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Application of RFID attendance system using PIC18F4580 microcontroller

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ABSTRACT

This project was created to track student attendance using the Radio Frequency Identification (RFID) system. Previously, the lecturer had to record the student's attendance on paper. There were numerous issues with students being able to cheat by attending lectures while using paper. By using RFID and a student card to automatically sign attendance, this project can assist lecturers in reducing such issues. The design is divided into four major sections: the power section, the input unit (RFID reader and RFID tag), the control section, and the output unit. The MPLAB X IDE and PROTEUS software were used for all simulations. The findings indicate that the lecturer can account for the presence of students in the classroom. When students enter the classroom, they must swipe their student ID.

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Introduction

RFID is a technology that uses electrostatic or electromagnetic combinations in the RF region of the electromagnetic spectrum to uniquely identify an object (M.K. Galhotra1 and A.M. Galhotra.2009).RFID tags are not 'enhanced bar code' because they are reliable technology advocates.As shown in Figure 1, RFID system contains of three components: an antenna, a transponder (tag), and a transceiver which readers are frequently combined into a single reader.The transponder is activated using radio frequency waves.When it is activated, the tag sends data to the antenna. RFID technology differs from bar codes.RFID can read the tag using RF without a line of sight depending on the type of RFID and the range between the transponder and transceiver.RFID tags also have a unique ID for each tag.This technology has been used in our country for several years in certain places like highways using Smart Tags such as 'Touch n Go,' and our government also uses this technology by using RFID as an identification card (MohdFirdaus. 2008). RFID will most likely replace the barcode system in the near future as technology advances.

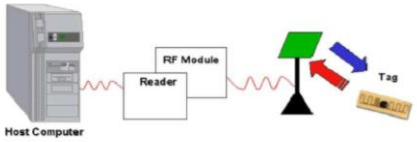

Figure 1 <Basic RFID System>

Literature Review

As illustrated in Figure 2, RFID systems can operate on a wide range of frequencies. The most common frequencies are low frequency (125 - 134 kHz), high frequency (13.56 MHz), and ultra-high frequency (433 and 860-960 MHz).

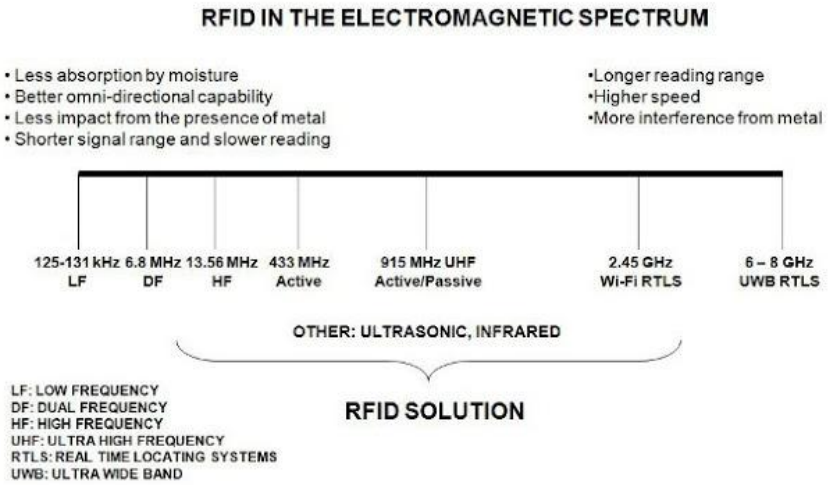

Figure 2: Frequency band spectrum of RFID
Source: Shain Armstrong., 2012
https://www.atlasrfidstore.com/rfid-insider

The frequency used will be determined by the RFID application, with actual distances obtained sometimes differing from what is expected. Low frequency tags have a longer wavelength and are more capable of penetrating thin metal materials. Typically, 125 kHz LF RFID systems are used compared to 134 kHz (Shain Armstrong.,2012). This LF RFID has a read range of 0-3 cm, and a data rate of 5-98kbps, which is slower than the HF RFID, and is less sensitive to radio wave interference.

According to the research, there are several systems that are similar to the proposed project, which implementsan attendance system using radio frequency identification technology. RFID is a technology proposed by (Lionel M. Ni and Yunhao Liu, 2004) that enables non-contact access to data stored on a transponder (also called tag or chip).Using readily available wireless devices and existing infrastructure, a prototype indoor location-sensing system was developed (M. B. Roslee and T. W. Lee.,2012) and created an indoor location-sensing system for use in a variety of mobile commerce applications. RFID technology was used by (P Suresh and R Kesavan., 2010) to communicate with a personal computer (PC) via a Wi-Fi connection.

