

SMART ATTENDANCE SYSTEM USING LI-FI & RFID

A Summer Internship Report

Submitted By

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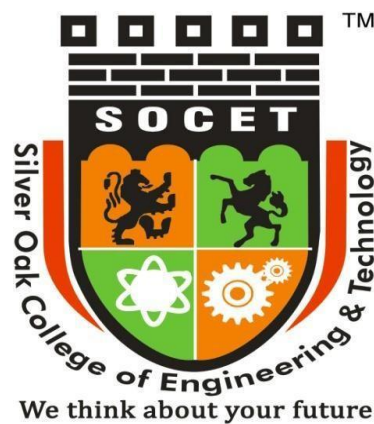
Under Subject of

Summer Internship

(3170001)

B.E. - IV, Semester - VII

(Department of Computer Engineering)



SILVER OAK COLLEGE OF ENGINEERING AND TECHNOLOGY

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Silver Oak College of Engineering & Technology

Department of Computer Engineering

2021 - 2022

CERTIFICATE

This is to certify that the Mini project entitled “**SMART ATTENDANCE SYSTEM USING LI-FI & RFID**” has been carried out by “ **Kunjan Chitroda (190773107007)**”, under my guidance in fulfillment of the Summer Internship (3170001) Subject of Bachelor of Engineering in **Computer Engineering**– 7th Semester of Gujarat Technological University, Ahmedabad during the academic year 2021- 2022.

Name of Guide

Prof. Shital Mehta

(Computer Engineering)

Head of Department

Prof. Satvik Khara

(Computer Engineering)

Candidate's Declaration

I hereby declare that the Summer Internship report titled “**SMART ATTENDANCE SYSTEM USING LI-FI & RFID**” submitted towards the completion of Summer Internship in 7th semester of Bachelor of Computer Engineering in Silver Oak College of Engineering & Technology, Ahmedabad is an authenticate record of mine work carried out.

I further declare that to the best of my knowledge the report of C.E. 7th semester.

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Submitted to:

Silver Oak College of Engineering & Technology, Ahmedabad

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ABSTRACT

- ❖ In this system we are going to make Smart Attendance System using LI-FI and RFID technology that allows us to detect the data of Student present in the identity card with the help of LED Tube Light. It is faster then Biometric Technology. For that purpose we just simply add student data into the server, After that the presence of the student are uploaded to the server. The camera are also used for assurity which are connected with the buffer

Keywords: RFID RC 522, LI-FI, RFID Tag.

ACKNOWLEDGEMENT

We would like to extend our heartily thanks with a deep sense of gratitude and respect to all those who has provided us immense help and guidance during our project. We would like to express our sincere thanks to our faculty guide **Prof. Shital Mehta** for providing a vision about the system and for giving us an opportunity to undertake such a great challenging and innovative work. We are grateful for the guidance, encouragement, understanding and insightful support given in the development process.

We would like to extend my gratitude to **Prof. Satvik Khara** Head of Computer Engineering Department, Silver Oak College of Engineering and Technology, Ahmedabad, for his continuous encouragement and motivation.

Last but not the least we would like to mention here that we are greatly indebted to each and everybody who has been associated with our project at any stage but whose name does not find a place in this acknowledgement.

Your Sincerely,

Kunjan Chitroda. (190773107007)

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CHAPTER 1

INTRODUCTION

1.1 Project Summary

In the Traditional Technology for taking the attendance is done either with Biometric or by direct uploading to website and if the number of the user increases the load on the server increases and also became slower. so, we have proposed a solution to overcome these inconveniences this project represents a smart attendance system, which includes transmission of data through the light.

1.2 Project Scope

- Firebase allows to manage the data on server.
- The application contains the database of all student's id which are available in attendance sheet.
- The system makes process of taking attendance simpler and faster.
- The system emphasizes on reduce the burden on server.
- The implementation of system is simple, reliable and reusable.

1.3 Objectives

- The Main objective is to make process of taking attendance simpler and faster.
- To reduce the burden on server.
- To manage the data securely.
- The implementation is simple.
- Its reliable and reusable.

1.4 Literature Review

We have searched many websites regarding our project that are

- <https://purelifi.com/lifi-technology/>
- <https://www.arduino.cc/>

2. System Requirement Study

2.1 User Characteristics

RFID based attendance system has an RFID reader, RFID Tag, LCD display & a microcontroller unit that allows the wireless communications to establish the identity of students, faculty, or any other staff. RFID attendance system provides wireless identification of stakeholders when they fall in the radiofrequency range of the RFID attendance reader. To mark the attendance automatically, the students or staff need to carry the RFID tag that contains unique information about them such as class/section/name/ID number. The receiver/reader of the RFID attendance system automatically registers the attendance & saves the attendance data in the system. The administrator can anytime extract the data to get a summary of student attendance history & keep a tab on them as well as faculty attendance for salary & payroll management.

- No line of sight is required to read a RFID card / tag. So no need of Oriented reading like bar code
 - Multiple RFID Cards can be read.
 - No human error like bar code reading while reading a card. Can be read in any orientation.
 - Very Limited data can be stored in bar code.
 - Re-usable for other purpose.
-
- **ARDUINO GENUINO**

Arduino is an open source hardware and software company, project and user that designs and manufactures single-board microcontrollers and microcontroller kits for building digital devices. Its products are licensed under the GNU Lesser General Public License (LGPL) or the GNU General Public License (GPL), permitting the manufacture of Arduino boards and software distribution by anyone. Arduino boards are available commercially in preassembled form or as do-it-yourself (DIY) kits.

- **BACK END TOOLS (MYSQL)**

- **MYSQL**

MYSQL is a relational database management system (RDBMS), and ships with no GUI tools to administer MYSQL databases or manage data contained within the databases. Users may use the included command line tools, or use MYSQL “front-ends”, desktop software & web applications that create manage MYSQL databases, build database structures, back up data, inspect status, & work with data records.

