

Automatic Door Unlock System Using IOT and RFID

Panguluri Srinivasa Rao, Mohammed Ali Hussain, Ch.Sriharika

Abstract: This paper clarifies the method of remotely controlling the door unlock by utilizing a web association and a hand-off of messages through this association with convey between the proprietor and the framework at the door unlock. This door unlock framework goes for making a progressively secure and a protected method to give get to guests approved by the proprietor of the house into their homes. By our research work denotes different approaches to door unlocking framework that is executed by utilization of password, RFID and mobile application. The equipment parts that are required for door unlock framework are RFID reader, passive RFID tags, wireless transmitter plus collector, Keypad, Arduinonano and ENodemcu, Servomotor, Programming help of Arduino IDE are utilized for the control of door unlock system. By user's registered password, RFID and mobile application [11] to the system, we can be able to unlock the door by that it will increase the safety level to stop Associate in Nursing unauthorized unlocking, in this paper we are providing Three approaches for automatic door unlock system, in which first way by password, second way by RFID and third way is by using mobile application. Security mechanism is also provided in these approaches. There is an arrangement for continuous observing of User activities. If the door is unlocked then notification window returns (door is opened), which is made conceivable by the utilization of the mobile application. Automatic password generation based lock system can provide user safety and low price means of locking-unlocking the system.

Index Terms: RFID, Arduinonano, Nodemcu, Mobile Application, Servo Motor.

I. INTRODUCTION

With the new advances in registering and correspondence methods, numerous applications that recently require dimplanted frameworks running in a fairly confined way that are presently be interconnected in an Internet of Things (IoT) world giving a progressively coordinated perspective all in all framework to the end client and better approaches to cooperate with the earth. IoT has empowered a change from savvy gadgets to brilliant homes, towards shrewd associations and savvy urban areas, while new difficulties and dangers are to be replied and confronted. Individuals

must be a piece of this development towards a half human - half machine world and thus new human-machine interfaces (HMIs) and correspondence strategies must be planned and In the security domain we use the Internet of Things that can be useful for users, Users can use what ever their need. executed to permit a smooth and reasonable connection. The entrance control is such a run of the mill connection between a security framework and individuals. Its motivation is to distinguish and perceive the nearness of an individual, remarkably distinguish it utilizing at least one confirmation systems, log the occasion in a database and approve the entrance. The location stage is utilized if the sensors can recognize the physical nearness of individuals adjacent the entrance control point. It is the situation of different sorts of closeness sensors or camera(s). In the verification process, organizing, distinguishing of individual dependents on a prior put away data: passwords, RFID, mobile application or replies to security questions. The approval stage can be completely robotized, when the get to is conceded or denied because of an unassisted calculation, or this stage can be human helped when the consequence of the validation together with pertinent information are sent to the framework chairman, lastly he may or may not approve the entrance with or without new prerequisites from the solicitant. We are more concentrating on security for the unlock systems, so we are implementing the Automatic door unlock system with security features with Low price.

Literature Survey:-

Literature survey is nothing but collecting information and data which are related to our idea. These data should analyse with respect to our idea because we have to know the better approach and ways, before beginning the analysis of project, we refer several analysis papers, documents, manuals which are related to our idea of the project.

A. **Muhammad SabirinHadishe** had purpose "Design of Smart Lock System for Doors with Special Features using Bluetooth Technology" in 2018 (ICOIACT). In this paper their Design Smart Lock System using Bluetooth Technology [2] and their mainly focused on Bluetooth technology which is present almost all the gadgets. The system uses Bluetooth technology with low power, the design of system is over and special features to improve the security and the comfort of the users. B. **PriyankaBandagaleshe** had purposed "Automatic door locking system" in 2016 (IJEDR). We can find in depth info in this paper on the detail info of Automatic door locking system by using different electronic parts, their implementations of the security framework by using of Bluetooth device and Microcontroller technology[3].

Manuscript published on 30 March 2019.

