Walchand College of Engineering, Sangli

(Government-Aided Autonomous Institute)

Department of Electronics Engineering

A Project Report

on

"RFID based Attendance System"

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We are thankful to one and all, who indirectly or directly have helped us in this project.

ABSTRACT

A crucial thing a student or an employee has to do after entering schools, colleges, or offices are attendance. Attendance record allows teachers/employers to keep a track and judge the sincerity and dedication.

However, maintaining the daily attendance is quite a challenging task. Traditional way of registering students' attendance may lead to unwanted errors and redundant manual work. So, we decided to build an attendance system. This system was built from RFID technology. It overcomes lots of challenges as it automates attendance process and helps in tracking and monitoring the respective person's activities seamlessly.

Besides attendance management, this new attendance system can also be used to track the attendance of employees for salary and paycheck remuneration.

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Chapter 1

INTRODUCTION

1.1 Overview

With advent of radio waves technology, our lives have got a lot easier. Radio waves have no.of real world uses like microwave ovens, RADAR, wi-fi, mobile communication, radios, etc.

1.2 Problem Formulation

Keeping attendance on a paper or in the notebook is the most used way to keep the attendance record of the students.But it is not so convenient and wastes lot of time. So, to make this process far simpler and efficient, we thought of - RFID Based Attendance System. So, for this project we have used RFID device which will help us to keep the track of attendance of student by scanning cards given to the students.

1.3 Proposed work and Objectives

Our project is meant to implement an attendance system using Node MCU and RFID card reader to store the attendance of students when scanned.

- To make the attendance system efficient in terms of time required for attendance.

- Making our work and education institutes smarter and moving towards the digital India goal.

Chapter 2

Components

For this project, main components which we have used are RFID reader, RFID tags, Node MCU and buzzer.

2.1 MFRC522 RFID reader

RFID stands for Radio Frequency Identification, i.e, we rely on radio signals for identification purpose. Reader is the device which transmits the radio waves of certain frequency depending upon the range. RFID reader comes in various shapes and sizes.
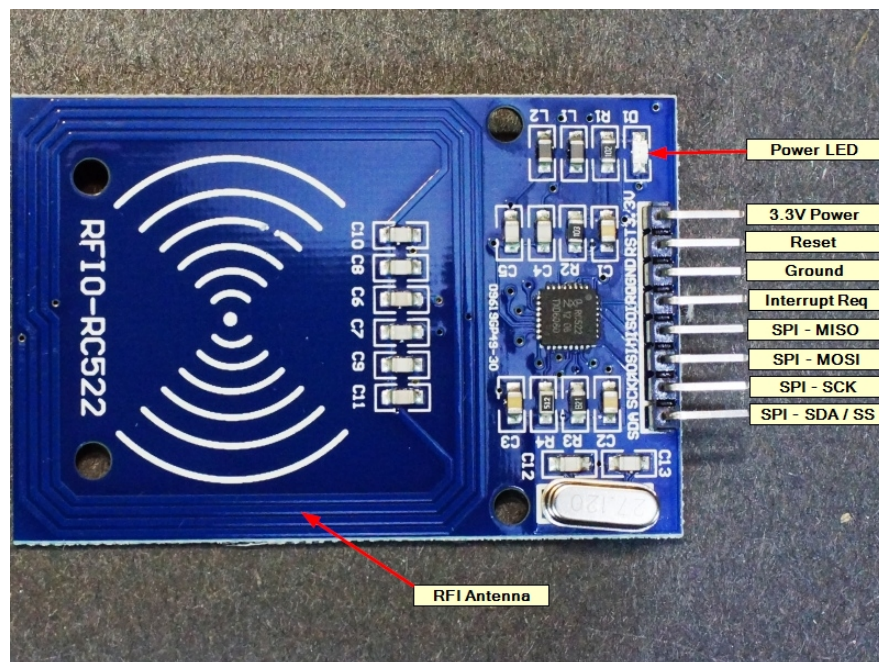

