

Intelligent Modeling of Smart Attendance System Using RFID

S. Ramya, J. Mithun, R. Madesh, S. Arshad Ibrahim, C. Gowtham

Assistant Professor, Students

*Electrical and Electronics Engineering, Sri Shakthi Institute of Engineering and Technology
Coimbatore, India*

Abstract—Radio Frequency Identification (RFID) is a new technology in communication system which can be defined as a medium used to identify and track the special tag implanted into an object or a living thing by using radio frequency wave. It is a wireless means of communication that use electromagnetic and electrostatic coupling in radio frequency portion of the spectrum to communicate between reader and tag through a variety of modulation and encoding scheme. Nowadays, most of the universities used the conventional, time consuming and inefficient method of taking attendance by calling names or signing on papers. From that, by integrating various components which are RFID reader, RFID card, ESP controller and Secure Digital Card (SD Card), a portable RFID based attendance system can be set up and become the solutions to address this problem. Uniquely identifying each person based on RFID tag is one of its special ability that can make the recording attendance process become faster and easier compared to conventional methods.

Keywords- attendance; system; radiofrequency identification; electromagnetic; data

I. INTRODUCTION

Recording the attendance of the students using RFID cards requires a portable recording device to be designed and built. Several components need to be integrated into a robust portable device that can read the RFID cards and store key data on board which can be transferred to a personal computer later. The RFID system have two important features. First, the RFID card i.e the microchip having the capacity to store information with authentication and second is RFID module for reading and writing identity information from/to RFID card. This portable device have a storage part which is Secure Digital (SD) card to store the data that can be prevent the data from damage. Attendance can be recorded by swiping student identification card onto a portable device that contain a microcontroller equipped with Radio Frequency Identification (RFID) reader and recorded into on-board memory. Then, the data will be transferred to a personal computer either using a memory card or through Universal Serial Bus (USB) cable.

Many of the educational institutions that use manual method in recording the attendance which by writing name on paper. Basically, recording of student attendance can be tedious and time consuming if done manually, especially for large classes. There are a few latest technology that also involve in recording students attendance such as bar code system and fingerprint system but all of them are very high maintenance and costly. If a portable computer assisted system with affordable cost is used, data can be recorded and stored accurately, so that time consuming problem can be avoided.

The objectives of the project are: 1 To design and build a portable RFID reader with data storage for the purpose of recording students attendance. 2. To enable the communication between ESP8266 and a data server 3. To build a device that can be implemented in order to improve management system, especially in recording student's attendance.

II METHODOLOGY

A. Radio Frequency Identification

In this world, there are a lot of methods can be used to transfer a data. One of them is using radio frequency electromagnetic field. The famous tool that use this method is Radio Frequency Identification (RFID). It is the wireless non-contact devices created for the purpose of automatically identifying and tracking the information inside programmable tags or card. The tags or card have an ability to read at a short range via magnetic field, also called as electromagnetic induction. Then, it will act as a passive transponder to emit microwaves or UHF radio waves. On the other hand, the limitation of other automatic identification approach which are used light to communicate (infrared and bar codes technology) can be overcome from this technology. It is proven when the RFID tag or card are invisible to the eye and can be used in dirty environment. Without labor-intensive manual scanning, RFID readers can be set to read automatically and remotely.



Figure: RFID Tag

1. B. ESP8266 MODULE

The ESP8266 module is a popular low-cost Wi-Fi module that's become a staple in the world of DIY electronics and Internet of Things (IoT) projects. Here are some key features about the ESP8266:

1. Microcontroller with Wi-Fi: The ESP8266 is not just a Wi-Fi module; it's a full microcontroller with Wi-Fi capability. This means it can be programmed to do various tasks and connect to the internet wirelessly.
2. Development Boards: While the ESP8266 itself is a standalone module, it's often used on development boards like the Node MCU or Wemos D1 Mini. These boards make it easier to work with the ESP8266, providing USB-to-serial conversion for programming and debugging.
3. Programming: The ESP8266 can be programmed using the Arduino IDE, which makes it accessible to a wide range of developers who are familiar with Arduino. There are also other programming options like Micropython and Lua.
4. GPIO Pins: The ESP8266 has a number of General Purpose Input/Output (GPIO) pins that can be used to interact with other hardware components like sensors, LEDs, and displays.
5. Community Support: Because of its popularity, there is a large community of developers working with the ESP8266. This means there are plenty of tutorials, libraries, and example projects available online.
6. Low Power Consumption: The ESP8266 is known for its relatively low power consumption, making it suitable for battery-powered applications.
7. Versions: There are several versions of the ESP8266, with the ESP-01 being one of the most basic and widely used, and newer versions like the ESP-12 offering more GPIO pins and features.

