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Preface

The 2nd ICIEVE 2017, the International Conference on Innovation in Engineering and Vocational Education, held on October 25-26, 2017 at Aryaduta Hotel, Manado, North Sulawesi, Indonesia, is hosted by Universitas Pendidikan Indonesia (Indonesia), Universitas Negeri Manado (Indonesia), and Rajamangala University of Technology Thanyaburi (Thailand).

The conference was a platform for scientists, scholars, engineers, industrial professionals, and researchers to exchange, share, and discuss their innovation, experiences, research works and problem solving techniques in all issues in engineering and vocational education.

The participants of ICIEVE 2017 were from around the world with a variety of background, including academics, industry, and even well-known enterprise. In general, there were 140 papers discussing such various topics as engineering and technology innovation (mechanical engineering, chemical engineering, civil engineering, etc.), engineering education (basic science in engineering education, engineering education reforms, new technologies in education, etc.), and vocational education and training (industry-driven training programs and collaborations, lifelong learning – reskilling and upskilling, government and policy, etc.).

We would like to thank all of those who helped and supported ICIEVE 2017. Each individual and institution's support was very important for the success of this conference. Specifically, we would like to acknowledge the advisory board, scientific committee, and organizing committee for their valuable advice, help, suggestions, and support in the organization and helpful peer-reviewing process of the papers. This year, we would like to express our deepest gratitude for all the co-hosts of ICIEVE 2017, UNIMA, Indonesia, and Rajamangala University of Technology Thanyaburi, Thailand for the collaboration. We would also extend our best gratitude to keynote speakers for their valuable contribution for sharing ideas and knowledge in the ICIEVE 2017.

We sincerely hope that ICIEVE 2017 will be a forum for excellent discussions for improving the quality of research and development in relation to innovation in engineering and vocational education. We also hope that this forum will put forward new ideas and promote collaborative researches among participants. We believe that the proceedings can serve as an important research source of reference and the knowledge. Indeed, the proceedings will lead to not only scientific and engineering progress but also other new products and processes for better science and technology in vocational education.

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Radio Frequency Identification (RFID) Based Employee Attendance Management System

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Abstract. Manually recorded attendance of all the employees has produced some problems such as the data accuracy and staff performance efficiency. The objective of this research is to design and develop a software of RFID attendance system which is integrated with database system. This RFID attendance system was developed using several main components such as tags that will be used as a replacement of ID cards and a reader device that will read the information related to the employee attendance. The result of this project is a software of RFID attendance system that is integrated with the database and has a function to store the data or information of every single employee. This system has a maximum reading range of 2 cm with success probability of 1 and requires a minimum interval between readings of 2 seconds in order to achieve an optimal functionality. By using the system, the discipline attitude of the employees and also the performance of the staff will be improved instantly.

1. Introduction

The recording of employee attendance is one of the important factors in human resource management. In-depth and detailed information about an employee's presence can determine work performance, salary, productivity or agency progress in general. However, manually recording the attendance might cause some drawbacks namely time consuming and not being marked due to human error [1][2][3]. RFID (Radio Frequency Identification) technology started to be developed as one of the alternative technology that makes it easy for users to identify for various things [4]. This technology itself consists of a tag in the form of a special chip where the chip has a unique code of information and a reader that serves to read the codes in the tag [4]. This technology has been implemented into several systems such as library management system, parking system [5][6]. The use of RFID technology also has been used widely in such ways for automatic attendance system. In year 2016 and 2017, another student attendance monitoring system using a number of technologies has been presented [7][8]. The process of recording and reporting and employee attendance is a continuous process. Employees come at a certain time to attend the absence then at certain hours also the employee is doing absent return. At a certain times the administrative officer will take the attendance card and do the recapitulation to know the attendance number of an employee. Such a process would be very ineffective because it contains several weaknesses, therefore a system that can replace the process of data collection of employee attendance automatically and computerized with the help of RFID.

To focus to the research, therefore this research has been limited to entry employee profile and attendance of the employee. With reference to the formulation of the above problem, the objective to be achieved in this research is to design an attendance system by using RFID technology that can help the



institutions of the Faculty of Engineering, Universitas Negeri Manado to improve the effectiveness in performing employee absenteeism data by minimizing the possibility of errors that will occur and reducing fraud in data collection so that information security can occur.

2. Methods

In the absence system design using RFID technology, the prototype of RFID attendance system is divided into several parts as shown in Figure 1. Although in fact the application of RFID system as a whole is very complex, but in designing RFID prototype this attendance system can generally be divided into three main parts, namely:

RFID part system, which consists of RFID tag and RFID reader module. The next part is the USB port used by the computer to communicate with the RFID reader. The last part is the control unit and display section which is the user interface for the user to use the system. These both units are made by using VB.Net programming language application along with its database.