Figure 2.1: MFRC522 RFID reader

Table 2.1: Pin details of MFRC522 RFID reader

Pin name	Description
Vcc	3.3V
RST	Reset pin
SCK	Serial Clock pin
Gnd	Ground
IRQ	Interrupt pin
MOSI	Master Out Slave In pin
MISO	Master In Slave Out
SDA/SS	Rx for UART

2.2 RFID tags

RFID tags receive the radio waves transmitted by readers. There are 3 types of tags based on frequency on which operation takes place-

- LF(Low frequency) - 125KHz or 134 KHz

- HF(High frequency) - 13.56 MHz

- UHF(Ultra High Frequency) - 860-960 MHz

Figure 2.2: RFID tags

RFID tags are also classified on basis of power supply:-

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- Active tags- operate on their own power supply.

- Passive tags - They don't have any direct power supply and rely on signals from reader for its power supply.

- Semi-passive tags are trade-off between active and passive tags. They are battery assited passive (BAP) tags.

2.3   Node MCU

NodeMCU is an open-source development kit that helps to prototype IoT product. It includes Lua based firmware. This board has wi-fi capability, analog pins, digital pins and supports serial communication protocols. This development kit is based on ESP8266 (wi-fi module), integrates GPIO, PWM, I2C, ADC all in one board. It can be programmed via Arduino IDE and ESPlorer IDE.
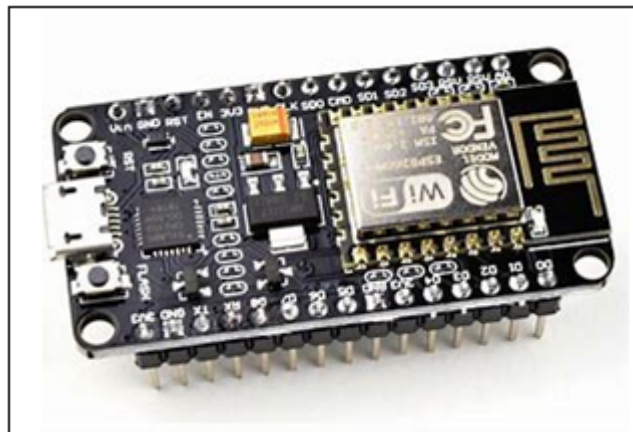
Figure 2.3: Node MCU V1.0

2.4 Buzzer

It is Passive Buzzer. It is used for Audio Alert. It can tolerate max. 5 V supply. To generate audible tone, it uses a coil element . It has 42 ohm resistance. The resonant frequency is 2048 Hz.

Figure 2.4: Buzzer

Chapter 3

Working

3.1 RFID working

Figure 3.1: Basic RFID structure

Radio frequency identification (RFID) can be used to automatically identify or track the objects. Our frequency of operation in this project is of 13.56MHz, i.e., lesser range. Reader transmits the radio waves continuously. So, whenever the concerned object is in the range of RFID reader then RFID tag attached to it, transmits its feedback signal to the reader.
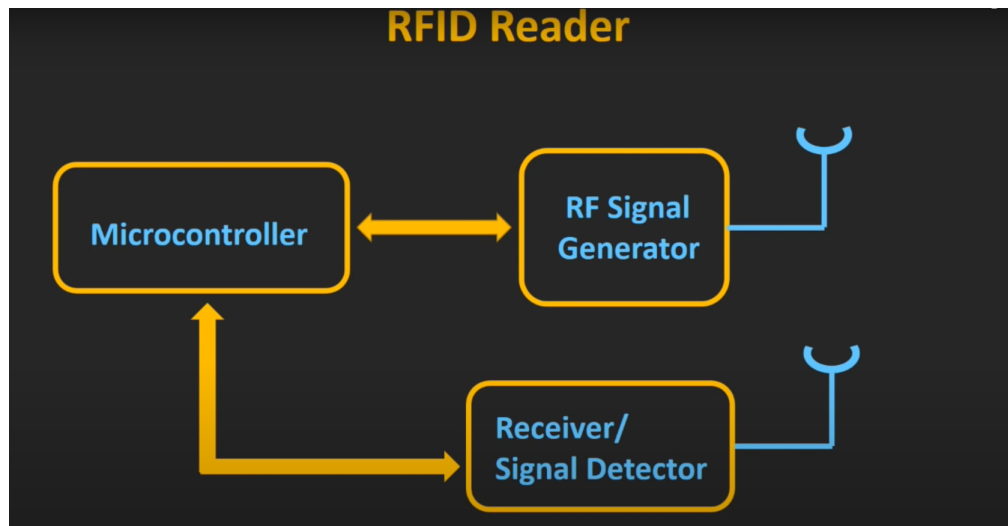
Figure 3.2: Internal structure of reader

