



RFID based Attendance Monitoring System

A cluster of decorative hexagonal icons is positioned in the top left corner. These icons include a lightbulb, a thumbs-up gesture, a smartphone, and a magnifying glass, all rendered in a light blue color.

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A cluster of decorative hexagonal icons is located in the bottom right corner. These icons include a speech bubble, a network of nodes, a large hexagon, and a gear, all rendered in a light blue color.



TOPICS



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Literature Survey

Study & Findings

It was found that most organisations use manual attendance monitoring and many models exist which aim to monitor attendance using RFID technology. The various models are:

- ◇ Simple attendance logging after verification using only RFID cards.
- ◇ Logging and monitoring attendance after connecting the RFID reader directly into a server.
- ◇ Use of GSM to inform parents about the student's attendance.
- ◇ Cloud storage and SD card options for backup.

Inference

- ◇ No methods were used to provide data security.
- ◇ Logging multiple attendances simultaneously was not possible.
- ◇ Uses limited infrastructure for covering a very large area.

Objective

Our aim is to provide a model that:

- ◇ is completely automatic,
- ◇ is able to log multiple attendance simultaneously,
- ◇ does not require any manual effort.
- ◇ helps in monitoring attendance seamlessly.
- ◇ is not limited by infrastructure.



A cluster of decorative hexagonal icons is positioned on the left side of the slide. These icons include a lightbulb, a thumbs-up, a network diagram, a smartphone, a magnifying glass, a gear, and a speech bubble. The hexagons are in various shades of blue and cyan.

1

INTRODUCTION



Proposed system

- Δ Automates the attendance taking process.
- Δ Reduces time and increases efficiency.
- Δ Enforces Security.
- Δ Scalable, easy to manage and easy to monitor.