*Correspondence Author(s)

PanguluriSrinivasaRao, UG Student, Department of Electronics andComputer Engineering, KoneruLakshmaiah Education Foundation,Guntur, India,

Dr. Mohammed Ali Hussain, Professor, Department of Electronics andComputer Engineering, KoneruLakshmaiah Education Foundation,Guntur, India,

Ch.Sriharika, UG Student, Department of Electronics andComputer Engineering, KoneruLakshmaiah Education Foundation,Guntur, India,

© The Authors. Published by Blue Eyes Intelligence Engineering and Sciences Publication (BEIESP). This is an [open access](https://creativecommons.org/licenses/by-nc-nd/4.0/) article under the CC-BY-NC-ND license <http://creativecommons.org/licenses/by-nc-nd/4.0/>.

They made the framework that will give 24x7 services, by the use of registered password. If the user forgets the password then framework presents the limberness to the user to change the password. 1st we have to enter the password for the Bluetooth connection and 2nd is for unlock the door in application. Both passwords can be changed whenever required. This framework will give user progressively secure and minimal effort method for locking-opening framework.

C.SomjitNath, Paramita Banerjee, RathindraNath, Swarup Kumar Mitra, MrinalKantiNaskar purposed "Arduino Based Door Unlocking System with Real Time Control" in 2016 2nd International Conference on Contemporary Computing and Informatics. In this paper they described about the implementation of Arduino based door unlocking system. The system is implemented using a central server which consists of a central database gathering all the info about the right personnel. They used RFID technology, it is also a low cost system, and for every door, their give the RFID tags in such a way that if the door is open/close the statues of the door is updated and stored in database. They wanted to replace the entire RF transmission by the WI-FI transmission for better transmission.

II. COMPONENT DESCRIPTION

A. Arduino Nano Micro Controller

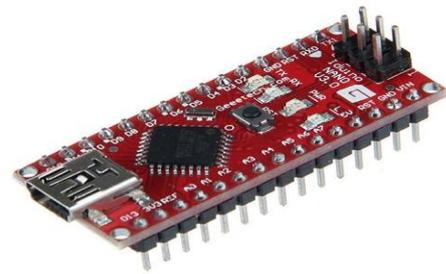


Fig.1: How Arduino we used in our project

Arduino NANO [1] is used to control the working of RFID reader (receivers and transmitters) and NodeMCU. Arduino Nano is a micro controller board which is based on the ATMEGA 168 or ATMEGA 328p. It consists of 12 digital inputs and outputs 8 analog inputs and outputs, Input voltage (7-12)v, Mini USB cable and reset button. And its operating voltage is 5v. It can perform 3 types of communication protocols, which are: Serial, SPI & I2C protocol. It has 3 types of built-in memories associated. 1 Flash memory (32KB), 2 EEPROM (1KB), 3 SRAM (2KB). It is the interface between the Servomotor and the devices (keypad, RFID, Smart Phones) to operate to unlock the door.

B. RFID Reader and Tag

A RFID reader ought to be presented at all the doors. It examines information on the "tag". Here we used a MFRC522 RFID reader [4] with a S50 Fudan card. The reader has a working repeat of 13.56MHz and the most extraordinary data swapping scale is 10Mbit/s.

C. Remote Transmitter and Receiver

Here a Radio Frequency Module (433 MHz) is used which has both transmitter and beneficiary. Both the transmitter likewise, the recipient work have a standard working voltage of 5 Volt. Normal extent of such modules is around 100 meters in impeccable conditions.

D. NodeMCU



Fig.2: NodeMcu has a interface between hardware and Mobile Application.

NodeMcu is used as a Wi-Fi module, which is the interface between hardware and smart-phone. NodeMcu connect only the network (name of the network and password of the network) which we are given in program code. It takes the input from the smart phone and that input will be sent to the hardware kit. With the help of NodeMcu and smart phone we will operate the door unlock system. The security thing in NodeMCU [6] is it will connect only the network, which are already given in the program code (network name and password of the networks).