➤ **HOW MYSQL WORKS?**

- Web Browser
- MySQL Server

2.2 Hardware and Software Characteristics

- Hardware Components

Arduino UNO Board

RFID CHIP RC522

RFID Card

JUMPER CABLE

LCD Display

- Software Components

RFID (Radio-frequency identification) uses electromagnetic fields to automatically identify and track tags attached to objects. An RFID tag consists of a tiny radio transponder.

In Database we have chosen My SQL Database for Store the details.

To implement the project we have chosen Ardiuno IDE language for its more interactive support.

We have store data can be read and write with and excel sheet.

3. System Analysis

3.1 Study of Current System

- Arduino Board

Arduino is an open-source electronics platform based on easy-to-use hardware and software. Arduino boards are able to read inputs - light on a sensor, a finger on a button, or a Twitter message - and turn it into an output - activating a motor, turning on an LED, publishing something online. You can tell your board what to do by sending a set of instructions to the microcontroller on the board. To do so you use the Arduino programming language (based on Wiring), and the Arduino Software (IDE), based on Processing.

- Arduino uno

Arduino Uno is a microcontroller board based on the ATmega328P ([datasheet](#)). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator (CSTCE16M0V53-R0), a USB connection, a power jack, an ICSP header and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.. You can tinker with your Uno without worrying too much about doing something wrong, worst case scenario you can replace the chip for a few dollars and start over again.

"Uno" means one in Italian and was chosen to mark the release of Arduino Software (IDE) 1.0. The Uno board and version 1.0 of Arduino Software (IDE) were the reference versions of Arduino, now evolved to newer releases. The Uno board is the first in a series of USB Arduino boards, and the reference model for the Arduino platform; for an extensive list of current, past or outdated boards see the Arduino index of boards.



Figure : 3.0

- Database Creation
Database of student is created before the recognition process, which includes one image of each individual. This is done by the respected teacher through the admin panel. During this process admin will email id. After taking images using a camera, an excel sheet will be created giving the database of all the students.
- Face Recognition –
This is the most important part of the proposed system. As students enter the class, teacher will switch on the camera and it will continuously detect and recognize the face. After recognizing all the students present in the class an excel file is created giving the attendance of the class with date.
- Sending Email –
As the attendance sheet is ready, within one minute email will be send to the absentee's employer or parent declaring that their employee or child is

3.2 Requirement of this System

- LI-FI

Li-Fi (Light Fidelity) is wireless communication technology which utilizes light to transmit data and position between devices. The term was first introduced by Harald Haas during a 2011 TED talks in Edinburgh.

- RFID
RFID (Radio-frequency identification) uses electromagnetic fields to automatically identify and track tags attached to objects. An RFID tag consists of a tiny radio transponder.



Figure : 3.1

- **LCD Display 16*2**

An LCD (Liquid Crystal Display) screen is an electronic display module and has a wide range of applications. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits. A 16x2 LCD means it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5x7 pixel matrix. The 16 x 2 intelligent alphanumeric dot matrix display is capable of displaying 224 different characters and symbols. This LCD has two registers, namely, Command and Data.



Figure : 3.2

4. Implementation Planning and Details

4.1 Technologies & Implementation Environment

- Tag: It's composed of an antenna to transmit and to receive signals and an RFID chip that contains information on the object to which it's affixed;
- Reader: It's the mind of the RFID system and it's necessary for the operation of any system. The reader is used to query and receive the information contained in the tag;
- Management Software: allows you to manage information coming from the tag and enables users to make informed decisions and take action.



Figure :4.0

The advantages of RFID technology in terms of efficiency are innumerable. However, its adoption within a company requires a precise and accurate analysis in order to guarantee the success of the RFID project.

If you want to implement RFID technology within your organization with excellent results read the 8 steps below!

1. IDENTIFY THE PROBLEM

Let's start from the assumption that a well defined problem leads to a well defined solution. To maximize the benefits deriving from the adoption of RFID, it's necessary to identify the bottlenecks and inefficiencies in the existing processes. However, it should be emphasized that RFID is not the panacea for all ills. If the company has organizational structure problems radio frequency technology alone cannot solve them. It will be up to the company itself to be ready to embrace a more comprehensive change programme in order to eliminate these problems.

2. SET GOALS

It's essential to set measurable goals to ensure that expectations are met. This step will be essential to ensure that the actions carried out in the field can then be translated into expected results.

3. ESTIMATE COSTS

Before running an RFID implementation, the company must estimate the costs of the project. The type of activity that is performed and the type of technology used, determine the amount of the investment required. The cost estimates will be different between an implementation in a warehouse environment where RFID will be used for inventory tracking and an implementation in a retail store where RFID will be used to trace valuable products. In each case the company will be faced with different technologies and therefore different costs. Correctly identifying costs in the project pre-realization phase is important because, in addition to estimating the overall capital outlay for the implementation, it provides an overview of the potential return on investment (ROI) that can be obtained by adopting RFID.

4. MAP THE BUSINESS PROCESS

Mapping clearly the operational processes is fundamental to obtain a systemic view of the flow and to identify the situations in which RFID technology must be implemented. When the analysis of the process is not carried out accurately, the use of technology, despite the commitment of time and the money spent does not solve the problem.

5. CHOOSE THE APPROPRIATE TECHNOLOGY

For each RFID project, you need to choose a specific technology. One of the first decisions to make is whether to use an active or passive tag. Localization at greater distances requires the use of the former, while for smaller objects that need to be located in limited areas the latter is used. RFID tags are available in different shapes, sizes, models and applications. The choice of readers is equally important, they can be fixed or mobile and have different reading distances depending on the power. Another element that affects the type of RFID technology to be adopted is the environment. A careful evaluation of the place and of the environmental conditions are of fundamental importance for the selection of the most suitable devices and tags.

6. TRAIN THE TEAM

If a company decides to implement RFID technology, it must ensure that all employees are informed about the main features of RFID: what it is, how it works, its limitations, etc. In addition, key project people should receive more in depth training on the technology in question. The more the employees are aware of how to manage RFID technology, the more effective the system will be as they will be able to intervene adequately if necessary.

7. EXECUTE A PILOT

In the implementation phase of the RFID project, running a pilot project ie a small scale project to evaluate the cost benefit analysis and obtain feedback on the choices made regarding the technology adopted (reader, tag, software) should be considered. Running a pilot is important because it allows the system to be modified before completely implementing the solution.

