RADIO FREQUENCY IDENTIFICATION (RFID) AND WEB BASED STUDENT ATTENDANCE SYSTEM

1Vasu Gandha, 2Maulik Gevariya, 3Dirgh Jani, 4Priyanka Patel
1,2B.Tech Student, 3B.Tech Student, 4B.Tech Student, Assistant Professor
1,2,3,4Smt. Kundanben Dinsha Patel Department of Information Technology,
1,2,3,4Chandubhai S. Patel Institute of Technology, CHARUSAT, Changa, Gujarat, India

Abstract: In school, student irregular attendance is major issues which can affect his academic performance, taking attendance in a conventional way like by calling roll number or by signing on paper is very tedious and time-consuming. On another hand when a child leaves home for school parents get worried whether the child reached school or not. RFID based E- attendance and child security system can be used as a solution to both problems. RFID (Radio Frequency Identification) secure system which uses electromagnetic waves to detect the object carrying the tag. This system will reduce the time of taking attendance and anxiety of parent. Using RFID cards, it automates the attendance system by checking attendance. In this system the student is provided with the RFID tag when student scans a card on RFID reader the system identifies the student’s data & compare with database and display authorized or unauthorized entry on Application.

Keywords: RFID, Radio Frequency Identification, Arduino based monitoring, Students Attendance system, RFID tags, Educational institutions, NodeMCU.

I. INTRODUCTION

Nowadays, Student’s truancy is the biggest problem in every school, which may badly affect their academics. Roll call in school consumes consider the amount of time and resources. The teacher checks attendance by calling out ID number and names of each student at the start of the day or after the lunch hour which may lead problem like proxy attendance and this system is time-consuming also. In today’s lifestyle, due to the busy schedule of parents, they don’t have time to pick and drop their child from school. But they always worried about him, because there are maximum chances of kidnapping and child trafficking. This project is an approach to this kind of problems. This system consists of an RFID reader and a tag. The RFID reader consists of receiver/transmitter antenna, buffer, register and UART. The coil, at the reader end, generates an electromagnetic field, and couples into the coil on RFID tag. The tag contains a chip antenna which acts as the transmitter. To provide power to the field, current is generated in the tags, which also contain the transmitted data. RFID tag serves as a unique identity card for each student. A student places his identification card in the range of RFID reader. The reader will read the data of a particular tag, which is being registered in the Database. If data matches with the database, it will print student information on the Mobile application. Otherwise, it will show unauthorized entry. It is widely used in all kind of industrial sectors like aerospace, automotive, logistics, education, etc. A parent can also log into the system website to check the status of their child. The system needs a controller to manage this process. So ARDUINO UNO is chosen as a platform. ARDUINO has everything that needs to a controller. It has its own inbuilt programmer. The ARDUINO software contains libraries for all components. The C/C++ or embedded C language can be used to write the program. The RFID reader is interfaced with the Arduino which continuously checks the reader for any scanned IDs. The system provides the signal with an ID card to the microcontroller, whenever a card is scanned. In proposed system Ethernet shield is used which allows the Arduino to access the internet [3][4][5].

II. INTRODUCTION TO RFID:

In 1940 RFID was first and foremost used to detect aircraft during the Second World War. The objective was to use the aircraft’s radar signal to read an ID number to identify whether they were allies or rivals. Till 1970s RFID system was still considered a secret technology used by the military to control access into nuclear plants etc. The technical expansions creation of passive tags were introduced in 1980. Through this innovative technology now energy been not embedded into the tag. Consequently, maintenance and price of the tag were significantly reduced. Normalization for the interoperability of RFID equipment began during 1990. In India recently designated 865-867 MHz Regulators as country’s UHF RFID spectrum, in line with the frequencies used by the United States and Europe. Generally used RFID frequencies are: RFID Low Frequency (125kHz and 134.2 kHz), RFID High Frequency (13.56 MHz) [1][2][3][5].