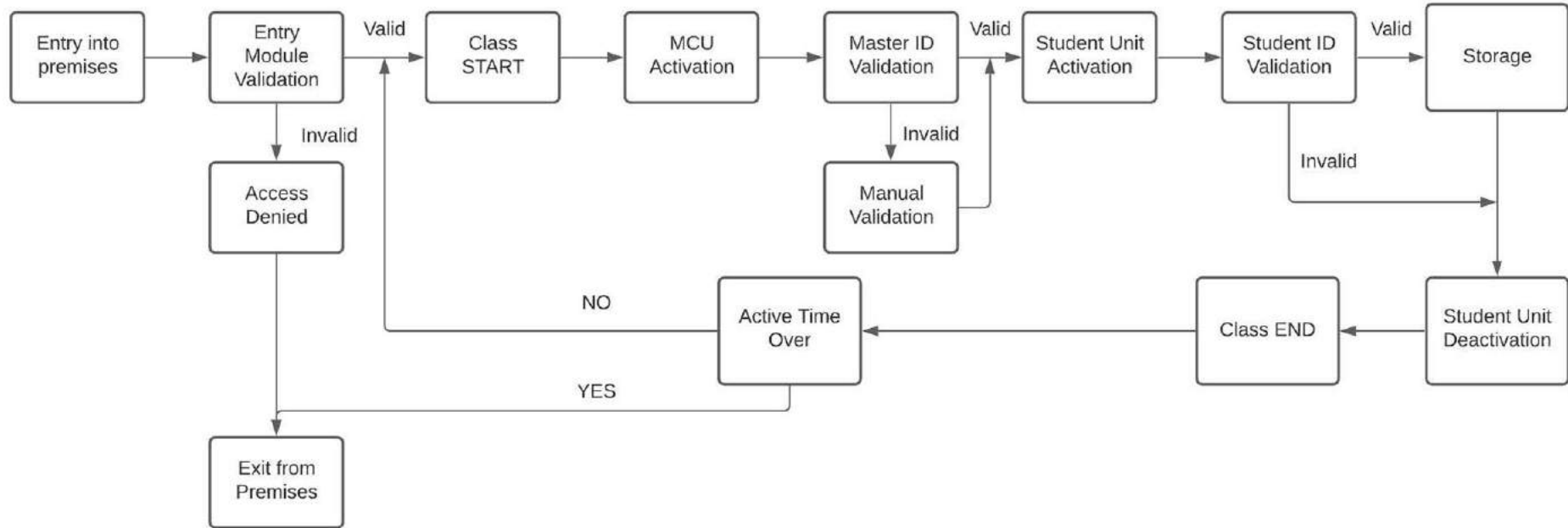
Importance of the method

- ❑ Methods will be implemented to tackle proxy/false attendance.
- ❑ (LoRa is used to connect multiple SUs to a single MCU, irrespective of the number of SUs). Greater area of connectivity.
- ❑ (Due to the implementation of multiple SUs, the model is able to handle greater volume of data in less time.) Handles greater volume of data. Enhanced efficiency.
- ❑ Easily detects failure, at any level and in any case.

A cluster of decorative hexagonal icons is positioned on the left side of the slide. These icons include a lightbulb, a thumbs-up, a network diagram, a smartphone, a magnifying glass, a gear, and a speech bubble, all rendered in various shades of blue and cyan. A large, central hexagon with a blue-to-cyan gradient contains the number '2'.

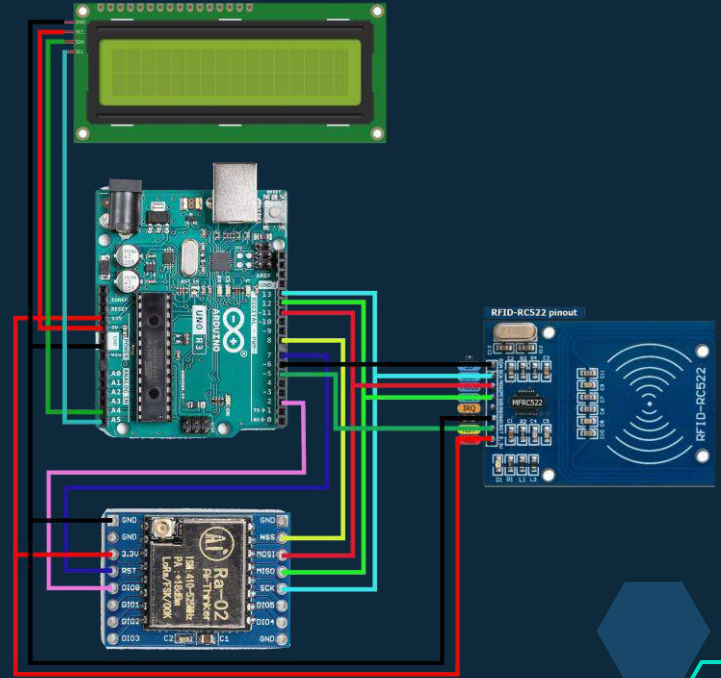
2

THEORY



Technology Used

- ❑ RC522 RFID reader is used for reading information from the RFID tags/cards.
- ❑ Arduino Uno or Nano is used as the microcontroller.
- ❑ LoRa is used as the communication layer and protocol.
- ❑ LCD is used to display the necessary information for visual aid.





RFID



Arduino



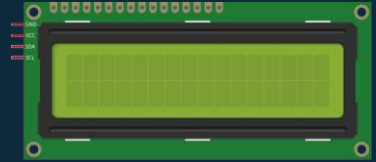
- ❑ Provides an **Unique** ID.
- ❑ **Open-source** in hardware and software and **Inexpensive**.
- ❑ **Line of Sight** not required.
- ❑ **Does not require** an external programmer.
- ❑ **Contactless** information sharing.
- ❑ Arduino IDE is **supported in almost every OS**.
- ❑ **Battery-less** operation.
- ❑ **Ease of Programming**.
- ❑ Can detect **through obstacles**.
- ❑ A very **large** and **growing community**.





LoRa

LCD



- ❑ Operates on **433MHz** band.
- ❑ Provides **deep indoor coverage**.
- ❑ **Low-power**.
- ❑ **Low-cost**. One unit costs around ₹450.