Above diagram points out the composition of a reader. Signal generator produces the radio waves. The responsibility of signal detector to receive feedback signal which is coming from the tag. And a microcontroller to process the information which is being sent by the RFID tag. Sometimes RFID reader is also connected to the computer directly.
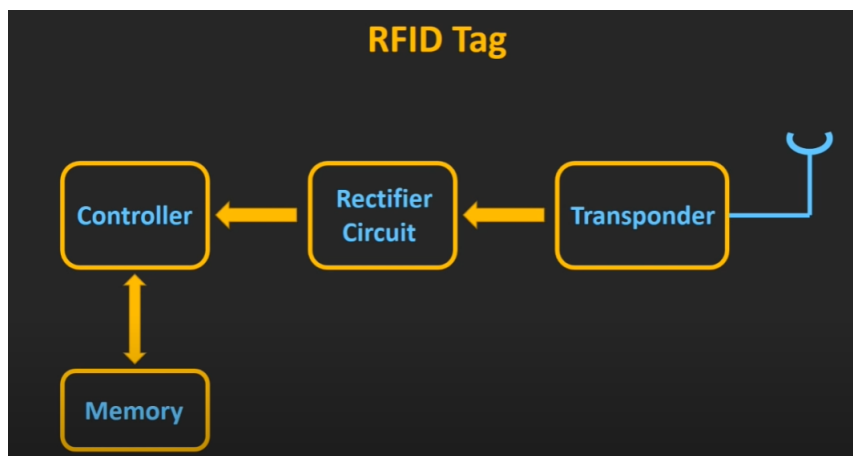

Figure 3.3: Internal structure of tag

Structure of a tag is emphasized in above figure. First is a transponder which receives the radio waves coming from the reader and transmits the feedback signal back to the reader. As the passive tags do not have their own supply hence they rely on radio waves coming from the reader as source of energy. To make this waves' energy usable, it has to go through rectifier circuit. Capacitor is accountable for storing this energy and used as power supply for memory element and controller inside the tag.
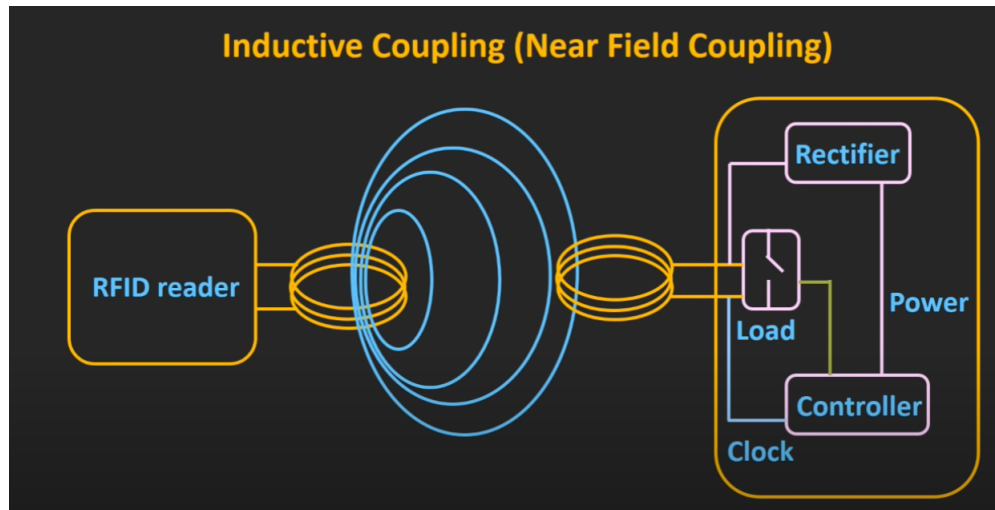
3.2 RFID Working Principle

