INTERNET OF EVERYTHING PROJECT

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AIM / Problem Statement

Smart E-Gate for Gated Community

Abstract

This project introduces a Smart E-Gate Security System that Authenticates users and Detects potential Intruders/Trespassers and warns us about where the trespasser might be

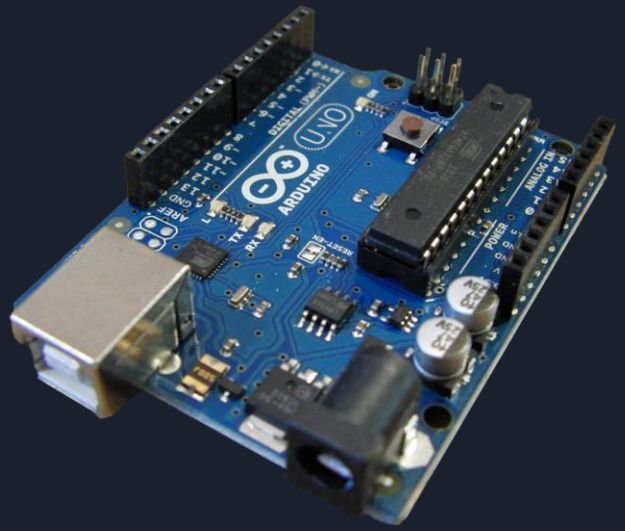
This project/system has 2 core parts

- **Gate Module**: this module authenticates users based on a PIN/Password which the User enters via a 4x4 keypad and the Gate is opened if the PIN is correct and if the wrong Pin has been entered 3 or more times the buzzer is turned on

- **Intruder Detection System**: this module is a network of sensors which uses ESP-NOW protocol and is configured in a multiple master,single slave configuration where the master nodes send the sensor data to a single slave node which displays the data

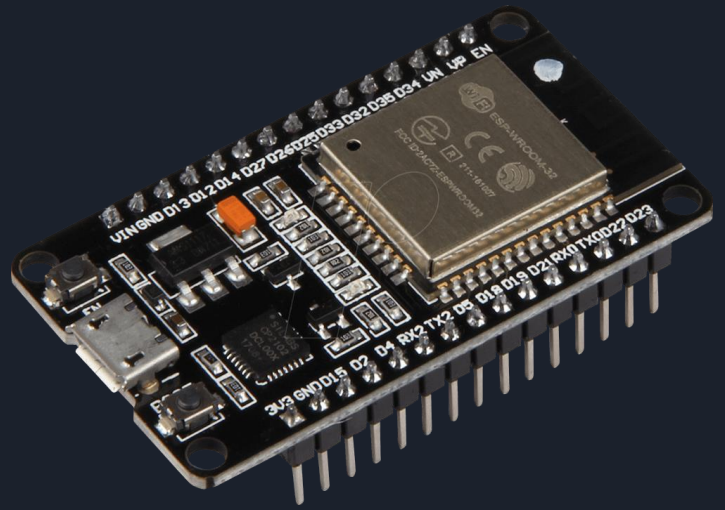
Components Used(Gate Module)

- Arduino UNO R3
- ESP 32
- 4*4 Keypad
- Servo Motor
- Ultrasonic Sensor
- LCD Screen with I2C Module
- Bread Board
- Buzzer

