BIOMETRIC ATTENDENCE SYSTEM

PROJECT DESCRIPTION

The **Fingerprint Enrollment System** is a **biometric security project** that uses a **fingerprint sensor** to register (enroll) users by storing their fingerprint templates in the sensor's internal memory. Each fingerprint is saved with a **unique ID number**, which can later be used for **authentication, access control, or attendance systems**. The system communicates with the fingerprint module through **serial communication** and uses the **Arduino Serial Monitor** to guide the enrollment process.

PIN CONNECTION

LCD (I2C – 16×2)

LCD Pin	Arduino UNO
VCC	5V
GND	GND
SDA	A4
SCL	A5

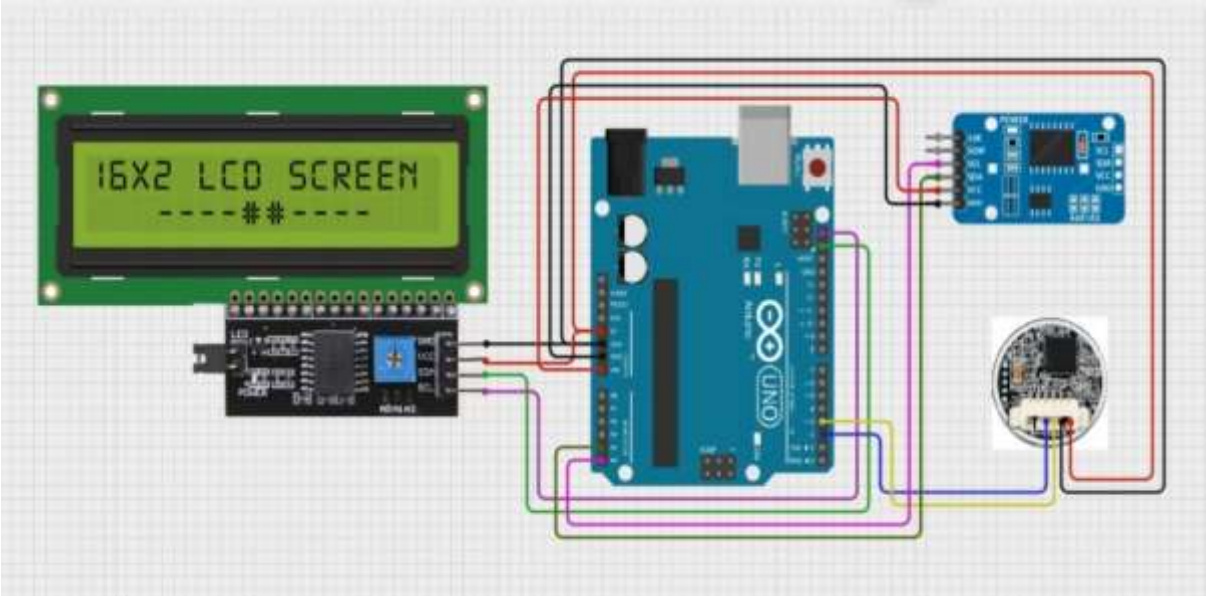
RTC Module (DS3231 / DS1307)