E. Keypad

Keypad is one of the essential parts in the embedded devices used for interacting with the embedded devices. Keypad is used as a input devices to give commands to the controller in this project we used the 3*4 matrix keypad [9]. It has 12 pins which are arrange in telephonic order, Out of 12 pins we use only 7 pins to interface to the controller that is 3-columns and 4-rows. It sends the input to the controller, the controller works based on input given by the keypad. We send the password to the controller by the use of this keypad only. If the password which is given to the controller with help of keypad is correct then only door will unlock and if the password is wrong then door will not unlock.



Fig.3: Keypad Lock System.

Keypad is interface to the controller by the following program code:-

```
#include<stdio.h>
#include<coino.h>
#include<Keypad.h>
Const byte COLs =3;
Const byte ROWs =4;
Char keys[ROWs][COLs]={
  {'1','2','3'},
  {'4','5','6'},
  {'7','8','9'},
  {'*','0','#'}};
};
Byte rowPins[ROWs] = { 5,6,7,8};
Byte colPins[COLs] = {2,3,4};
```

F. Servo Motor



Fig.4: Servo Motor

The Torque of the servo motor[8] 4.8V: 25.00 oz-in (1.80kg-cm) And is Speed: 4.8V:0.12 sec/60°,Weight of it is 0.32 oz (9.0 g),Dimensions:Length:0.91 in (23.0 mm),Width:0.48 in (12.2 mm),Height:1.14 in (29.0 mm),Motor Type is 3-pole. When the torque is observed by the servo motor then the motor rotates in anti-clock wise and clock wise. This servo motor is fixed to door and door also rotates automatically.

G.Blynk App

Blynk is a Platform with Android applications to control Arduino, Raspberry Pi and the preferences over the Internet. We need to make a Blynk Account for the same. After the BlynkApp[10] is downloaded, creation of new account required to make a New Project. After a user effectively signed into his/her record, need to begin by making another undertaking, pick Hardware, AuthToken, include a Widget and Run The Project. The BlynkArduino Library is to be included, which produces the firmware running on your ESP8266.The Auth Token is vital – you'll have to stick it into your ESP8266's firmware. Include a Button; at that point click on it to change its settings. Transfer the Blynk Firmware. With the help of Blynk app, We can operate the Door Unlock System by the use of IOT; as we see Widget Box in app where we select the Buttons and notifications, by the use this Buttons, we can operate the hardware.

III. Brief Description of the System

The focal database contains all the data of the approved clients stating their names, occupation, age and the serials which are composed inside their RFID cards or labels. The clients are exceptionally distinguished by the server by the sequential

manner allotted to card. At the point when another client is first enrolled to the framework, new sequential is created haphazardly and is scorched to the new card utilizing RFID per user. Next time when this client finds ways to deal with enter through any entryway the new sequential is handled in indistinguishable way from it is effectively incorporated into the focal database. At the point when a client comes to passage point just the sequential number is gotten from the card and it is watched that whether the sequential is an approved one or not. On the off chance that the sequential is approved the section ask for is acknowledged by the server. As needs be, the entryway at that specific passage point is opened and after a predefined time delay it is bolted again giving some an opportunity to the client to enter. In any case, if the sequential is unapproved access to that entryway is denied with a disturbing (sound excluded in the model). This passage leave data is likewise put away in the focal database in the type of a log record with date, time and entryway number. The framework can likewise be controlled physically for any crisis or at the season of any debacle, for example, fire or seismic tremor. Two catches are given at the server terminal. One for manual opening and another for manual shutting - of all the entryways at once. There is additionally a web based checking framework. This permits the in charge of the framework to screen the registration exercises of the clients just as to control the status of each and singular entryway not withstanding when the individual is out of station or out of that zone RFID tags has unique code, the developer dump that unique code to the Arduino by the use of Arduino IDE; If scan the RFID card to remote transmitter ,RFID module detects the unique code. If the unique code is match the developer unique code then door will automatically unlock, if unique code does not match then door did not match to unlock.