III. THE BASIC FLOW OF RFID SYSTEM:

The below figure-1 shows the Pipeline of the whole system. The transmitting antenna of RFID reader transfers a certain radio frequency signals and when the Tag is in the range of reader it will generate an induced current. Now the radio frequency card activates the energy, then the information transmission done such as its own built-in code through the tag reader; the system receiving carrier signal sent from the RF card, transmitting it to the reader via the antenna adjuster, the reader decodes the received signal and sends it to the background of the main system for related processing; the explored system verifies the card according to the logic operation Validity, conforming processing and control for different settings, issuing command signals to control here used NodeMCU (Micro-controller Unit) actions. To check and update information here developed and integrated PC interface and Mobile Application.
Figure 1: Pipeline of System

IV. HARDWARE COMPONENTS:

4.1 NODEMCU:

It is an open source IoT platform. It includes firmware which runs on the ESP8266 Wi-Fi SoC (Espressif Systems) and hardware which is based on the ESP-12 module. The term "NodeMCU" itself refers to the firmware rather than the development kits. The firmware uses the Lua scripting language. It is based on the eLua project and built on the Espressif Non-OS SDK for ESP8266. Also, it uses many open source projects, such as Lua-cjson, and spiffs. The ESP8266 is a low-cost Wi-Fi microchip with full TCP/IP stack and microcontroller capability produced by Shanghai-based Chinese manufacturer Espressif Systems [5][6][8][9].

![Diagram of NodeMCU](image)

Figure 2 Connections between Receiver and NodeMCU
4.2 RFID Tags:

The RFID tag is also known as transponders. The information is sent from these electronic tags using radio waves to the RFID reader. Mainly two components are required to complete RFID tags. The first tag is an antenna- it is used to receive Radio Frequency emitted by the tag, the second tag is an integrated circuit through which the data is stored and processed, as well as radio waves received or sent by the antenna, are modulated and demodulated. The tag stores information in electronic form. RFID tag are of three types as listed in figure-4.1) passive Tag 2) Active Tag and 3) Semi-Passive tag. Here used passive tags, through passive tags the energy or data is collected from nearby RFID reader’s interrogating radio waves. Active tags can be operated hundreds of meter from the RFID reader as it has a local power source such as a battery. Active tags operate in the absence of reader but for the passive reader is a must. Some tags have rewritable memory which size can vary according to the application requirement. Unique Identification of each object is stored in a Microchip inside the tag [7]. Other tags are listed in figure-3 [8][4].

![Figure 3: Three Types of RFID Tags](image)

![Figure 4: Types of RFID Systems & Three Types of Tags](image)

4.3 RFID Reader

The RFID Tag sends the information which is gathered by a hardware device called RFID reader. It also called a Proximity Coupling device and read the data at a certain frequency. A specific reader can also be used to read information
from different tags with varied frequencies. The reader used in the proposed system is MFRC522. The MFRC522 is a highly integrated transmission module for contact-less at communication 13.56 M-Hz [4][5].

Figure 5 NodeMCU and RFID Receiver

Figure 6 Example of RFID receiver with passive tags

Figure 7 Graphical Representation of input data Analysis [10].

V. CONCLUSION:

Study of this research has explored how a system depends on RFID key and card or any other tags. This paper also has shown the advantages of using web-based technology to analyze data. The developed system is very flexible and user-friendly, in future extension system one may be adding more modules to extend the system. The cards and key tags that have been hired for this specific system are RFID cards and RFID keys respectively, and the android application and available “thingspeak” website has shown stable and reliable results after data analysis; also the extension of these RFID cards can be put to use at the school or a university, may replace student ID cards for employees and students, the purposes of using these RFID card for canteen payments, books issuing at library, access control inside university campus, etc. Added functions can always be integrated into the system and greater security provided to the development by including Smart Attendance System using Radio Frequency Identification (RFID).

REFERENCES


