Hardware

1.MFRC522 RFID Reader Module



2.Arduino Uno



3. SIM800L

4. R307 fingerprint sensor

5. NodeMCU ESP8266

# 1. MFRC522 RFID Reader Module:

Specification:

- Operates at 13.56 MHz frequency.
- SPI communication interface.
- Supports ISO14443A standard for RFID cards and tags.
- Typically used for short-range communication.

Role in Project:

- The MFRC522 RFID reader module is responsible for reading data from RFID cards or tags.
- It captures the unique identification information from the RFID cards used by individuals for attendance tracking.
- Allows for contactless identification, making it convenient for users.

# 2. Arduino Uno:

Specification:

- Microcontroller: ATmega328P
- Clock Speed: 16 MHz.
- Digital I/O Pins: 14 (of which 6 provide PWM output).
- Analog Input Pins: 6.
- Flash Memory: 32 KB.

Role in Project:

- Arduino Uno serves as the brain of your project, controlling and coordinating the activities of other components.
- Reads data from RFID reader and fingerprint sensor.
- Sends data to the server using the GSM module.
- Executes the main program logic, including handling attendance data and communication with peripherals.

# 3. SIM800L GSM Module:

Specification:

- Supports 2G (GSM/GPRS) communication.
- Operates on frequencies 850/900/1800/1900 MHz.
- Provides SMS and GPRS data transmission capabilities.

Role in Project:

- Enables the Arduino Uno to send SMS alerts containing attendance data to a specified phone number.
- Facilitates communication between the Arduino and a remote server over the GSM network.
- Allows for real-time data transmission, making the attendance system responsive and remotely accessible.

## 4. R307 Fingerprint Sensor:

Specification:

- Optical fingerprint sensor.
- UART communication interface.
- Stores and recognizes fingerprints.
- Can store multiple fingerprints.

Role in Project:

- Enhances the security of the attendance system by incorporating biometric identification.
- Captures and stores fingerprints of individuals for attendance tracking.
- Allows for a more personalised and secure identification method compared to RFID cards.

# Software Technologies

Arduino Programming (C/C++):
- The Arduino Uno microcontroller is programmed using the Arduino IDE, using a variation of C/C++ language. You write the firmware that runs

on the Arduino to read data from the RFID reader and fingerprint sensor, process it, and communicate with the GSM module.

Arduino Libraries:

- You'll be using specific libraries for the RFID reader (e.g., `MFRC522` library) and the fingerprint sensor (e.g., `Adafruit_Fingerprint` library). These libraries abstract the low-level details of the hardware, making it easier to interface with the sensors.

Web Technologies (HTML, PHP, MySQL):

- The server-side of your system will likely involve a web application. You may use HTML for creating the structure of web pages, PHP for server-side scripting, and MySQL as the database to store attendance data. PHP scripts handle requests from the Arduino and perform operations like inserting data into the database.

HTTP/HTTPS Communication:

- The Arduino communicates with the server using HTTP or HTTPS protocols. It sends attendance data to the server, which is then processed by server-side scripts.

SMS Communication:

- The SIM800L GSM module is used to send SMS alerts. Communication with the module is often done using AT commands. You'll send SMS notifications to predefined phone numbers when specific events occur, like marking attendance.