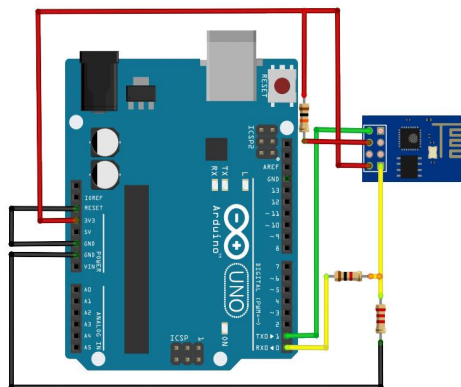


Figure: Circuit diagram

III. WORKING PRINCIPLE

Storing data on Excel sheet: Storing data in an Excel sheet involves entering information into cells organized in rows and columns. Each cell can hold text, numbers, or formulas. Here's a brief overview:

1. Entering Data: - Click on a cell and start typing to enter data. - Press Enter to move to the cell below or use the arrow keys.
2. Cell References: - Cells are identified by column letters and row numbers (e.g., A1, B2). - Formulas often use cell references to perform calculations.

3. Formatting Cells: - You can format cells to display data in a specific way (e.g., currency, date). - Right-click on a cell or use the toolbar for formatting options.
4. Creating Tables: - Select your data and use the "Insert Table" option for better organization. - Tables allow sorting, filtering, and easier data management.
5. Formulas and Functions: - Excel provides numerous formulas and functions for calculations. - For example, "=SUM(A1:A5)" adds the values in cells A1 through A5.
6. Data Validation: - Set rules to control what can be entered in a cell (e.g., allow only numbers).
7. Charts and Graphs: - Visualize data using charts and graphs for a better understanding. - Select your data and choose a chart type from the "Insert" menu.
8. Protecting Sheets: - Password-protect sheets to control access and prevent unauthorized changes.
9. Saving and Sharing: - Save your Excel file regularly to avoid data loss. - Share your file with others by sending the Excel file or using cloud storage.

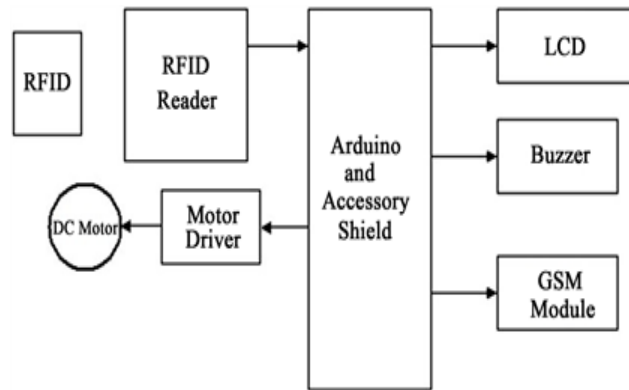
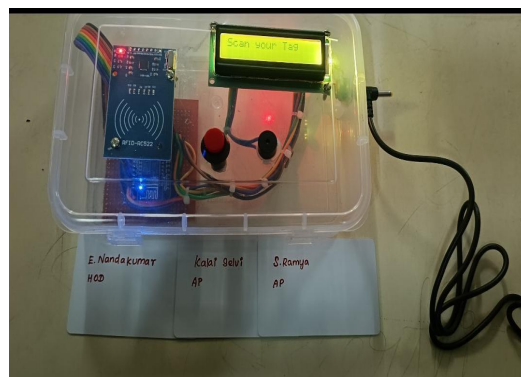


Figure: Block diagram

IV. REAL TIME IMPLEMENTATION

Module Testing Module testing is one of important phase in this project. The main objective on running this testing is to ensure that all the module are in good condition and working as expected. The module involves are RFID module, ESP8266 module and LCD module.



In this work, there are certain limitations that involve the duration time to complete and responder's contribution. A perfect planning can eliminate all the limitations. From that, the first important step need to do is studying the fundamentals of RFID and embedded system from any trusted sources such as published articles, journals, books and conference papers and also the second important one is the collection of various range of responses. By doing that, deeper understanding especially in theory can be gained and practical studies can be made.