8. EXPAND THE SOLUTION

When the pilot project has been successful, it's possible to extend the implementation of RFID to other areas. Once the expansion project is completed, the advantages and set goals will be achieved.

Circuit Diagram-

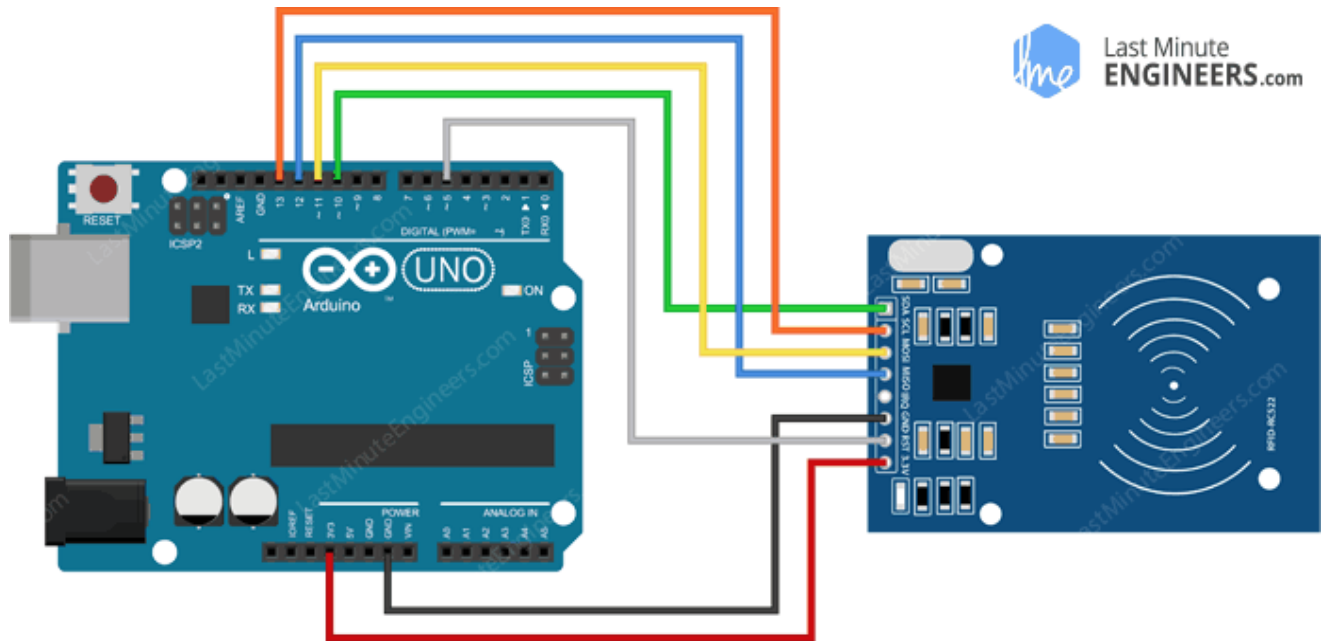


Figure :4.1

RFID or [Radio Frequency Identification](#) system consists of two main components, a transponder/tag attached to an object to be identified, and a Transceiver also known as interrogator/Reader.

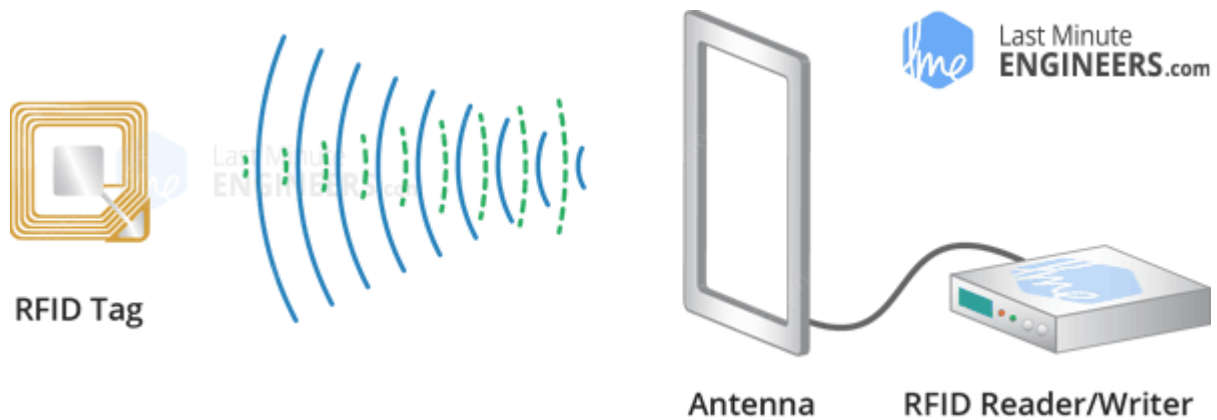


Figure: 4.2

A Reader consists of a Radio Frequency module and an antenna which generates high frequency electromagnetic field. On the other hand, the tag is usually a passive device, meaning it doesn't contain a battery. Instead it contains a microchip that stores and processes information, and an antenna to receive and transmit a signal.

To read the information encoded on a tag, it is placed in close proximity to the Reader (does not need to be within direct line-of-sight of the reader). A Reader generates an electromagnetic field which causes electrons to move through the tag's antenna and subsequently power the chip.

The powered chip inside the tag then responds by sending its stored information back to the reader in the form of another radio signal. This is called backscatter. The backscatter, or change in the electromagnetic/RF wave, is detected and interpreted by the reader which then sends the data out to a computer or microcontroller.