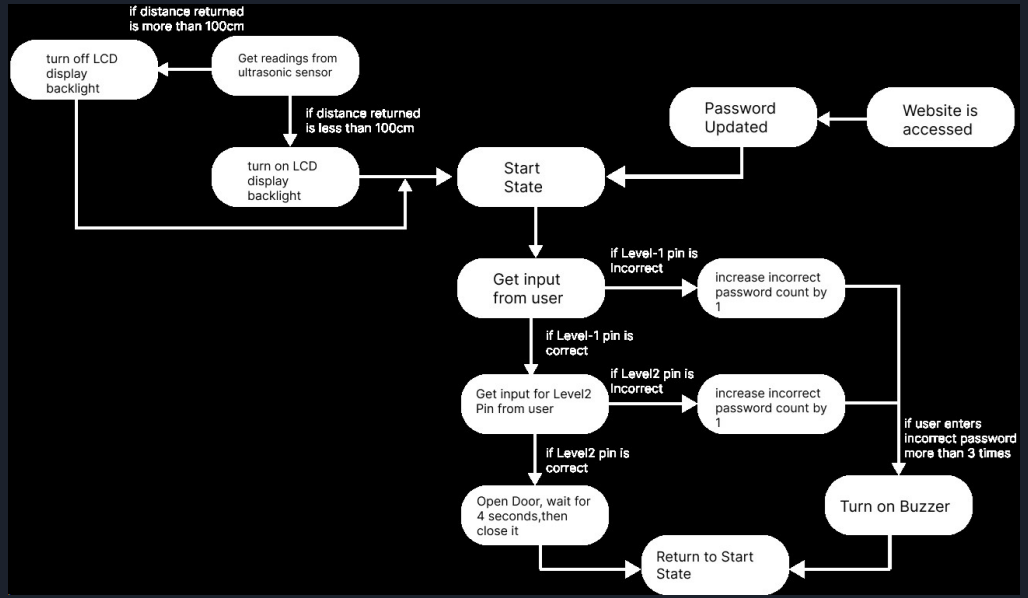


Components Used(Intruder Detection Module)

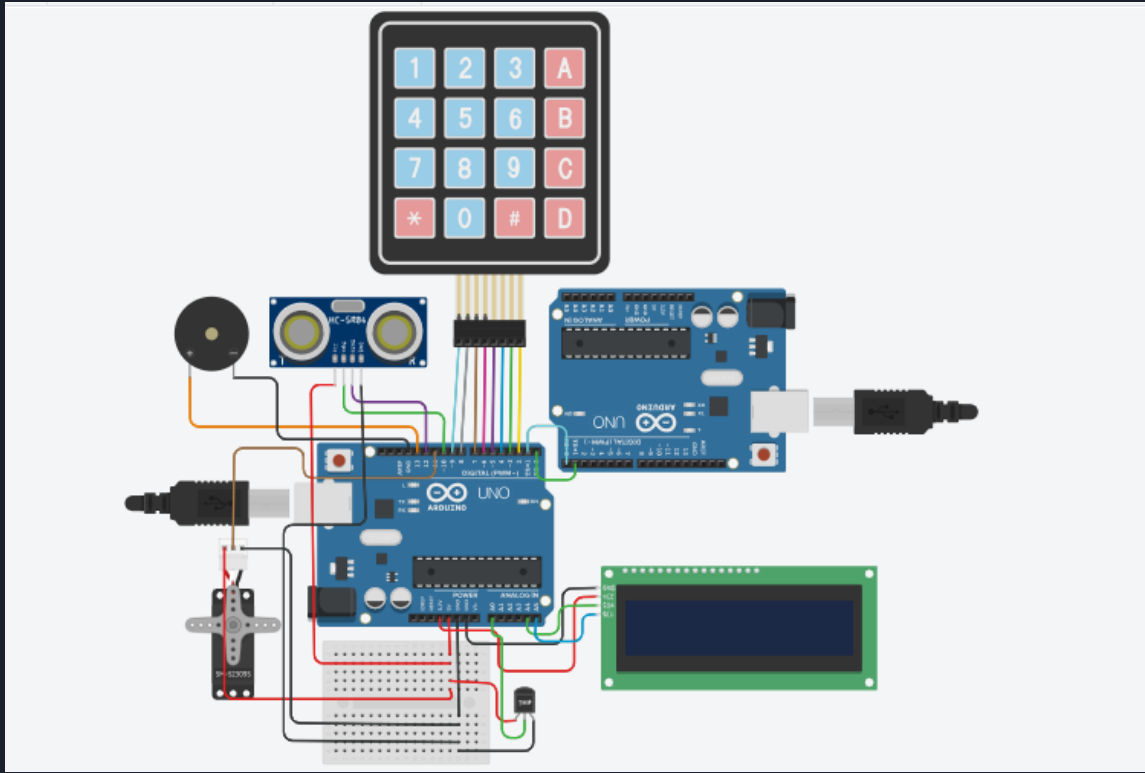
- ESP 32
- Ultrasonic Sensor
- PIR Motion Sensor
- LDR
- Bread Board
- Buzzer



