FINGERPRINT ATTENDANCE SYSTEM USING ZIGBEE TECHNOLOGY

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Tajuk Projek : **FINGERPRINT ATTENDANCE SYSTEM USING ZIGBEE TECHNOLOGY**

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"I declare that this report "Fingerprint Attendance System Using Zigbee Technology" is the result of my own research except as cited in the references. The report has not been accepted for any degree and is not concurrently submitted in candidature of any other degree".

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Special dedicate:

To beloved family, which have a lot of praying and encouraging me throughout the development of this project. Do not forget also to my supervisor and co-supervisor of guidance and moral support to me and to all my fellow friends who have helped and supported throughout my educational journey.

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ABSTRACT

This project is designed and developed for the system to record and track student attendance fingerprint-based identification that allows monitoring of student attendance in class electronically. Thus it can overcome the problems that exist and to replace the existing manual system that uses paper sheets and forged signatures of other students. To address the problem, design a prototype using a wireless fingerprint attendance system based on ZigBee technology. The system is also able to see the records whether the students every day, every week or every month. All information will be recorded student attendance and stored in the system database graphical user interface (GUI). This system will facilitate the presence of institutions / organizations to make individual presence; in the same time the thumb data information is detected to be taken as a signature to be included in the system. In order to achieve a system that is easy and effective methods to have the characteristics of high security facilitate lecturers to save their time. All the information can be recorded attendance in a more systematic with this system. Thus, the project prototype wireless fingerprint attendance system based on ZigBee technology, it has achieved the desired objectives.

ABSTRAK

Projek ini direkabentuk serta dibangunkan untuk sistem merekod dan mengesan kehadiran pelajar berasaskan pengenalpastian cap jari yang membolehkan pemantauan kehadiran pelajar didalam kelas secara elektronik. Sekaligus dapat mengatasi masalah-masalah yang wujud serta menggantikan sistem manual sedia ada yang menggunakan helaian kertas dan peniruan tandatangan pelajar lain. Bagi menangani masalah tersebut, reka bentuk prototaip menggunakan tanpa wayar cap jari sistem kehadiran berdasarkan ZigBee teknologi. Sistem ini juga dapat melihat rekod-rekod pelajar sama ada setiap hari, setiap minggu atau setiap bulan. Segala maklumat kehadiran pelajar akan direkod dan disimpan didalam pangkalan data sistem graphical user interface (GUI). Sistem kehadiran ini akan memudahkan institusi / organisasi untuk membuat kehadiran individu, dalam masa yang sama maklumat data ibu jari yang dikesan akan diambil sebagai tandatangan untuk dimasukkan didalam sistem. Dalam usaha untuk mencapai sistem yang mudah dan kaedah yang lebih berkesan kerana mempunyai ciri-ciri keselamatan yang tinggi memudahkan pensyarah untuk menjimatkan masa mereka. Segala maklumat kehadiran pelajar dapat direkodkan dengan lebih sistematik dengan sistem ini. Dengan terhasilnya prototaip projek tanpa wayar cap jari sistem kehadiran berdasarkan ZigBee teknologi ini, maka tercapai sudah objektif yang diinginkan.

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CHAPTER I

INTRODUCTION

1.1   Background

There is some evidence that fingerprint identification has long exist. The earliest reporting introducing fingerprint science is Marcella Malpighi in the year 1686. According to Sir Francis Galton (1888), he has shown scientifically that fingerprint is unique and remains unchanged throughout life. According to Sir Edward Henry (1897), he managed to classify fingerprints to five classes of normal curve, curve camping, left loop, right loop and eddy. Fingerprints have unique characteristics and are different fingerprints between each other.

Accordingly, a "Fingerprint Attendance System Using Zigbee Technology (FASUZT)" industrialized as an endeavour to apply the progress of data knowledge in management and association of IPT. Assembly of "Fingerprint Attendance System Using Zigbee Technology" is aimed to update the association led by the university. Arrangement to be industrialized is working to assist and enable the university administrators, lecturers and association to record the attendance of students.

For the progress of "Fingerprint Attendance System Using Zigbee Technology" has been industrialized established on an consolidated computer joining data association needs to aid association university company student attendance record keeping and systematic manner. Therefore, this arrangement creates a systematic data association for enable notifying of data.

Zigbee knowledge is a new knowledge industrialized in present years. Assessing alongside a little continuing wireless contact knowledge, the Zigbee has the supremacy of low manipulation and low cost. It is extremely suitable for wireless sensor web applications. Targeting the flaw of established wire attendance arrangement, wireless design methods "Fingerprint Attendance System using Zigbee Technology" is proposed. It grasped an association attendance across fingerprint identification. At the alike period, the arrangement merges the Zigbee wireless knowledge and the attendance of management. It realizes low price, low manipulation and elevated presentation fingerprint data buy transmission and credit purpose that provides a new method for the attendance of institutions such as universities, schools and power offices.