Implementation of Diagram

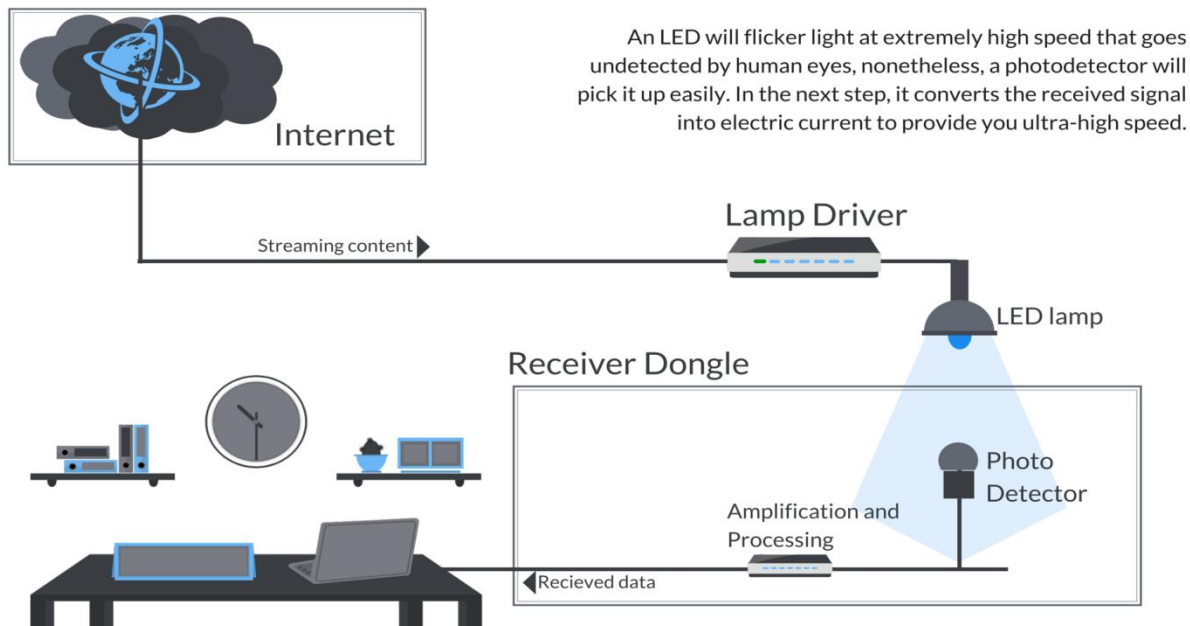


Figure : 4.3

4.2 Modules Specifications

- RC522 RFID Module Pinout

The RC522 module has total 8 pins that interface it to the outside world. The connections are as follows:

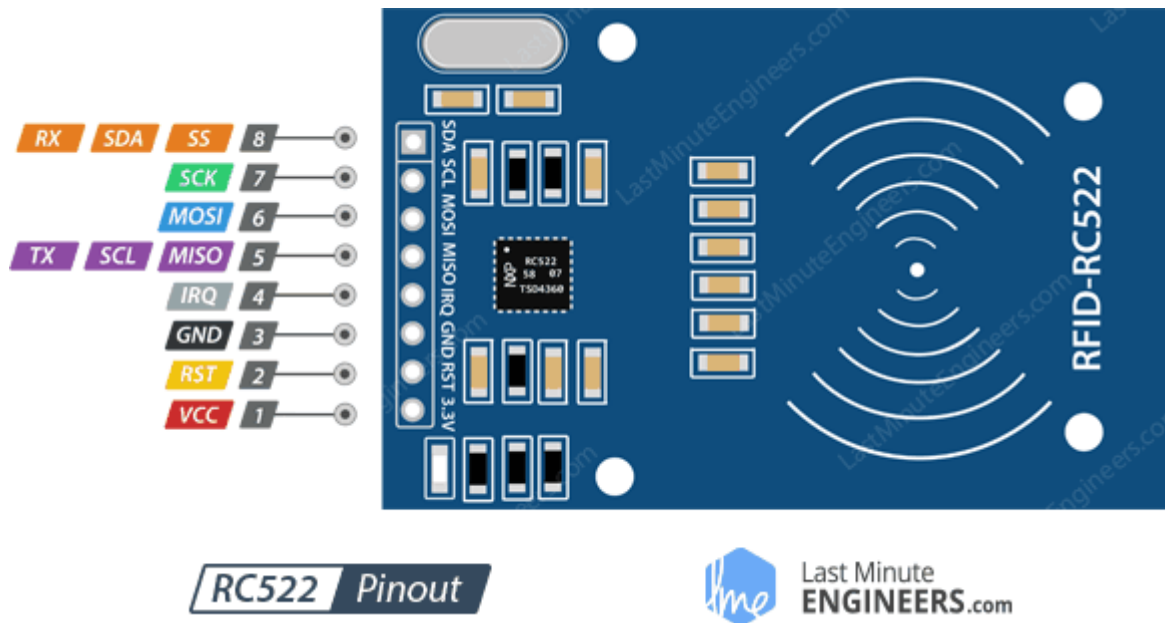


Figure :4.4

VCC supplies power for the module. This can be anywhere from 2.5 to 3.3 volts. You can connect it to 3.3V output from your Arduino. Remember connecting it to 5V pin will likely destroy your module!

RST is an input for Reset and power-down. When this pin goes low, hard power-down is enabled. This turns off all internal current sinks including the oscillator and the input pins are disconnected from the outside world. On the rising edge, the module is reset.

GND is the Ground Pin and needs to be connected to GND pin on the Arduino.

IRQ is an interrupt pin that can alert the microcontroller when RFID tag comes into its vicinity.

MISO / SCL / Tx pin acts as Master-In-Slave-Out when SPI interface is enabled, acts as serial clock when I2C interface is enabled and acts as serial data output when UART interface is enabled.

MOSI (Master Out Slave In) is SPI input to the RC522 module.

SCK (Serial Clock) accepts clock pulses provided by the SPI bus Master i.e. Arduino.

SS / SDA / Rx pin acts as Signal input when SPI interface is enabled, acts as serial data when I2C interface is enabled and acts as serial data input when UART interface is enabled. This pin

is usually marked by encasing the pin in a square so it can be used as a reference for identifying the other pins.

- 16×2 Character LCD Pinout

Before diving into hookup and example code, let's first take a look at the LCD Pinout.

