	12:10:47
34	Yudi Andiansyah	16/10/2023	12:10:46
35	Dedi Admajaya	16/10/2023	12:10:16

Figure 6. *Report*

3.2. User Page

User typically refers to an individual who interacts with a website or a web application. The term is broad and encompasses various types of users, each with different roles, goals, and expectations. A user page typically refers to a web page or interface within a system, application, or website that is personalized for a specific user. The content and features of a user page are often tailored to the preferences, settings, and activities of the individual user. The purpose of a user page is to provide a personalized and relevant experience based on the user's interactions with the platform. Pages that use Near Field Communication (NFC) technology for attendance have several functions that utilize NFC's near-field communication capabilities. NFC allows data exchange between devices that support this technology by simply bringing them closer to each other. The main function of the NFC tag page for attendance is to record a person's presence. Every time someone brings their NFC device close to the NFC tag, the system can record time and attendance information[7].

Each NFC tag can be set to have a unique identification. This allows the system to precisely identify the individual or object carrying out the attendance recording process. This unique identification is often associated with specific user data[8].

To record attendance, do so on the following page :

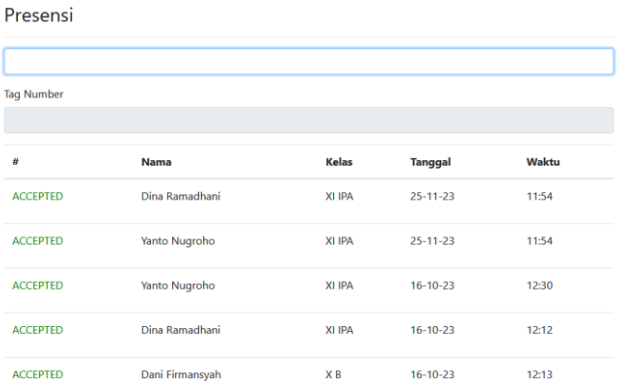

Figure 7. *Tag input page.*

On the input page, students can tag from a maximum distance of 5 cm, and the data will be entered with an acceptee status if the card has been registered.The resulting report can be selected based on time using the date time selected by the admin.

4. Conclusion

The next plan after research on the use of Near Field Communication (NFC) and Radio Frequency Identification (RFID) technology in assessing student attendance at Nur Azizi Tanjung Morawa Private High School could involve several steps to maximize the benefits of implementing this technology. The conclusion of a research project on attendance data collection using NFC (Near Field Communication) tags would typically summarize key findings, insights, and implications of the study. Here's a sample conclusion for such a research project.

Provide a concise overview of the research methodology, emphasizing the steps taken to evaluate the effectiveness of NFC tags for attendance tracking. Discuss key elements such as the pilot study, data collection methods, and analysis techniques.

In conclusion, the utilization of NFC technology for attendance data collection has proven to be a promising and efficient solution. Through our research, we have identified several key advantages and considerations associated with implementing NFC tags in an attendance management system.

Firstly, the use of NFC tags offers a convenient and contactless method for capturing attendance data. This not

only streamlines the process for both students and instructors but also minimizes the potential for errors in manual data entry. The technology's ability to quickly and wirelessly transmit data enhances the overall efficiency of attendance tracking[9].

Moreover, the findings suggest that NFC-based attendance systems contribute to improved accuracy and real-time data access. The system provides instant updates on attendance records, allowing for timely intervention and follow-up actions. This has the potential to enhance overall classroom management and improve the learning environment [10].

However, it's crucial to acknowledge some challenges and considerations. Issues related to the initial setup costs, hardware maintenance, and potential privacy concerns need careful consideration before widespread adoption. Additionally, user education and awareness are paramount to ensure smooth implementation and user acceptance [11].

In practical terms, the successful implementation of NFC-based attendance systems requires collaboration between educational institutions, technology providers, and relevant stakeholders. The system's scalability and adaptability to different educational settings should also be explored to maximize its benefits.

In conclusion, the research findings support the viability of NFC technology for attendance data collection, offering a reliable and efficient alternative to traditional methods. As technology continues to evolve, further studies and continuous improvements in implementation strategies will be essential to fully harness the potential of NFC-based attendance tracking systems.

Here are some future plans that might be considered:

1. Evaluation of Overall Implementation: conducting a comprehensive evaluation of the implementation of NFC/RFID technology in assessing student attendance. Review the successes, obstacles, and challenges that have arisen while using this technology.

2. Security and Privacy Improvements, Identify and implement additional steps to improve the security of the NFC/RFID system, especially if there are findings related to security risks during the research.

3. Involvement of Related Parties: Involving students, parents, and teachers in developing and improving the system Perhaps by holding feedback sessions or participatory forums to hear their views regarding this technology.

4. Training and raising awareness, Conduct additional training for school staff, teachers, and students to ensure better understanding regarding the use of NFC/RFID technology.

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