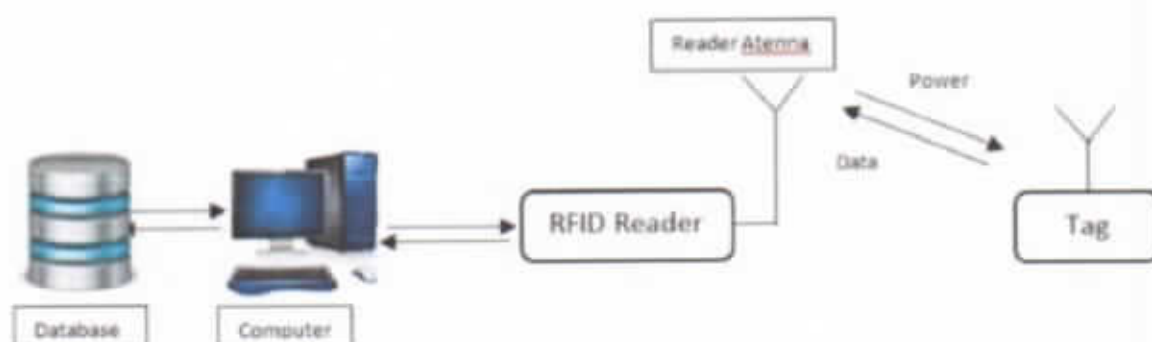


Figure 1. RFID attendance system block diagram.

2.1. Tags

A tag has a microchip with a special unique number, which is stored in the RFID memory, that is useful in identifying objects individually. This memory can be permanent or rewritable, which can be programmed electronically by the programmer to adjust with the needs of the system that is being developed [4]. Tags also have been produced in many variety materials such as plastic, metal and also embedded into coin. In this research, plastic material like a card is occupied. The contactless card attendance system is an option when there are many users that need to be registered. This kind of card also known as RFID tag. Nowadays, this tag has been produced in some variety materials such as metal, plastic. In addition, the length of time users in using the system is also relatively short. Generic attendance machine is an attendance machine that can accept input scan card for attendance. Generally, attendance machines can also be used to control access so that unauthorized parties cannot access a location [5]. Sometimes the identification process is done simultaneously with the process of recording attendance. This attendance system utilizes a non-touch card media in terms of identification. While there is the possibility of lending cards to other parties in the case of identification, this system facilitates the registration of large numbers of participants at short notice [9]. This system also provides convenience in the calculation at the end of the month or the end of the semester because all the data stored in the form of computerization.

2.2. RFID reader

An RFID reader is a special device that take a role to interrogate the tags. This is the most important part of the system. Inside of the reader, there is a small part that takes a very important role in RFID as it generates electromagnetic wave. It reads the number stored in the RFID tag memory and transfer it

into the middleware before it is being transferred to the computer. Middleware itself is an interface that takes a role to transfer the number from the tag to the database management system [4].

Frequency that are common in operational used ranges from 125 KHz – 2.4 GHz [4]. Frequency 125 KHz is used in this system as it features low cost, less power consumption, small factor form and easy to use [10].

2.3. Antenna

Antenna is a part of RFID system that is resides inside the reader part. As the name implies, the role of the antenna is to generate electromagnetic field, in which this wave.

2.4. Backend database

The backend database primarily deals with the storage of relevant information recorded by the RFID. It stores the data of the employee and also data of attendance after processed by the computer [4].

3. Results and discussion

As a result of this research, ID Card of every single employee is replaced by an RFID card uses to record their attendance every day. The card has a sequence unique number stored in its memory and uses to identified the member of the faculty. For connecting the RFID reader to the computer, it uses USB port 2.0 as a communication port. This RFID system has a plug n play feature therefore it does not need a driver in order to be recognized by the operating system of the computer. System itself (attendance system) firstly will check the unique number of the card into the database whether the number has been registered into the system or not. If the number of the tag is found in the database, then the system will save the employee id and the name and also the time of attendance into the backend database and display it into the screen of the computer. By the time system found that the number of tag is not recognized in the database, then it will ask the user to contact the administrator to record the number of the tag. System also will check whether the employee has been scanned the tag or not. If the ID has been scanned before than the system will reject the card and give a notification to the user that the card has been scanned on that day. Figure 2 shows the flowchart of the automatic attendance system.