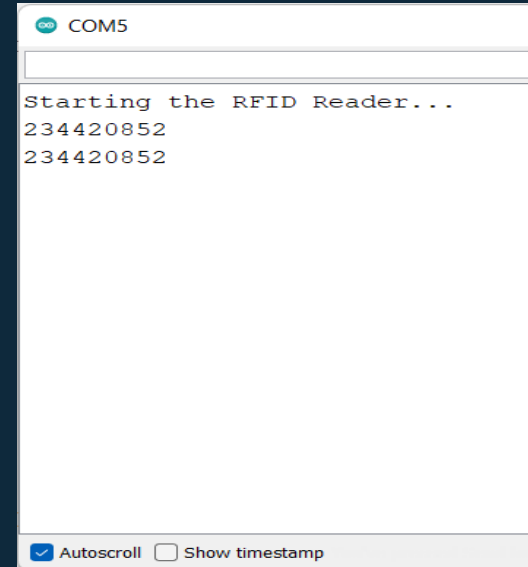
- ❑ It is a **16x2** LCD.
- ❑ Provides **visual info**.
- ❑ Uses **I2C** protocol.
- ❑ **Depicts status** of the process.

A decorative pattern of hexagons in various shades of blue and teal is located on the left side of the slide. The hexagons are of different sizes and are arranged in a cluster. Some hexagons contain icons: a lightbulb, a thumbs up, a smartphone, a magnifying glass, and a gear. A large, central hexagon contains the number '3'.

3

WORKING

Reading info from the RFID Card



Picture showing the RFID reader detecting and printing the Tag value.



Communicating using LoRa

The LoRa module is used to send and receive data packets to and from end nodes.

The same is shown below:

```
COM4

LoRa Sender
Sending packet: 0
Sending packet: 1
Sending packet: 2
Sending packet: 3
Sending packet: 4
Sending packet: 5
Sending packet: 6
Sending packet: 7
Sending packet: 8
Sending packet: 9
Sending packet: 10
```

Figure showing LoRa sending data packets

```
COM3

LoRa Receiver
Received packet 'hello beta 1' with RSSI -121
Received packet 'hello alpha 32' with RSSI -121
Received packet 'hello beta 2' with RSSI -121
Received packet 'hello alpha 33' with RSSI -122
Received packet 'hello beta 3' with RSSI -121
Received packet 'hello alpha 34' with RSSI -121
Received packet 'hello beta 4' with RSSI -122
Received packet 'hello alpha 35' with RSSI -122
Received packet 'hello beta 5' with RSSI -122
Received packet 'hello alpha 36' with RSSI -122
Received packet 'hello beta 6' with RSSI -121
Received packet 'hello alpha 37' with RSSI -122
Received packet 'hello beta 7' with RSSI -121
Received packet 'hello alpha 38' with RSSI -122
Received packet 'hello beta 8' with RSSI -121
Received packet 'hello alpha 39' with RSSI -122
Received packet 'hello beta 9' with RSSI -121
Received packet 'hello alpha 40' with RSSI -122
```

Figure showing LoRa receiving data packets

Customising the LCD



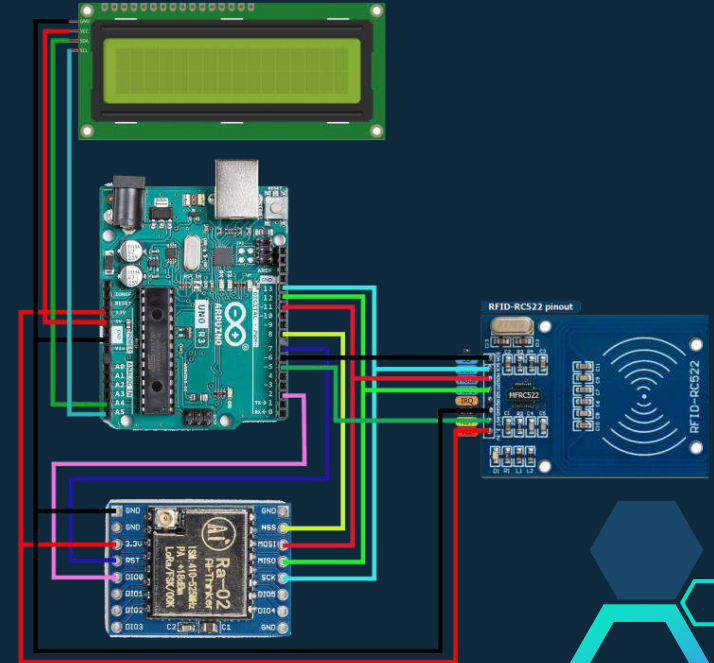
We are able to customise the LCD based on our needs like:

- ❑ Displaying a **Welcome message**.
- ❑ **Status** of the process.
- ❑ Necessary **numbers and values**.



Master Control Unit

- ❑ The Master Control Unit will have an Arduino Uno, RC522 reader module, LoRa Ra-02 module and I2C LCD module.
- ❑ The Master Control unit is responsible for the whole process.
- ❑ The Master Control Unit is capable of showing the vital information at that time .
- ❑ The task performed by MCU is explained in the next slide.

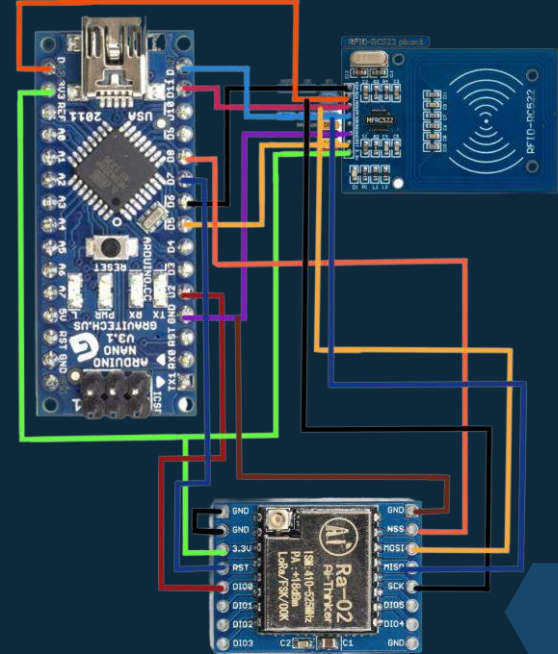


Process

- ◇ The teacher starts the MCU.
- ◇ The teacher is greeted .
- ◇ All the SUs will be activated.
- ◇ All the students data is collected and stored in the respective database.
- ◇ The attendance is confirmed and the process ends.

Student Control Unit

- The Student Unit mainly comprises the Arduino Nano, RC522 RFID reader module and Ra-02 LoRa module.
- This is done to collect the Information from the student's ID card when taking the attendance and to transmit that information to the Master Control Unit for further processing.



Process

- ◇ Student places the ID card
- ◇ Transmits the data to the MCU
- ◇ MCU sends back the confirmation
- ◇ Attendance process ends