Figure 3.4: Working principle in LF and HF tags

The working mechanism of passive RFID tags is inductive coupling. The mutual coupling due to field generated by reader coupled with tag, results in induction of voltage across RFID tag's coil. This voltage undergoes through rectifier and further used as power supply for controller and memory elements. Now, the voltage induced across the coil is of a particular frequency because we work around waves of certain frequency.

Now, current will flow through load of coil because it also part of the circuit. So, obviously if we change load impedance then the current flowing through this load will also vary. Hence, this current switching or rate of current change also generates a voltage in RFID reader.

This modulation of load happens according to the data stored in RFID tag. This data is read by the Reader in the form of voltage. In this way data is read from the tags.
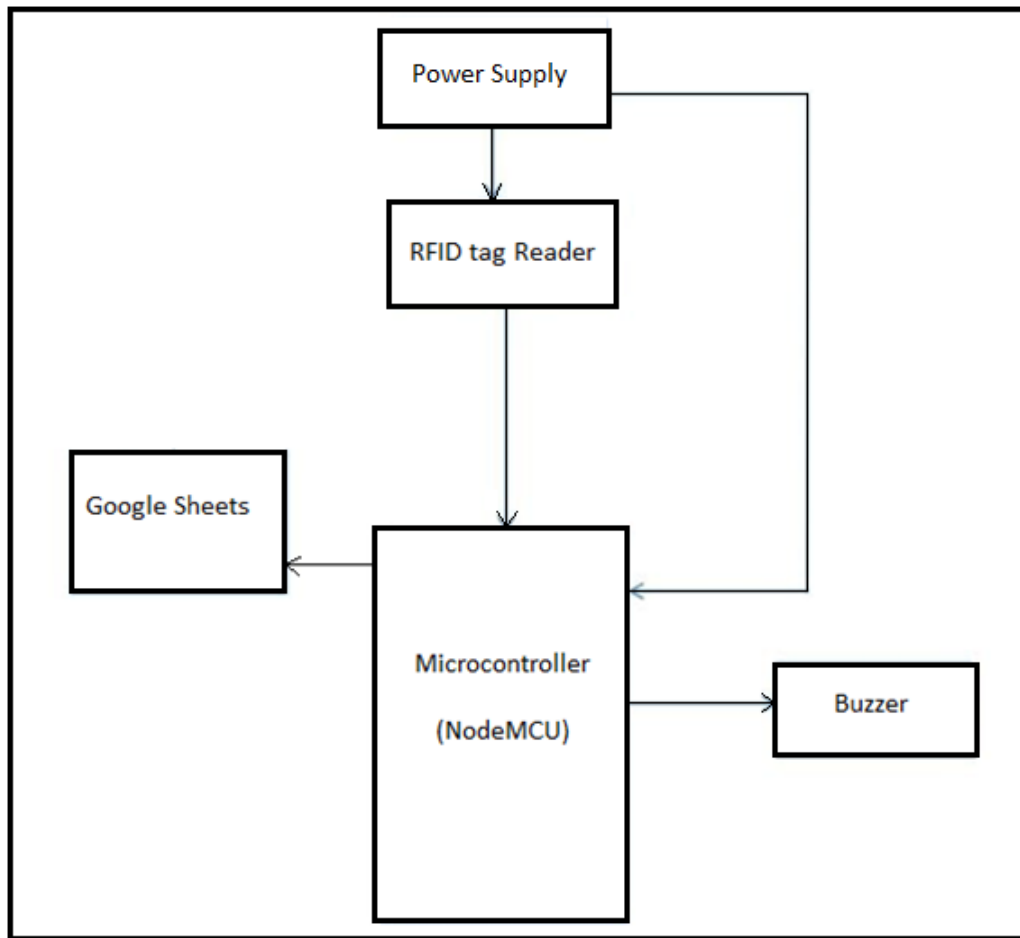
3.3   Overall Project Working and Flow

