Requirements and Hardware Setup Guide

1. SOFTWARE (Required)

- **Python 3.x** – Programming language for backend logic

- **Django** – Web framework for admin panel and database handling

- **OpenCV** – For webcam integration and capturing live face frames

- **Face recognition** – Face verification logic using deep learning

- **pyttsx3** – Text-to-speech for user feedback

- **playsound** – For playing sound alerts

- **pyserial** – Communicate with Arduino over USB

- **VS Code / PyCharm / any IDE** – For writing and editing code

- **Windows Command Prompt / Linux Terminal** – To run server and scripts

- **Web Browser** – To access the Django admin panel (Chrome, Edge, etc.)

- **pip** – Python package manager for installing all of the above

- **Arduino IDE** – Write and upload code to Arduino Uno

- **CMake (Optional)** – For compiling OpenCV or native C++ code

- **Visual Studio 2022 (with C++ desktop dev) (Optional)** – For building C++ libraries or troubleshooting OpenCV

2. HARDWARE (Required)

A. Core Components

- **Arduino UNO R3** – Controls the RFID and connects to PC

  amazon link for ardunio uno r3:
  amazon.in/gp/product/B0F9TJPLC6/ref=ox_sc_act_title_4?smid=A21APBL8A6QIHT&psc=1

- **USB Cable (Type B)** – Connects Arduino to PC for programming and power

- **RC522 RFID Reader Module** – Scans RFID cards and sends UID

- **RFID Cards** – At least 1–2 for testing

  Amazon link for Rfid reader and cards:

  [Robodo SEN13 MFRC-522 RC522 RFID RF IC Card Reader Sensor Module, Arduino ARM Raspberry : Amazon.in: Industrial & Scientific](#)

B. Power & Wiring

- **Breadboard (830 points or more)** – To connect components without soldering

- **Male-to-Male Jumper Wires** – For Arduino to Breadboard

- **Male-to-Female Jumper Wires** – For connecting RFID module to Arduino

  amazon link for breadboard, m to m, m to f and f to f jumper wires :
  https://www.amazon.in/gp/product/B0F4669XP3/ref=ox_sc_act_title_3?smid=A2QS4FU4YA9WPX&psc=1

- **9V Battery with DC Adapter** – Optional external power for Arduino **(HAS TO BE PURCHASED OFFLINE)**

- **220Ω–330Ω Resistors** – Current limiting for LEDs

- **10kΩ Resistor** – Pull-down resistor for stable logic levels (if needed)

C. Feedback System (currently optional, discussion to be done for Deciding to add this or not)

- **Buzzer (Active or Passive)** – To beep on success or error

- **Red LED** – Indicate failure (e.g., wrong UID or face mismatch)

- **Green LED** – Indicate success (attendance marked)

D. Face Recognition Setup

- **Laptop/PC with Webcam** – Needed for running face detection

- *(Or you can use your Phone as Webcam via Iriun or Camo apps)*

- **Monitor/Screen** – To view face capture, UID detection, and admin interface

RC522 RFID Module to Arduino UNO (wiring table)

RC522 Pin	Signal Type	Arduino Pin	Pin Number on UNO	Purpose / Description	Notes / Caution
SDA	SPI Slave Select	D10	Pin 16 (Digital 10)	Selects the RC522 as the active device on the SPI bus.	Must match SS pin in your code (often MFRC522 library uses D10 by default).
SCK	SPI Clock	D13	Pin 19 (Digital 13)	Provides clock signal for SPI communication.	Shared line if multiple SPI devices are used.
MOSI	SPI Data Output	D11	Pin 17 (Digital 11)	Sends data from Arduino (master) to RC522 (slave).	Ensure solid connection for correct data transmission.
MISO	SPI Data Input	D12	Pin 18 (Digital 12)	Receives data from RC522 to Arduino.	Connect carefully; wrong wiring results in read failures.
IRQ	Interrupt Output	*Not connected*	—	Optional. Can trigger interrupt on card detection, but not required.	Leave unconnected unless you specifically use interrupt-driven logic.
GND	Power Ground	GND	Pin 4 or 29	Common ground connection between RC522 and Arduino.	Must be firmly connected to prevent logic errors.
RST	Reset Signal	D9	Pin 15 (Digital 9)	Allows Arduino to reset the RC522 chip.	Must be connected for proper reinitialization after power loss or soft resets.
3.3V	Power Supply (VCC)	3.3V	Pin 2 (3.3V output)	Powers the RC522 module.	**Do NOT connect to 5V** – it will damage the module.

Wire Type Recommendations

Component	Recommended Wire	Why
Arduino to Breadboard	Male-to-Male jumper wires	For digital pins and power lines
Breadboard to RC522	Male-to-Female wires	If RC522 has female headers
RC522 to Arduino (alt)	Direct Male-Male	If both have male headers (less common)

- Place the **RC522 on a small breadboard**, close to the Arduino to avoid signal loss.

- Use **color-coded jumper wires** (e.g., red for power, black for ground, yellow/green for data).

- Label your wires (masking tape or wire tags) during your first-time setup.

- 3.3V used for power

- SDA, SCK, MOSI, MISO connected to proper digital pins?

- RST connected and to be declared in code

- Using SPI mode in your Arduino sketch (with MFRC522 or similar library)