Simultaneous Working of MCU and SU

```
COM3
Master Control Unit
LCD is on
Starting the RFID Reader...done
Aeie_8

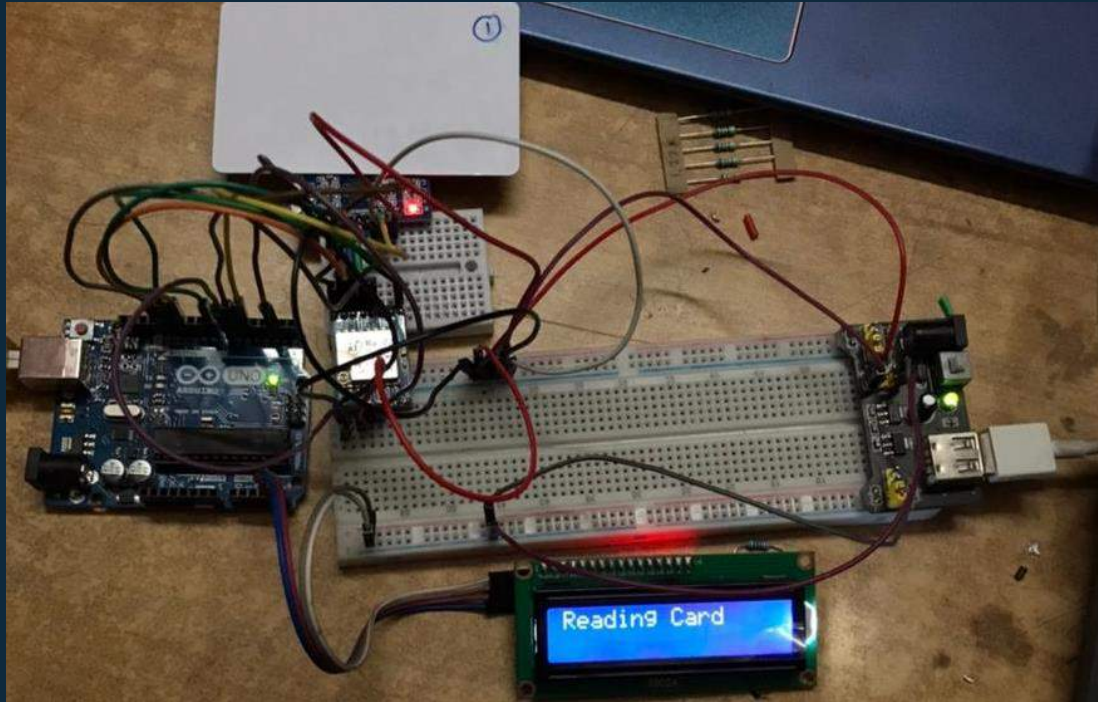
Sent data from server
Card ID
169310111
```

☒ Autoscroll ☐ Show timestamp Newline 9600 baud Clear output

```
COM5
Inside Read Lora Data
Inside Check received data
Inside Check received data
Inside Read Lora Data
Inside Check received data
Inside Check received data
Inside Read Lora Data
Inside Check received data
Inside Check received data
Inside Read Lora Data
Inside Check received data
Inside Check received data
Inside Read Lora Data
Inside Check received data
Inside Check received data
Inside
```

☒ Autoscroll ☐ Show timestamp Newline 9600 baud Clear output

Pictorial Representation :



Video Representation :



Video Representation :



Database Table

St_ID	St_Name	EI_801	EI_801_Total	EI_802	EI_802_Total
1701258826	Ahana Das	7	8	7	9
169310111	Bratati Rout	8	8	9	9
18920922752	Debapriya Bose	6	8	7	9
18694347	Hirak Das	8	8	8	9
234420852	Snehasish Malik	6	8	7	9
12312017354	Soumalya Sen	8	8	9	9



Flowchart of the process

CONCLUSION



Automation

- ◇ Saves time.
- ◇ Reduces errors.
- ◇ Less human effort.

Low Cost

- ◇ Most of the components and software are open-source.
- ◇ Relatively cheaper than other comparable/similar technologies available.

Better Operability

- ◇ Simple Interface.
- ◇ Easy to use & operate.
- ◇ Abstract design.

Advantageous

- ◇ Digitalization of data.
- ◇ Low response time.
- ◇ Simultaneous registering of attendance.

Low maintenance

- ◇ Battery operated.
- ◇ Very low power consuming components and techniques.

Future Scope

- ◇ Adopt in other organisation to cater their needs.
- ◇ Include parts to enhance or change certain requirements.

References

- ❑ Gatsheni, B.N., R.B. Kuriakose, and F. Aghdasi. Automating student class attendance register using radio frequency identification in South Africa, in Mechatronics, ICM2007 4th IEEE International Conference in 2007.
- ❑ Mahyidin, M.F. Student Attendance Using RFID System 2008; Available from: <http://umpir.ump.edu.my>.
- ❑ T. S. Lim, S.C. Sim, M. M Mansor. RFID Based Attendance System. 2009 IEEE Symposium on Industrial Electronics and Applications (ISIEA 2009), Kuala Lumpur, Malaysia, October 4-6, 2009.



THANK YOU 