RTC Pin	Arduino UNO
VCC	5V
GND	GND
SDA	A4
SCL	A5

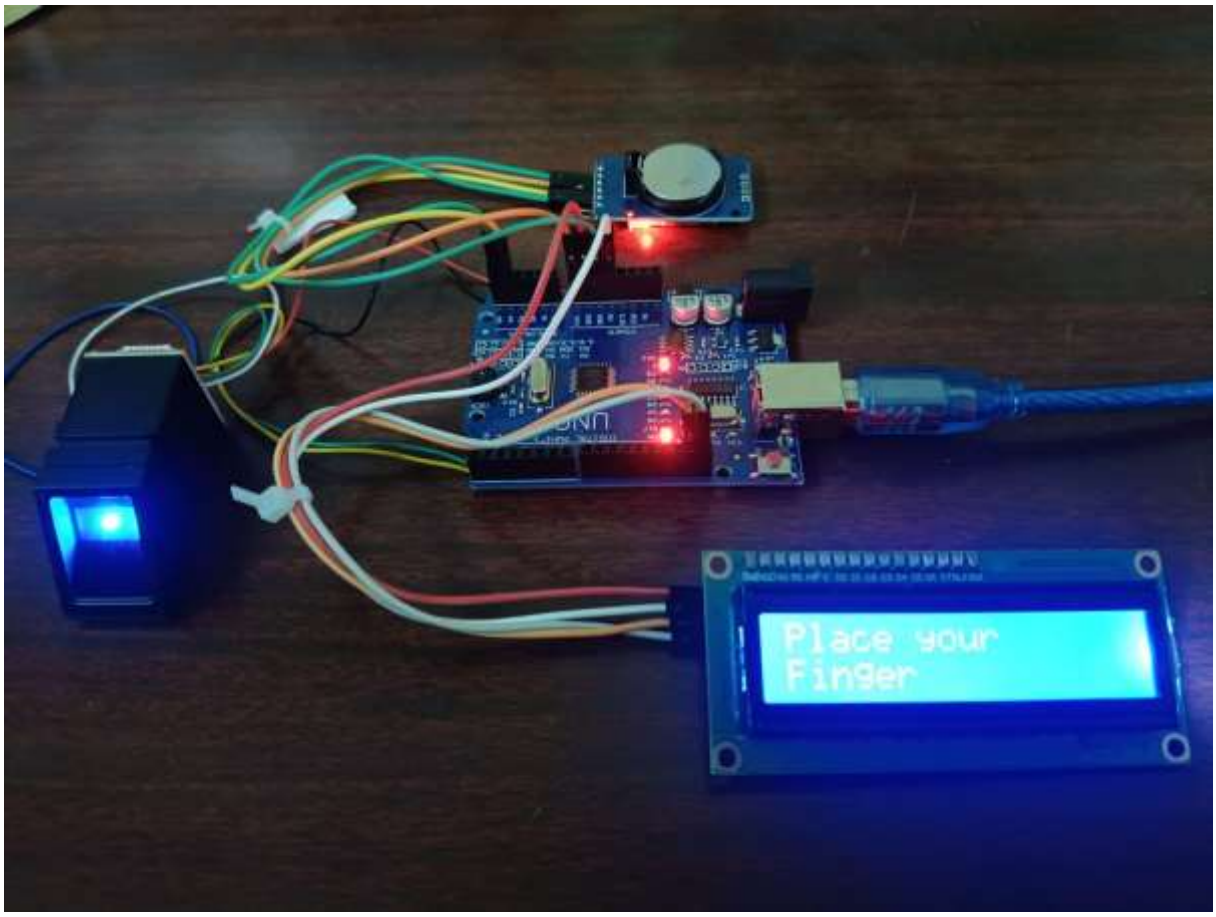
Fingerprint Sensor

Fingerprint Pin	Arduino UNO
VCC	5V
GND	GND
TX	D2
RX	D3

CIRCUIT DIAGRAM



PROJECT PHOTOS



PROCEDURE

1. Power ON the system.
2. LCD displays “Attendance Tracking System” for 5 seconds.
3. LCD shows “Place your Finger” and waits for input.
4. Teacher places registered finger on the sensor.
5. If fingerprint is valid, attendance is marked Present.
6. LCD displays teacher name, then time and date.
7. System returns to “Place your Finger” for the next teacher.
8. If fingerprint is invalid, Access Denied is shown.

CODE

```
#include <Adafruit_Fingerprint.h>
#include <SoftwareSerial.h>
SoftwareSerial fingerSerial(2, 3); // RX, TX
Adafruit_Fingerprint finger = Adafruit_Fingerprint(&fingerSerial);
uint8_t id;
void setup() {
  Serial.begin(9600);
  delay(100);
  Serial.println("\nFingerprint Enrollment");
  finger.begin(57600);
  if (finger.verifyPassword()) {
    Serial.println("Fingerprint sensor found!");
  } else {
    Serial.println("Fingerprint sensor NOT found!");
    while (1);
  }
  Serial.println("Enter ID # (1 - 127) to enroll:");
}

void loop() {
  if (Serial.available()) {
    id = Serial.parseInt();

    if (id == 0) {
      Serial.println("Invalid ID");
      return;
    }
    Serial.print("Enrolling ID ");
    Serial.println(id);

    while (!enrollFingerprint(id));
    Serial.println("Enrollment Successful!");
    Serial.println("Enter next ID to enroll:");
```

```
  }
}

uint8_t enrollFingerprint(uint8_t id) {
  int p = -1;
  Serial.println("Place finger on sensor");
  while (p != FINGERPRINT_OK) {
    p = finger.getImage();
  }
  p = finger.image2Tz(1);
  if (p != FINGERPRINT_OK) {
    Serial.println("Image error");
    return p;
  }
  Serial.println("Remove finger");
  delay(2000);
  while (finger.getImage() != FINGERPRINT_NOFINGER);
  Serial.println("Place SAME finger again");
  p = -1;
  while (p != FINGERPRINT_OK) {
    p = finger.getImage();
  }
  p = finger.image2Tz(2);
  if (p != FINGERPRINT_OK) {
    Serial.println("Image error");
    return p;
  }
  p = finger.createModel();
  if (p != FINGERPRINT_OK) {
    Serial.println("Finger mismatch");
    return p;
  }
  p = finger.storeModel(id);
  if (p != FINGERPRINT_OK) {
    Serial.println("Storage error");
    return p;
  }
  return true;
}
```