III. METHODOLOGY

A. Over all Block Diagram

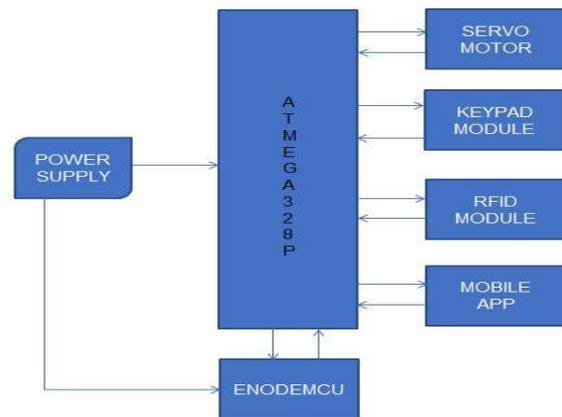


Fig.5: Block Diagram of the System

B. Proposed structure of the system for RFID

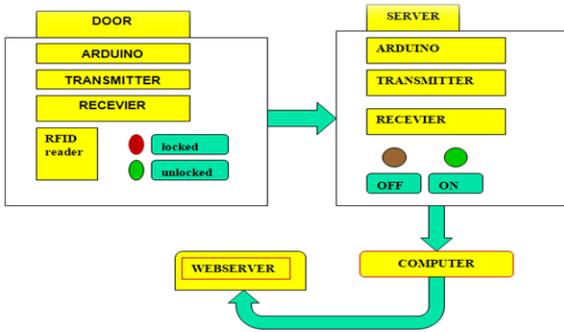


Fig.6: Block Diagram for RFID System

RFID tags has unique code, the developer dump that unique code to the Arduino by the use of Arduino IDE, if scanning the RFID card to remote transmitter, RFID module detects the unique code. If the unique code matches the developer unique code then door will automatically unlock, if unique code does not match then door did not match to unlock.

C. Keypad and Hardware

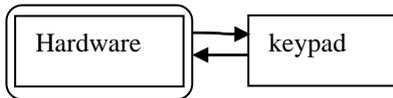


Fig.7: How Keypad interfaces to Hardware

the developer fixes the password to unlock the door, and code is dumped in Arduino through Arduino IDE, and when the code is executing if user enter the password correctly, then door will automatically unlock ,the password is wrong the door do not unlock.

D. Blynk app and Hardware

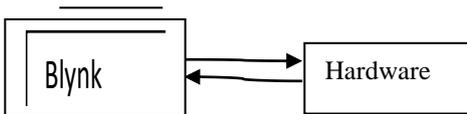


Fig.8: Blynk app and Hardware Interface

To connect the Blynk app & hardware module, We need a Auth token, where this Auth token comes to our email, if a new project is created in Blynk app this auth-token and login credential that is name of the network and password are dumped to NodeMCU. After the NodeMCU is connected by given credential only through Wi-Fi network, we can operate the hardware kit by the use of Blynk app, in that app we see Widget Box we select the Buttons and notifications, by the use this Buttons we operate the hardware. If the Button is ON then the door will automatically unlock and it will send the notification window to mobile that is DOOR IS OPENED.