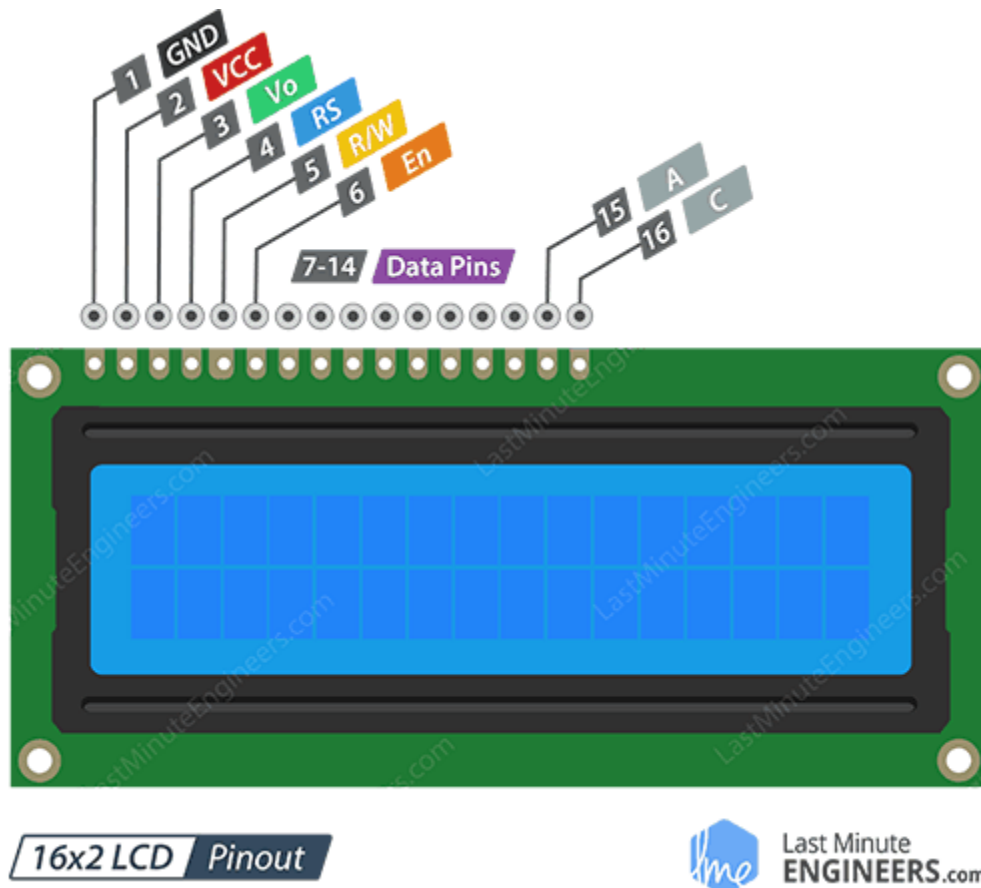


Figure :4.5

GND should be connected to the ground of Arduino.

VCC is the power supply for the LCD which we connect the 5 volts pin on the Arduino.

Vo (LCD Contrast) controls the contrast and brightness of the LCD. Using a simple voltage divider with a potentiometer, we can make fine adjustments to the contrast.

RS (Register Select) pin lets the Arduino tell the LCD whether it is sending commands or the data. Basically this pin is used to differentiate commands from the data.

For example, when RS pin is set to LOW, then we are sending commands to the LCD (like set the cursor to a specific location, clear the display, scroll the display to the right and so on). And when RS pin is set on HIGH we are sending data/characters to the LCD.

R/W (Read/Write) pin on the LCD is to control whether or not you're reading data from the LCD or writing data to the LCD. Since we're just using this LCD as an OUTPUT device, we're going to tie this pin LOW. This forces it into the WRITE mode.

E (Enable) pin is used to enable the display. Meaning, when this pin is set to LOW, the LCD does not care what is happening with R/W, RS, and the data bus lines; when this pin is set to HIGH, the LCD is processing the incoming data.

D0-D7 (Data Bus) are the pins that carries the 8 bit data we send to the display. For example, if we want to see the uppercase 'A' character on the display we will set these pins to 0100 0001(according to the ASCII table) to the LCD.

A-K (Anode & Cathode) pins are used to control the backlight of the LCD.