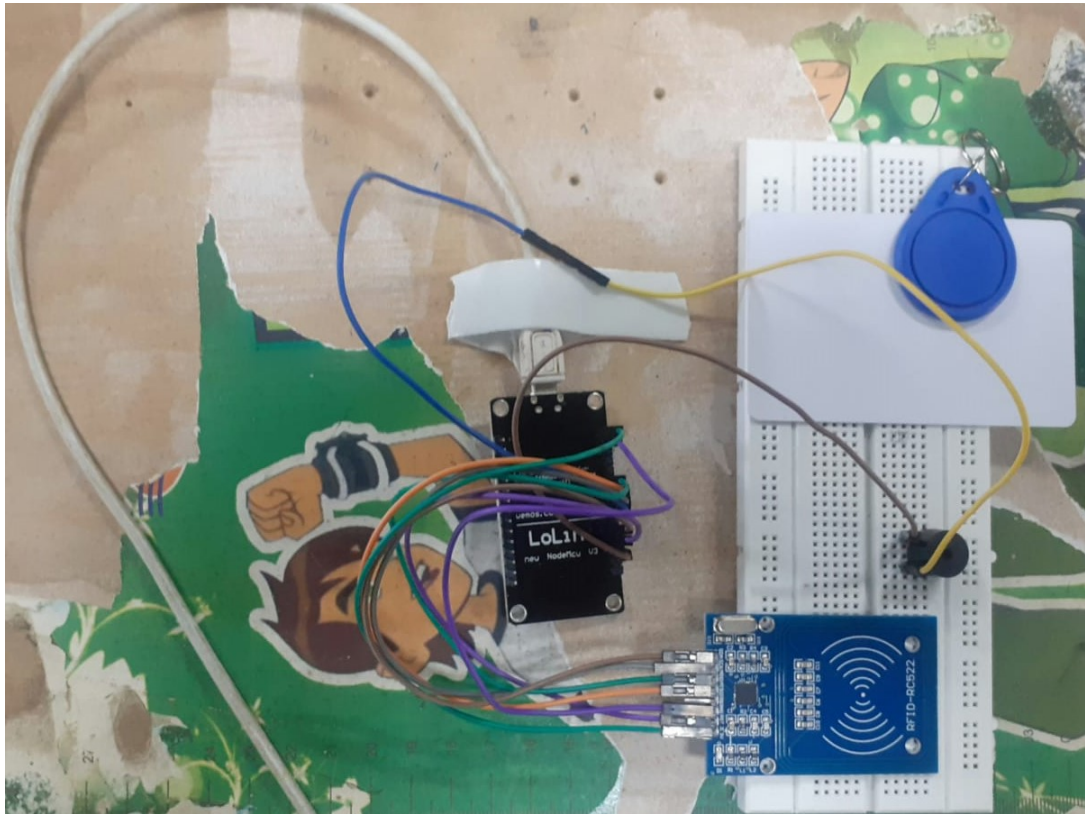Figure 3.5: Flowchart of Project

Chapter 4

Conclusion

Figure 4.1: Final Project Photo

This project of RFID based attendance system successfully serves the purpose of marking the attendance of students and employees without wasting anytime, efficiently. This system will also help in digitalizing our work and education sectors.

Figure 4.2: Google sheet attendance photo

Chapter 5

References

1] Datasheet of MFRC522 RFID Module

2] Information about the development boards, in this project NodeMCU