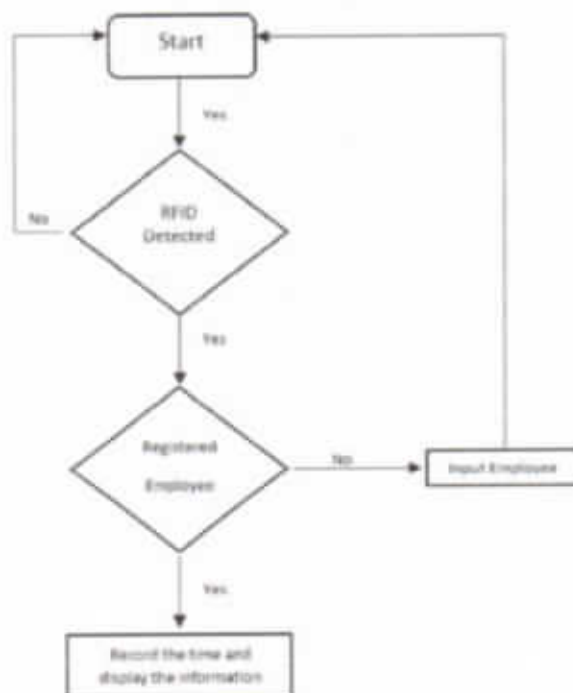


Figure 2. Flowchart of automatic attendance system.

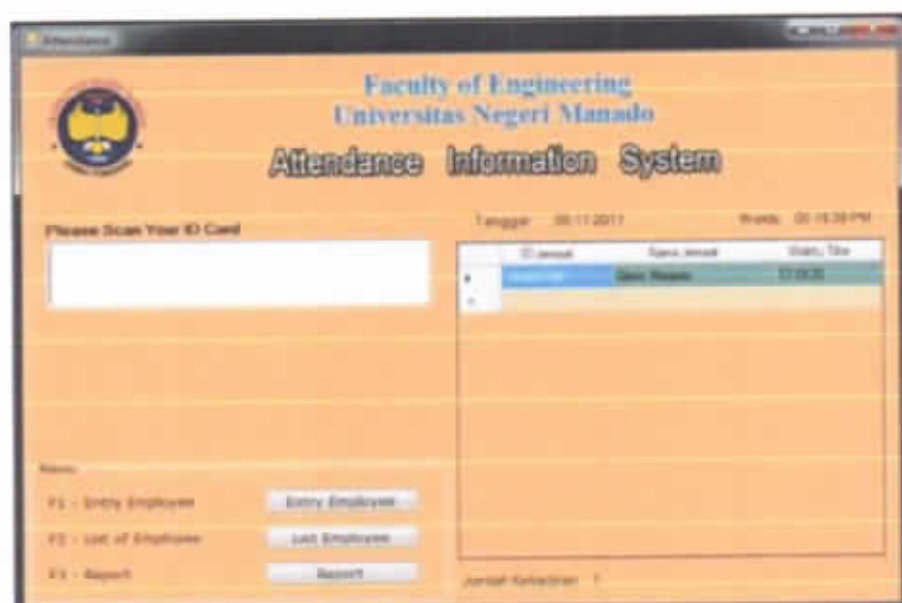


Figure 3. User Interface of the attendance information system.

As shown by the Figure 3, the system will show the id, name and the time of the time in of the employee. The id itself is the special unique number of the tag. There are 3 menus provided by the system, which are entry employee, list of employee and finally the full report of the attendance per month period. When the tag number cannot be found in the database, it will show a dialog box ask the user to contact the administrator to make an entry of new employee as shown by Figure 4.

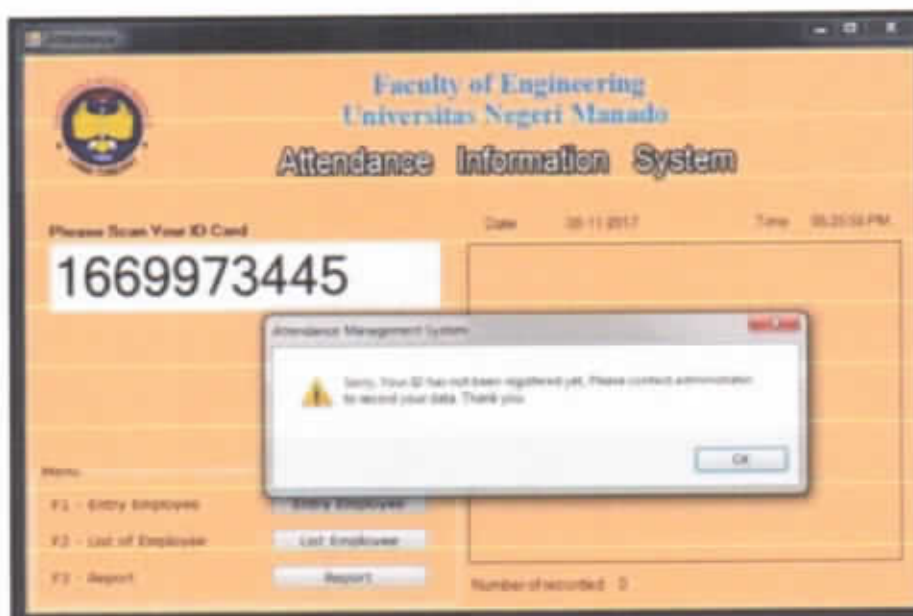


Figure 4. Unrecognized ID.