V.CONCLUSION

The Student and staff Attendance System using RFID is developed with the purpose to automate and improve the current processes and procedure of manual attendance recording. In developing the system, the student had to prepare three major scopes of functions which include the Esp8266 microcontroller, RFID module and Excel server. A portable RFID reader with data storage for the purpose of recording students attendance which enable the communication between micro controller and a computer via serial port is managed to build. From that, this device can be propose to be implemented in order to improve management system especially in recording student's attendance.

REFERENCES

- [1] Aysha Qaiser and Shoab A Khan, "Automation of Time and Attendance Using RFID System" IEEEICET 2nd International Conference on Imaging Technology, 2006.
- [2] Sato DCS & Labeling Worldwide, "The RFID Guidebook (Revision 8)", 2004
- [3] Wayne Wolf, "A Decade of Hardware/ Software Co-design" IEEE 5th International Symposium Multimedia Software Engineering (MSE), 2003.
- [4] C.Nagarajan and M.Madheswaran - 'Experimental verification and stability state space analysis of CLL-T Series Parallel Resonant Converter' - Journal of ELECTRICAL ENGINEERING, Vol.63 (6), pp.365-372, Dec.2012.
- [5] C.Nagarajan and M.Madheswaran - 'Performance Analysis of LCL-T Resonant Converter with Fuzzy/PID Using State Space Analysis'- Springer, Electrical Engineering, Vol.93 (3), pp.167-178, September 2011.
- [6] C.Nagarajan and M.Madheswaran - 'Stability Analysis of Series Parallel Resonant Converter with Fuzzy Logic Controller Using State Space Techniques'- Taylor & Francis, Electric Power Components and Systems, Vol.39 (8), pp.780-793, May 2011.
- [7] C.Nagarajan and M.Madheswaran - 'Experimental Study and steady state stability analysis of CLL-T Series Parallel Resonant Converter with Fuzzy controller using State Space Analysis'- Iranian Journal of Electrical & Electronic Engineering, Vol.8 (3), pp.259-267, September 2012.
- [8] Nagarajan C., Neelakrishnan G., Akila P., Fathima U., Sneha S. "Performance Analysis and Implementation of 89C51 Controller Based Solar Tracking System with Boost Converter" Journal of VLSI Design Tools & Technology. 2022; 12(2): 34–41p.
- [9] C. Nagarajan, G.Neelakrishnan, R. Janani, S.Maithili, G. Ramya "Investigation on Fault Analysis for Power Transformers Using Adaptive Differential Relay" Asian Journal of Electrical Science, Vol.11 No.1, pp: 1-8, 2022.
- [10] G.Neelakrishnan, K.Anandhakumar, A.Prathap, S.Prakash "Performance Estimation of cascaded h-bridge MLI for HEV using SVPWM" Suraj Punj Journal for Multidisciplinary Research, 2021, Volume 11, Issue 4, pp:750-756
- [11] G.Neelakrishnan, S.N.Pruthika, P.T.Shalini, S.Soniya, "Perfromance Investigation of T-Source Inverter fed with Solar Cell" Suraj Punj Journal for Multidisciplinary Research, 2021, Volume 11, Issue 4, pp:744-749
- [12] C.Nagarajan and M.Madheswaran, "Analysis and Simulation of LCL Series Resonant Full Bridge Converter Using PWM Technique with Load Independent Operation" has been presented in ICTES'08, a IEEE / IET International Conference organized by M.G.R.University, Chennai.Vol.no.1, pp.190-195, Dec.2007
- [13] M Suganthi, N Ramesh, "Treatment of water using natural zeolite as membrane filter", Journal of Environmental Protection and Ecology, Volume 23, Issue 2, pp: 520-530,2022
- [14] M Suganthi, N Ramesh, CT Sivakumar, K Vidhya, "Physiochemical Analysis of Ground Water used for Domestic needs in the Area of Perundurai in Erode District", International Research Journal of Multidisciplinary Technovation, pp: 630-635, 2019
- [15] Claudio Talarico, Aseem Gupta, Ebenezer Peter, Jerzy W. Rozenblit, "Embedded System Engineering Using C/C++ Based Design Methodologies" 12th IEEE International Conference And Workshop on The Engineering of Computer-Base System, 2005.
- [16] Yuanrui Zhang and Mahmut Kandemir, "A Hardware-Software Codesign Strategy for LoopIntensive Applications" IEEE 7th Symposium on Application Specific Processors (SASP), 2009.