Method

This project's system architecture is divided into hardware and software development. The entire hardware can be divided into four main units which is Power Supply Unit, Input Unit (RFID Reader and Tag), Control Unit (PIC18F4580 Microcontroller) and the Output Unit (PC and LCD). The system hardware is based on the RDM6300 module as a function of RFID reader. The development of the software used for the RFID interface to the PIC18F4580 microcontroller can be divided into four parts which are configuring the serial communication, reading the RFID card, fetching it from the memory location using C language and displaying it on the LCD. RFID technology uses automated data capture systems that help improve system efficiency. For identification, a combination of tags and readers is used. The code is stored in an RFID tag, which is attached to a physical object.

Once the system is turned on, the RFID reader begins to monitor and detect any cards scanned in its electromagnetic area as shown in the flowchart inFigure 3.When a card is scanned in close proximity to the reader, the reader decodes the information (card number) and sends it to the central PIC18F4580 Microcontroller for processing. To ensure that the card number is valid, the microcontroller processes and

decodes it. If valid, the system is accessed and it displays on the LCD which is Student Name and Registration Number.The card's information and the number of times it has been scanned will be sent to the PC database by the microcontroller. This data can be accessed at any time by lecturers using programmed student cards (tags) to track student attendance.

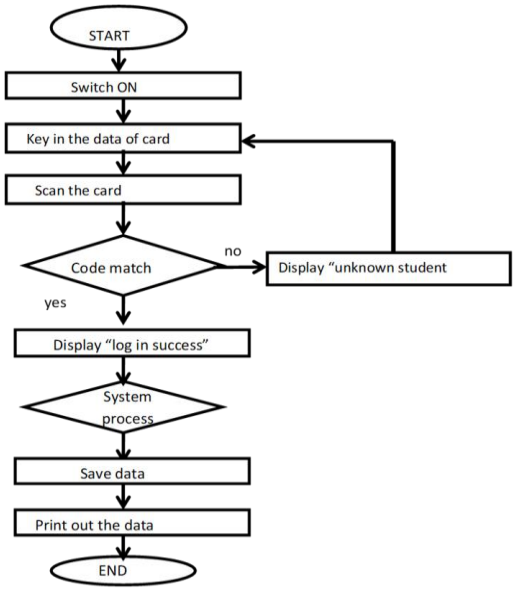

Figure 3 <Flowchart of the System Project>

Each student card is an RFID tag and will be placed on the reader. The information received from the student's card will be saved in the receiver buffer.Then the data is matched with the data that has been previously set in the database based on the attendance registration of a particular student.The 125kHz transponder will constantly respond to incoming data and collect it from the transmitter. The microcontroller works to store that data.The LCD screen will display this card id.This data will then be sent to the database.

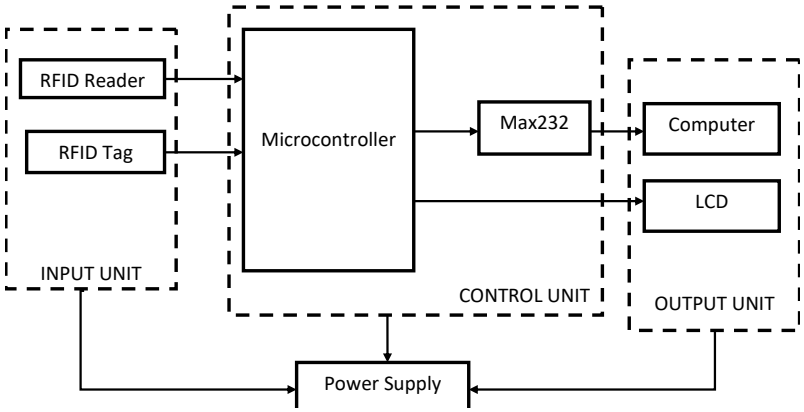

Figure 4 <Block Diagram of the RFID Attendance System>

Figure 4 depicts the RFID Attendance System's basic block diagram. When the RFID reader received information from the RFID tag, the reader will send information on the core which is PIC18F4580 to generate output. Once the PIC microcontroller generates the output, the LCD will show that the identification is correct and MAX232 will start running to detect atD9F control cables are for RS232 applications to show at a laptop. If the RFID reader received the false RFID tag, the reader will send another information to the PIC microcontroller, the PIC generates the false output to the MAX232 after MAX232 received the false information, and itautomatically sends a message to alert the laptop.Figure 5 depicts the RFID Attendance System prototype. The RFID Tag indicates the identification number of each student's card on class DEP4A.