In addition to this process, Figure 5 shows when the new employee has been added to the system. However, Figure 6 draws the system reject to entry duplicate data when the employee already makes an absence. It is very important to have this function so we can assure that data is valid and readable.

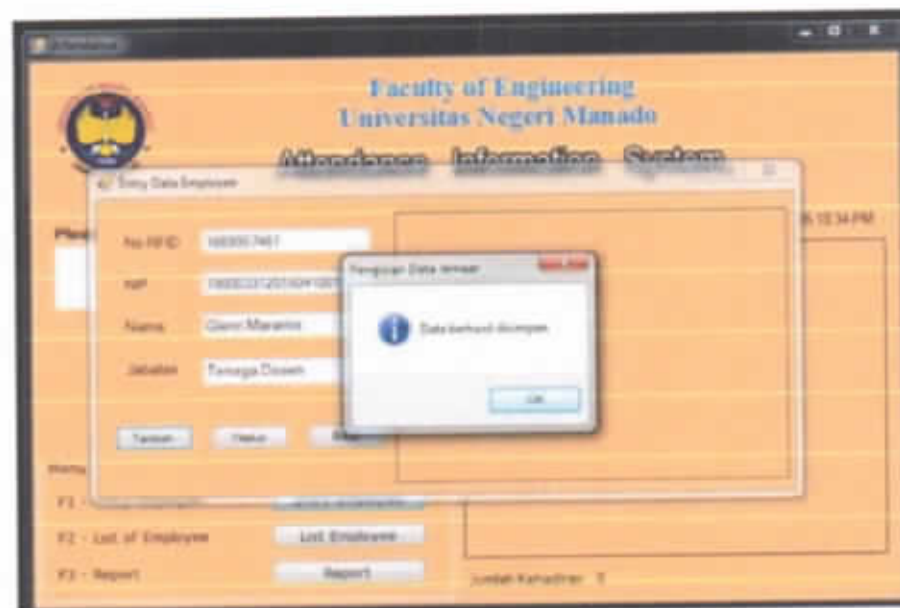


Figure 5. Entry new employee.

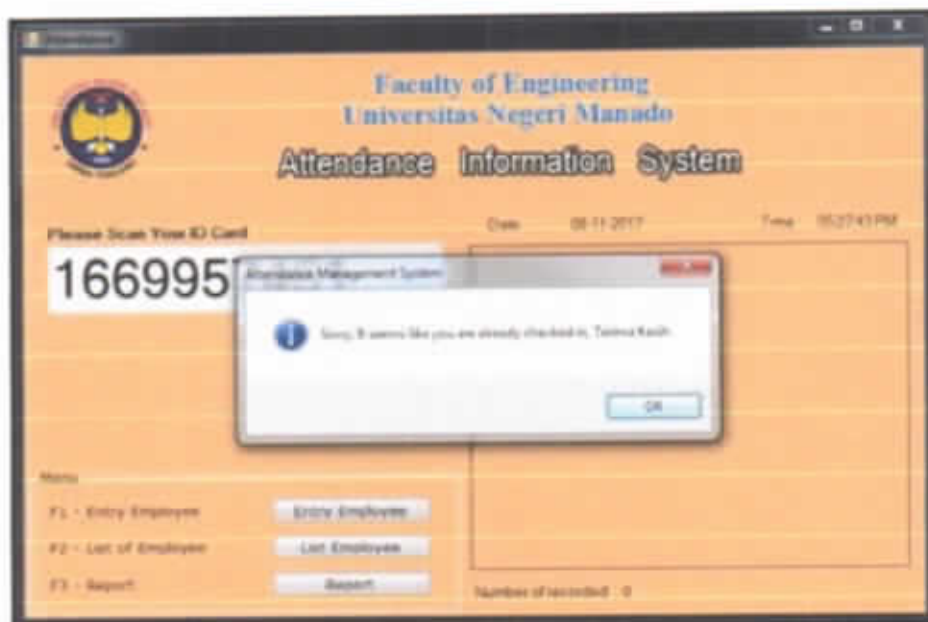


Figure 6. Duplicate entry of absence.

4. Conclusion

Based on the results of analysis, design and implementation has been done, then the conclusions obtained are as follows, which are employee absence process using RFID technology ensures information security from attendance data. Secondly, the existence of databases in data storage facilitate the search data so that it can help the institution or company to improve the effectiveness in performing data absenteeism of employees. Finally, it offers an ease way in recapitulation of employee attendance data for payroll purposes. After that, the system overall increases the efficiency of reporting and evaluating the performance of the employee and the discipline of the employee itself

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