- **Prototype module**

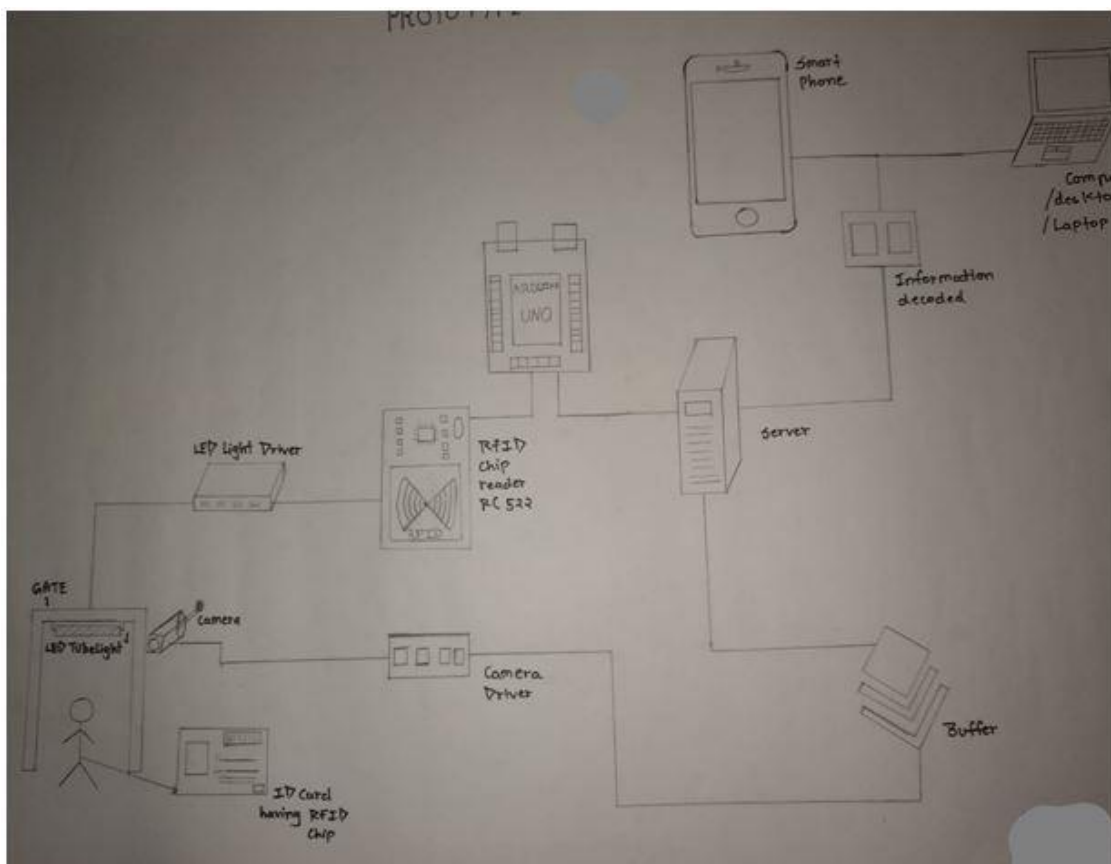


Figure : 4.6

5. ScreenShot

1. Register card ID

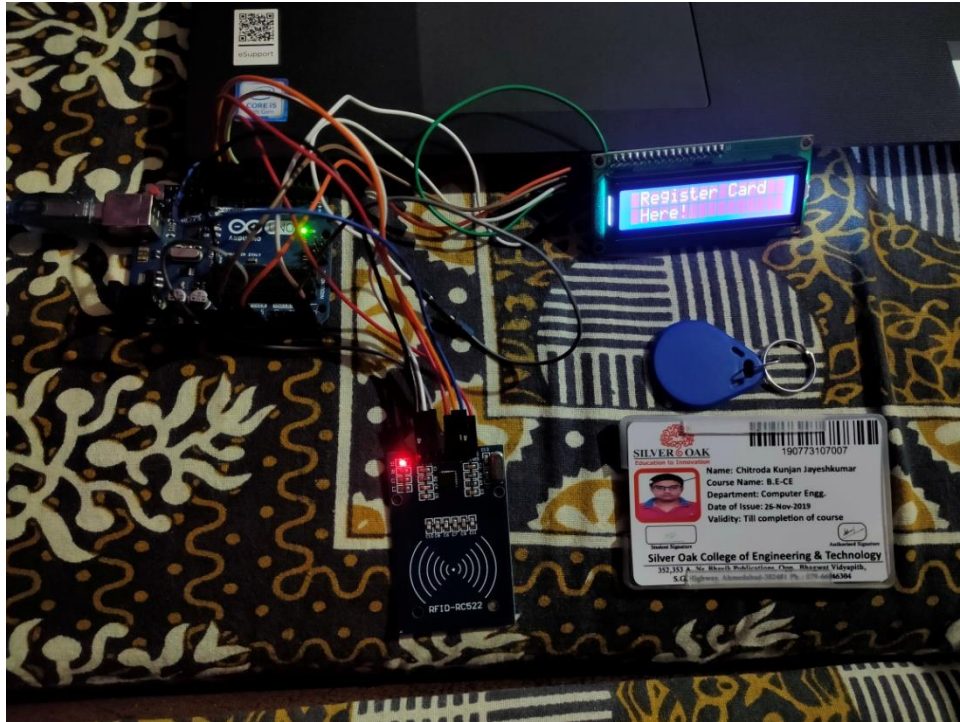


Figure 5.1

2. Scan A Card To Check

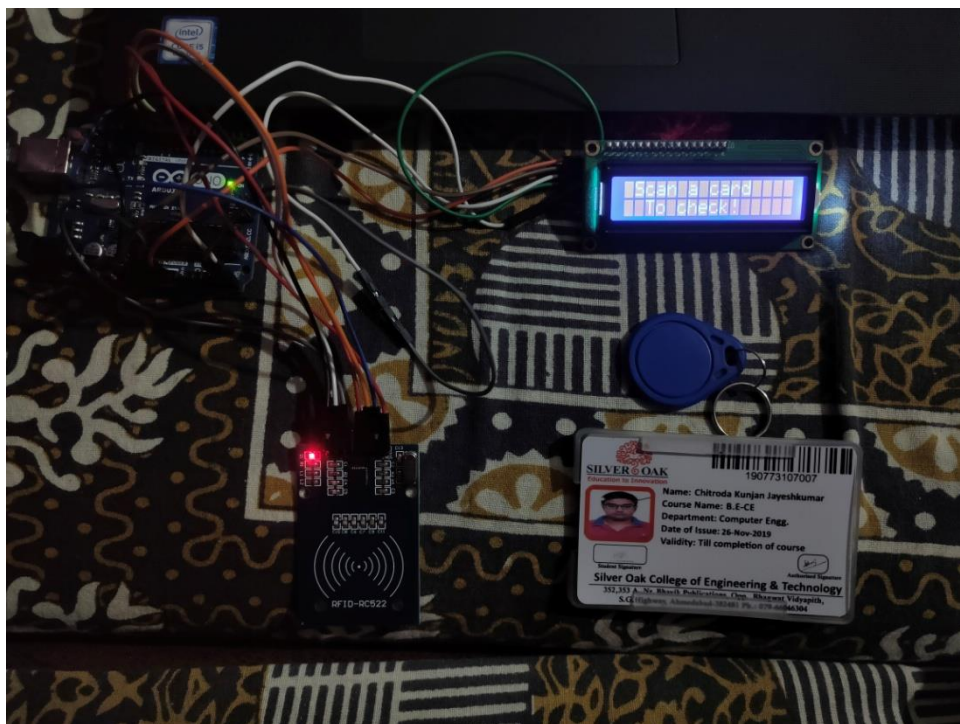


Figure 5.2

3. Successfully Card Access

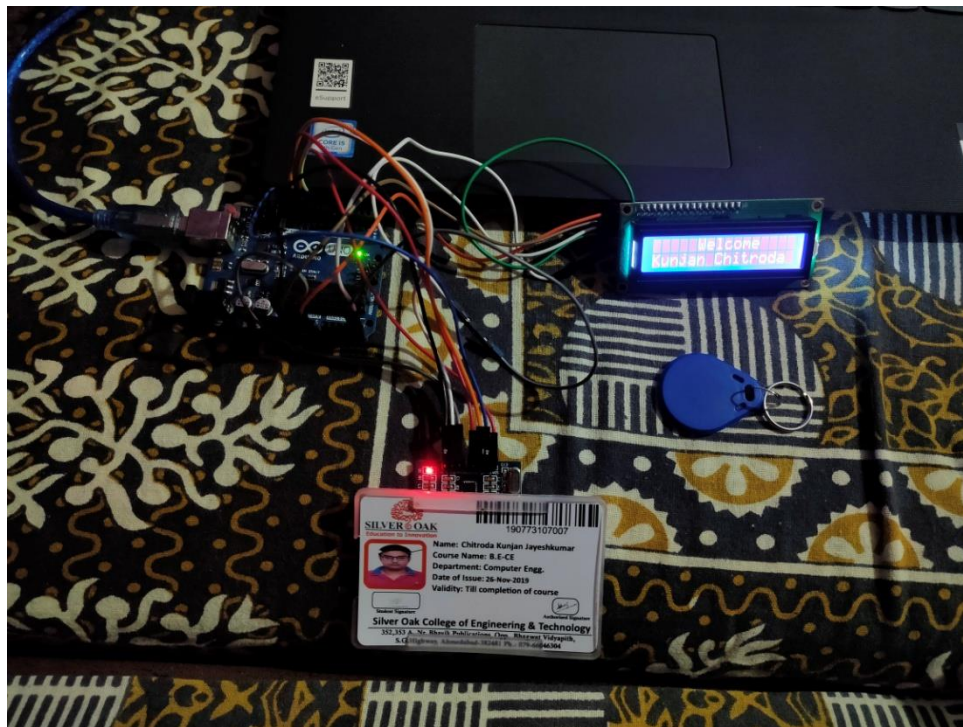


Figure 5.3

4. Not Registered Card was Access Deny