So, after the fingers are swiped, a check will be grasped out alongside continuing databases and the corresponding student will be a signal to materialize on his attendance record is upheld in the server. Transfer fingerprints from the mechanism to the server can be completed lacking wires employing precise wireless adapters that jointly can form a web in a short distance and hold out the verification process.

The methodology utilized to develop this arrangement is progress prototype approach. In supplement, this arrangement industrialized employing fingerprint knowledge obtainable at this period as SN-FPR-UART Fingerprint Reader, Fingerprint Reader GUI, PIC16F876A, XBee Pro (transmit and receive) and use Microsoft Visual Basic database to retain trail of student attendance.

Project entitled "Fingerprint Attendance System Using Zigbee Technology" this is a power to furnish an arrangement that is thrilling, vibrant and methodical data on student attendance. Current arrangements and methods use an extra systematic and effectual use in the arrangement data to be relayed to the user.

1.2   Objectives

There are two main objectives in pursuing the accomplishment of this project:

   i.   To design a prototype system using fingerprints attendance.
- It can be executed in the presence of students at the university. This will prevent fraud in student attendance.

  ii.   To develop a graphical user interface (GUI) using Microsoft Visual Basic
- That will integrate with the fingerprint system to capture and record student attendance. It will communicate with the interface in Visual Basic to display the database.

1.3   Problem Statement

At the moment, the current system in lecture or lab sessions, lectures will deliver sheets of paper a list of students to enrol in classes for the students who attend it. Cheating in attendance often and easily seen. For example, another student signed his or her friend's attendance. So, to avoid this problem, it is appropriate to develop attendance management system using fingerprint recognition that will track and record the attendance of each student in the class. RFID is easy to produce and copy, but fingerprints are unique to each person. Iris as well, it is a unique retinal tracking system but it takes a long time to scan the retina. Thus, the system is not developed based on the current RFID system in smart card student or retinal tracking system (iris).

1.4   Scope of Project

Generally, all projects have their own scope or limitation as a guideline. There are three scope of project:

i. This project will involve software and hardware prototype ONLY implementation.
ii. Visual Studio 2010 will be used to create a Graphical User Interface (GUI) based on the previous GUI of fingerprint attendance system.
iii. For hardware implementation, Zigbee and fingerprint attendance circuit based on cytron product with few modification of the current circuit in order to set connection with Zigbee.

Research	Research on fingerprint algorithm.
	Get familiar with Microsoft Visual Basic software and Zigbee module.
Design	Design the interface with Fingerprint Reader GUI Description using SN-FPR-UART Fingerprint Reader Module based on Zigbee.
	Include the basic personal information database i.e. full name, matrix number, course, section, group etc.
Develop	Develop the fully functional software that can work on Microsoft Visual Basic platform.
	Test the flexibility and performance of the system.

Table 1.1: The Project Scope for Implementation of Project

1.4.1 Hardware Development

Basically this project does not involve the development of hardware. The software is integrated with SN-FPR-UART Fingerprint Reader module through PIC16F876A and Zigbee module. The hardware consists of two blocks, the transmitter and receiver. Transmitter block it consists of Fingerprint Reader Module (SN-FPR-UART) for captures the data which is a person's fingerprint. Turn in connected to a PIC16F876A microcontroller via RS232. The unique ID of the captured data is sent through the Zigbee transmitter module for further processing. While the receiver blocks, it receives a unique ID that is captured by Zigbee receiver module. If they match, then the signal on the LCD is shown. Then the microcontroller sends the data to a PC through RS232.

1.4.2 Software Development

Software development includes design the Fingerprint Reader GUI using Microsoft Visual Basic. This programming language is used to integrate with the Fingerprint Reader Module (SN-FPR-UART) as an input. To make this reader to communicate with Microsoft's.NET Framework, the SN-FPR-UART Fingerprint Reader module provided is used.

1.5   Project Report Structure

This thesis consists of five chapters. For CHAPTER 1 will be explains about overview of project, objective, problem statement, scope of project and outline thesis.

CHAPTER 2 will describe the theory about fingerprint attendance system using Zigbee technology (FASUZT) and the literature review in regarding the previous similar project on FASUZT. It will explain about the concept of the components that are used in the project.

CHAPTER 3 includes the project methodology. It will explain how the project is organized by the flow chart of process in completing this project. Also in this chapter, it discusses the methodology of the system and process overall project, block diagram, project design include software and hardware design.