Figure 5 <RFID System Prototyping>

Result and Discussion

The result of this project is that the lecturer can get the student attendance list without having to call the student's name to take attendance.The card includes a one-of-a-kind identification number known as an electronic product code (EPC).The 125kHz RFID tag can be read at close range and the electronic information embedded in each card can be written over and over again. This is how each student's RFID Card, RFID reader, and LCD segment are activated and tested.When the system is turned on, it will display the status of "Swipe Your ID CARD", which indicates that the system is now prepared to scan the card. When the card is swiped into the RFID reader, the reader recognizes and decodes the embedded (information) code and sends the coded signal to the microcontroller (PIC18F4580) for processing. The code (Student Name and Registration Number) will be displayed on the LCD screen if it is found to be valid. The central microcontroller (PIC18F4580) also transmits card information to be displayed on a computer screen. Table 1 below shows the real-time data of attendance class DEP5A from the department of Electrical Engineering, PKT.

Table 1 <Real-Time Data class of DEP5A (Dis'19 session) from the RFID Reader to Excel Sheet>

BIL	NAME	MATRIK NUM	CHECK IN
1	NUR SHAHIRAH BINTI RAZALI	12DEP18F1001	10:20:52
2	NUR HUDA BINTI MOHD ISMAIL	12DEP18F1002	10:21:06
3	NUR AIN ATHIRAH BINTI YAACOB	12DEP18F1003	10:21:19
4	ADIBA HANIM BINTI HAZAMAN	12DEP18F1005	10:22:24
5	NUR IZDIHAR BINTI MAZLI	12DEP18F1007	10:22:42
6	NUR AIN NABILAH BINTI AHMAD	12DEP18F1009	10:25:52
7	AFIFAH WIRDANI BINTI JAMISABRAN	12DEP18F1010	10:26:09
8	NURUL AMIRAH BINTI SHARAFAT	12DEP18F1011	10:29:52
9	MUHAMMAD AIMAN BIN MALIKI	12DEP18F1012	10:30:15
10	MOHAMAD AMIR ARFAN BIN ANUAR	12DEP18F1015	10:30:55
11	HANIZATUL NADIA BINTI HALIM	12DEP18F1016	10:31:52
12	CHE MUHAMMAD ALIF BIN CHE RAZAK	12DEP18F1017	10:32:12
13	MUHAMMAD YADIYFAKHRI BIN YUSNIRAFI	12DEP18F1018	10:35:52
14	MUHAMMAD AIEZAT NAIEM BIN ZARAWI	12DEP18F1998	10:40:18
15	SITI NURDINI BINTI ALIAS	12DEP18F1999	10:41:32

Conclusions

Finally, the goal of developing the RFID Attendance System is to systematize and improve the current manual attendance processes and procedures. A portable RFID reader with data storage is constructed to track student attendance, enabling serial port Universal Asynchronous Receiver/Transmitter (UART) communication between the RDM6300 and a computer.Hence, the project has provided a simple method of taking attendance compared to traditional methods of attendance system.

References

Davinder Parkash, Twinkle Kundu and Preet Kaur (2012). The RFID Technology And Its Applications: A Review FROM https://www.researchgate.net/publication/232575248_THE_RFID_TECHNOLOGY_AND_ITS_APPLICATIONS_A_REVIEW

Lionel M. Ni and Yunhao Liu (2004). Indoor location sensing using active RFID. Retrieved from https://link.springer.com/article/10.1023/ B:WINE.0000044029.06344.dd

M. B. Roslee and T. W. Lee (2012). Implementation of RFID and Bluetooth for data tagging. Retrieved from https://1library.net/document /q2eo02pq-implementation-rfid-bluetooth-technology-data-tagging-transmission-point.html

MohdFirdausBinMahyidin (2008). Student Attendance Using RFID System. http://umpir.ump.edu.my/id/eprint/345/1/3275Firdaus.pdf

Muhammad Haekal Bin Md Haled, Student Attendance System Using RFID From http://utpedia.utp.edu.my/14244/1/Dissertation_13944.pdf

M.K. Galhotra1 and A.M. Galhotra. (2009). Application of Radio Frequency Identification Technology in Libraries.

P Suresh and R Kesavan (2010). Analysis of Supply Chain Network using RFID Technique with Hybrid Algorithm. Retrieved from https://arxiv.org/ftp/arxiv/papers /1003/1003.4063.pdf

Shain Armstrong (2012). Which RFID Frequency is Right for Your Application. from https://www.atlasrfidstore.com/rfid-insider

Tsay. Li-Shiangavery Williamson, and SeughyunIm (2012). Framework to Build an Intelligent RFID System for Use in the Healthcare Industry.

Ukoima Kelvin NkaloEkweOgbonnayaAgwuEzeonyeChinonso Stanley (2019). Radio Frequency Identification (RFID) Based Attendance System with Short Message Service (SMS) Backup. Retrieved from https:// iosrjournals.org/iosr-jce/papers/Vol21-issue2/Series1/A2102010108. pdf.