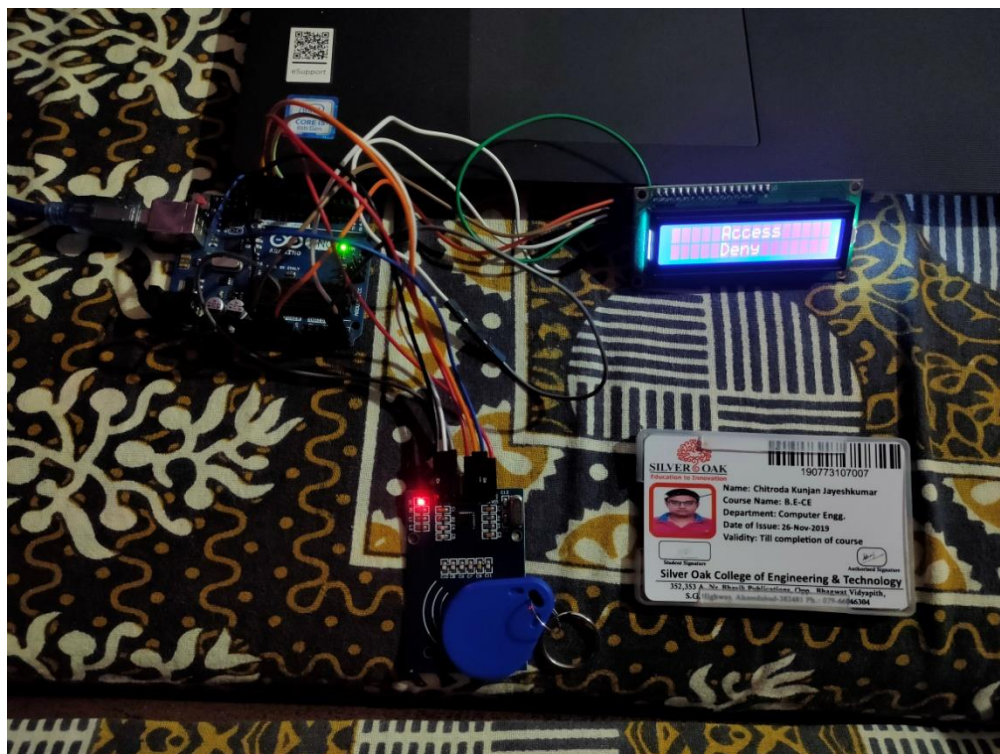


Figure 5.4

5. Connect with Excel Sheet

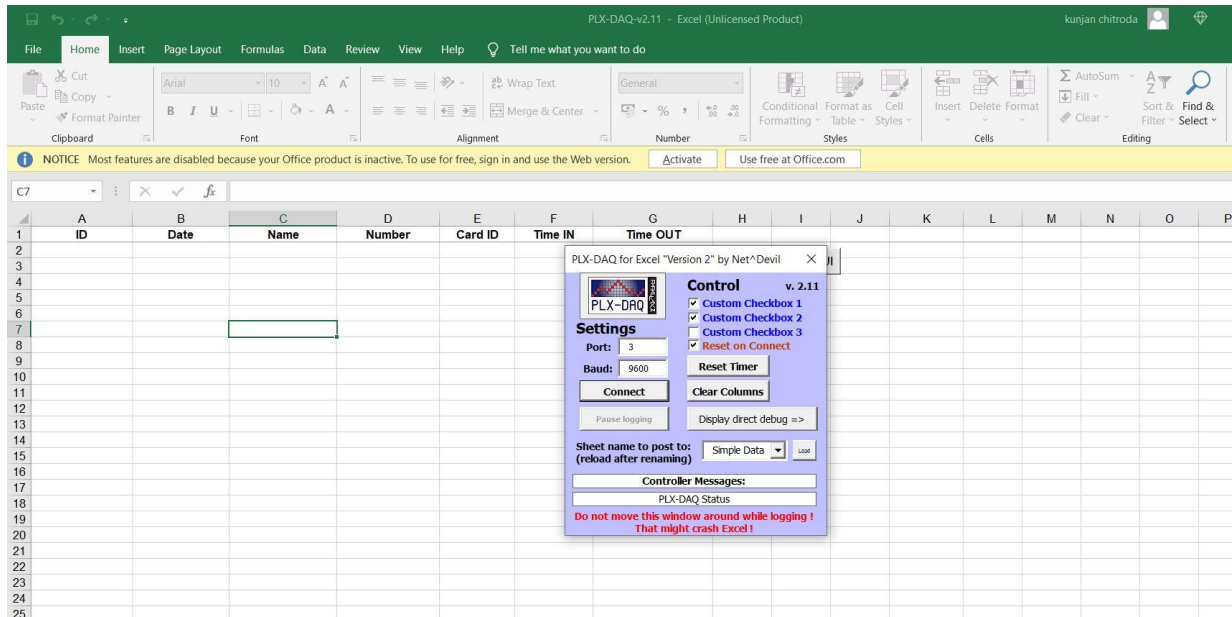


Figure 5.5

6. First Data Entry Details Stored

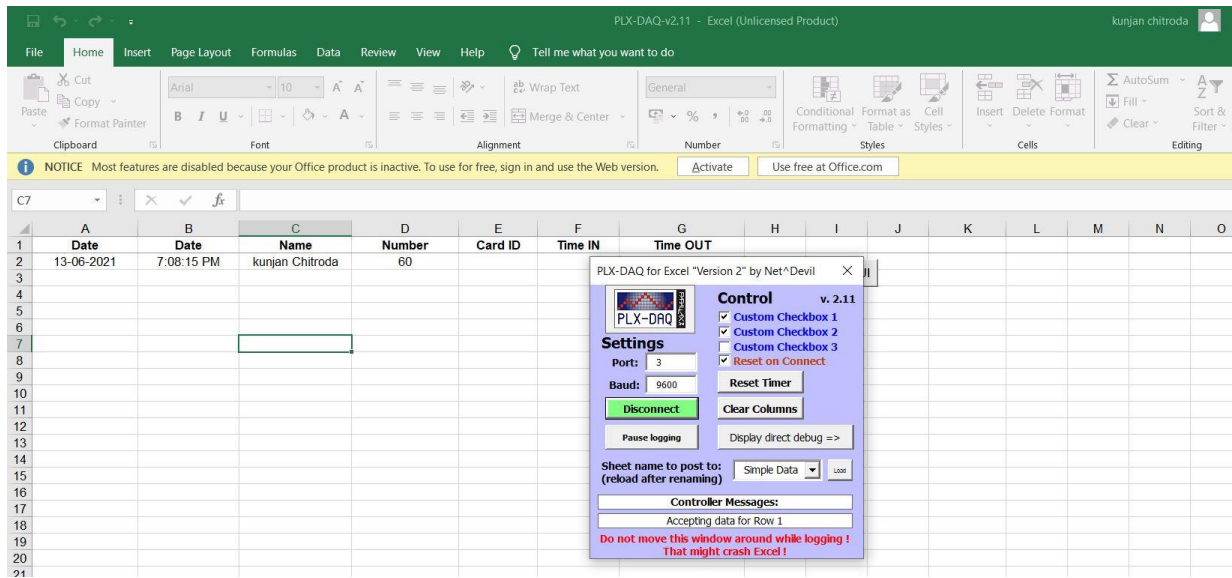


Figure 5.6

7. Second Data Entry Details Stored In Different Time.

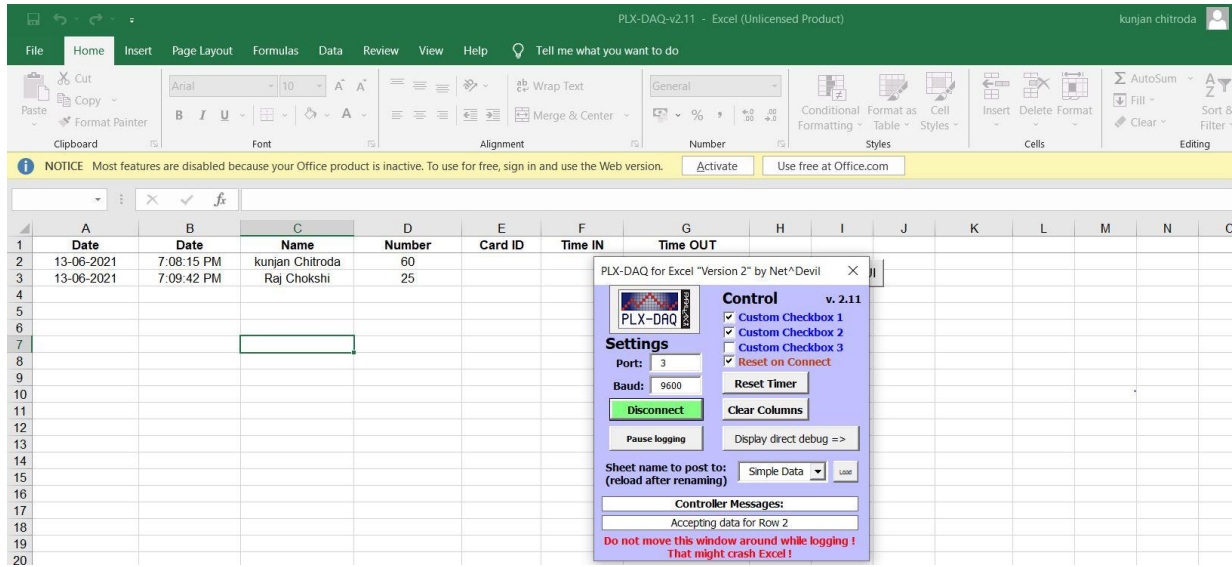


Figure 5.7

6. Conclusion and Future works

In Conclusion we can say that this website is helpful in colleges and organization. In future we will try to implement our system in the defence sector, because the data are transferred through the light So, its very hard to track. We will also try to implement our smart attendance system in corporate sector and also for the household purpose.

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