CHAPTER 4 will be discussing about the result obtained of the project and a discussion about the result. This chapter also discuss about the experimental result, expected performance and performance limit that can be achieve.

Finally, the conclusions for this project are presented in CHAPTER 5. This chapter also discusses about the recommendation or future development of the project and cost that involved in the project.

CHAPTER II

LITERATURE REVIEW

2.1   Introduction

Every project has a literature review and related works of the project. This chapter will explain about the platform and all tools that have been used to build this project. That is included Microsoft Visual Basic as a system development platform, SN-FPR-UART Fingerprint Reader Module and Zigbee Module as hardware used the explanations about fingerprint itself and also an example of attendance system that already had been used in real time.

2.2 Attendance Management System

Attendance Management System is the easiest way to track the presence of an organization for the lecture time, during the examination, working hours, etc. associated with the presence of management. It simplifies the process of data entry coming & out/in with a smart card machine and produce reports required by the administration. This facility also for the revision of data coming to and exit/entry directly from a computer terminal, which can save time for data access arrangements arrival & exit/entry in which the parties involved just have to touch the Smartcard Reader smart card (smart card machine).

2.2.1 Iris Recognition

The human eye is sensitive to visible light. It will improve the lighting in the eye causes the pupil to contract to be great. Visible light causes specular reflections in the iris ring. In contrast, the human retina is less sensitive to near infrared radiation (NIR) in the wavelength range from 800 nm to 1400 nm, but still detailed iris NIR imaging with illumination.

In order for the measurement of dynamic movement to the human pupil, iris makes light reflex resulting from affecting the quality of digitalized images. This allows biological phenomena occur and develop two pupils illuminate simultaneously when one eye with visible light.

This is an innovative method to propose the extraction of information on how the human eye responds to light. Decision several study show that it's this feature is the characteristics of distinguish. Although the uses of the Euclidean distance measurement, an average recognition accuracy of 99.1% is obtained. The method used has the potential to be a "fraud-proof" because the DFS can only be taken from the only living irises.

2.2.2 RFID

Radio Frequency Identification (RFID) is an Assessment Centre which includes criteria for tags and storage devices are needed to evaluate the use of RFID systems. RFID systems are used in different situations; require the detection of unique items. RFID tags, there are in the context of enterprise resource planning and supply chain management that make goods that can be seen from manufacturing through distribution. RFID tags can also be used to carry basic information such as address or more complex information used at different stages of assembly lines.

With the use of RFID systems, the management of student attendance will be easier, more efficient and more accurate. It can also be used in places like hospitals, government offices, as well as companies to monitor their employee's attendance. First, RFID systems can be used for real-time recording student attendance. It can automatically collect and record the presence of all the basic information such as name, time attendance for the time in and out, and ID number.

Second, this system can be used as access control systems. Only the key tag or RFID card only can access the place. Therefore, with the use of RFID systems, security access control for class attendance is no longer a problem. Third, RFID attendance system has the ability to back up data, repair and replacement tags. A schedule that is configured by the user can be automatically generated in the software. In the table, the time of entry and exit can be viewed and edited in the user interface.

At the conclusion of a study made by the Iris and RFID system, fingerprint system selection to choose from. This is because the two systems studied have some disadvantages compared to the fingerprint system. to use for class attendance management, is suitable for fingerprints to avoid fraud attendance of students. Selection as a fingerprint attendance system is selected based on the problems and objectives that have been made.

2.3   Related Works

As explained earlier, this project only involves the development of software only. This chapter contains the literature review of the project. It consists of the review of the programming language that have used and how it can integrate with the hardware SN-FPR-UART Fingerprint Reader Module, PIC16F876A and Zigbee Module also the assessment of fingerprint.

2.3.1   Microsoft Visual Basic

Microsoft Visual Basic is a free development tool that can help in designing and programming simple or complex applications. Although it is stripped down version of the full program, but still need other tools to use. It has a nice, good interface to be desired and is optimized to work quickly. Besides that, the simplicity found in VB this is an advantage for amateur programmers.

Code editor can automatically adjust and attractive graphical tools to help make text easier to analyze. Color is also used to indicate various types of code (variable, comments, class, etc.) according to the desired design. The program interface can be customized in any way with an attractive and easy production.

Codes easily added either by directly writing or by using a GUI. Its auto-complete feature, called IntelliSense, is very accurate and it helps to increase write speed and reduce the likelihood of errors because the objects referred to (a common example is when you cannot remember if a variable called SomeVariable or Somevariable, errors often made in the case of sensitive programming language).