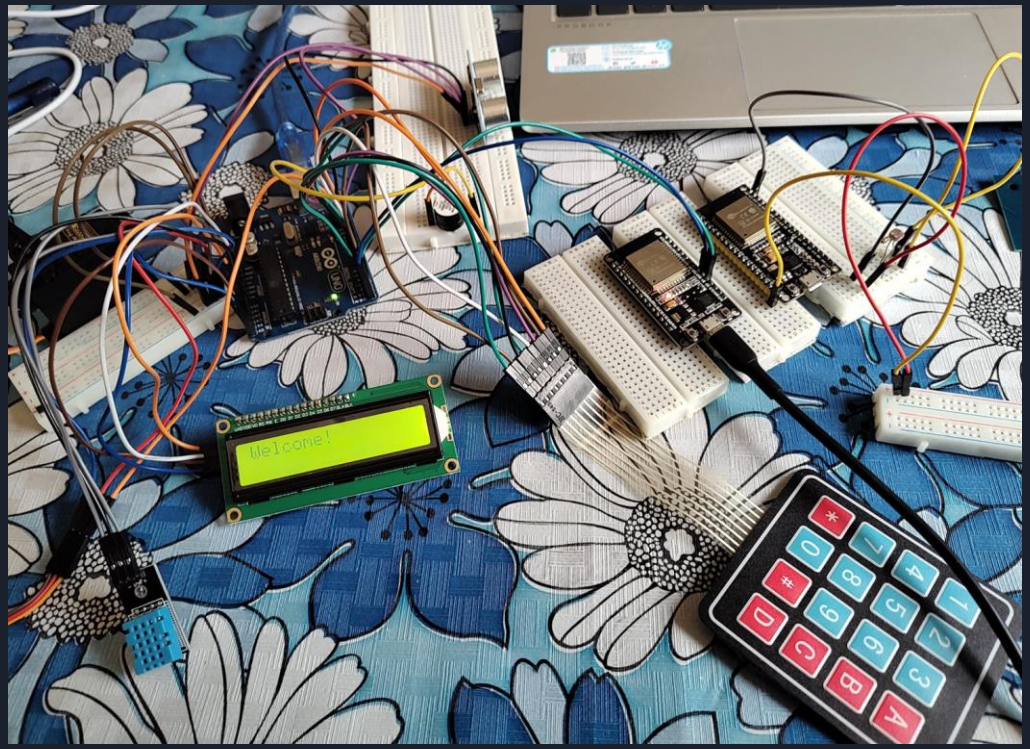
Logical Diagram of Gate Module



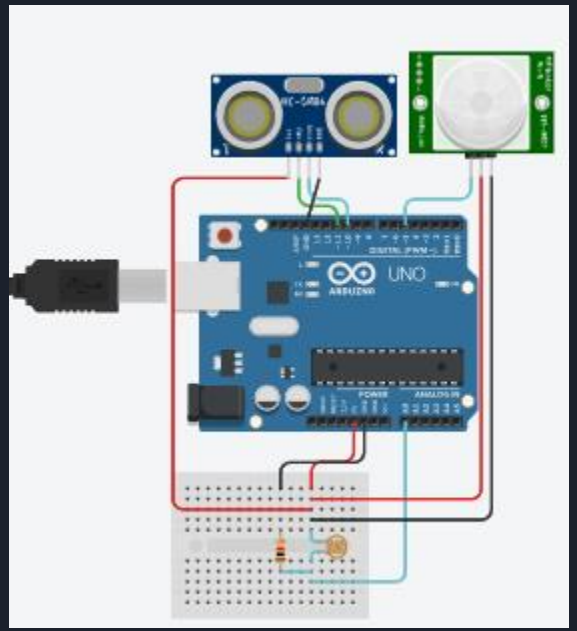
Circuit/Interfacing Diagram (Gate Module)



Physical project (Gate Module)



Circuit/Interfacing Diagram (Intruder Detection Module)



Advantages

(when comparing this to no security system)

- This System Can be used to Authenticate and Identify Users and potentially keep track of Who Enters the premises
- The Password can be Changed easily whenever required via the website which can only be accessed in a private network
- It is highly scalable as each Slave/Receiver node in the Intruder Detection module can be connected to 20 devices and when we need more devices we can just add another slave node,
- Brute force attack is not possible because of the 2 level authentication and the limited number of tries you get.

Disadvantages

- Maintenance
- Dependency on Internet & Power
- Network Vulnerability
- Limited Accessibility
- False Alarms

Future Expansions

- In the Intruder detection module The TX,RX ports of the ESP32 have been be left and can be used to connect a esp32 camera module and Edge Impulse(cloud service for ML on Edge devices) so that the camera can start and detect humans once motion is detected via motion sensor the Sensor Module of the Intruder detection System

- The Password Change Website is currently locally hosted within the esp32 we can make it so that the website is hosted in the cloud

- We can use a RFID Sensor(RC522) and use the phones of the Users as the tags(most phones that have a RFID reader can also be used as a RFID tag, in that case To open the Door ,we can have the user Enter a PIN along with the RFID when both are Valid the Gate Opens,