V. EXPERIMENTAL RESULTS



Fig.9: Door is locked



Fig.10: Door is unlocked

We operate the door by using 3 approaches as show below:-

LockModes	Operations
ON	Door Unlocked
OFF	Door Locked

Table.1:Door Operations By using Moblie APP

Keypad	Operations
If password is correct	Door will Unlock
If password is incorrect	Door will not Locked

Table.2:Keypad Operations

RFID	Operations
If RFID code matches	Door will Unlock
If RFID code did not match	Door will Not Unlock

Table.3:RFID Operations

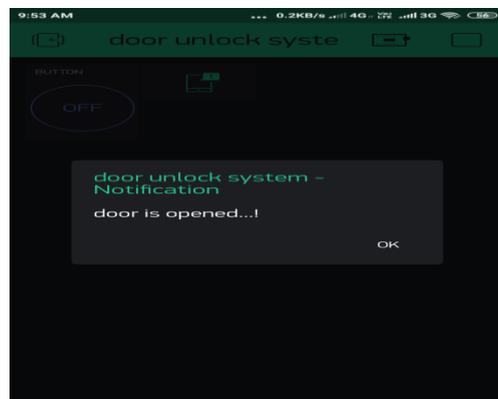


Fig.11: Notification window when the Door is Unlocked.

VI. CONCLUSION

The research study can be used to design the Automatic Door Unlock System (ADUS) using IOT & RFID Technology. User mainly wants the security; and in our system we had the security module also by using IOT & RFID Technology. IOT Technology gives more security and user benefits Compare to Bluetooth Technology.

In our project we provided the security to the user by Password, RFID and IOT. If the door is unlocked then the notification window will come to the user.

REFERENCES

1. Comparison among Arduino boards we reference this link arduino.cc/usa/arduino-nano
2. Muhammad SabirinHadis,"Design of Smart Lock System for Doors with Special Features using Bluetooth Technology",in 2018 International Conference on Information and Communications Technology (ICOIACT).Pages[396-400].
3. PriyankaBandagale,"Automatic Door Locking System" in International Journal of Engineering Development and Research.2016 IJEDR | Volume 4, Issue 1 | ISSN: 2321-9939,Pages[495-499].
4. To work with RFID Technology we had referredhttps://www.rfid-library.com/?gclid=EAIaIQobChMIyZWvIc_T4AIVXqPCh2hngDuEAAAYASAAEgLGzvD_BwE
5. SomjitNath, Paramita Banerjee, RathindraNath, Swarup Kumar Mitra, MrinalKantiNaskar,"Arduino Based Door Unlocking System with Real Time Control",2016 2nd International Conference on Contemporary Computing and Informatics,Pages[358-362].
6. <https://www.electronicwings.com/nodemcu/introduction-to-nodemcu>
7. Dr.Mohammedsowket,"password protected electronic lock system for smart home security",Published by :Vol. 7 Issue 04, April-2018,(IJERT), Pages [541-544].
8. <https://www.elprocus.com/servo-motor/>
9. For keypad interface with controller we refered the https://www.addicore.com/v/vspfiles/downloadables/Product%20Downloadables/Project_Interface_Kit/Addicore_12-Key_Keypad_Tutorial.pdf
10. For mobile application we used the blynk app www how to work with this app we refered<https://blynk.cc/getting-started/>
11. Alexandru Agape, MihaiPostolache,"Internet-enabled Access Control System using a Mobile Application in 2018 22nd International Conference on System Theory, Control and Computing (ICSTCC), Pages [244-249].

AUTHOR PROFILE



Panguluri Srinivasa Rao is a UG Student in K L University and belongs to the branch Electronics and Computer Engineering. His areas of interests are Internet of Things.



Professor Dr. Mohammed Ali Hussain received his Ph.D. in Computer Science & Engineering from Acharya Nagarjuna University in 2013, M.Tech Computer Science & Engineering from Bharath University in 2005 and B.E Computer Science & Engineering from Gulbarga University in 2000. He has more than 17 years of teaching experience in India and Abroad. He has been awarded with 6 different prestigious awards from various research organizations in India and Abroad for his research contributions. He has published about 100 refereed technical articles in scholarly international journals and proceedings of international conferences. He is Chief Editor/Advisory Board Member and Technical Review Member of more than 100 peer reviewed International Journals. He is a recognized supervisor for Ph.D. from various Universities in India. He has produced 5 Ph.D's under

his guidance. He has been invited to deliver keynote speeches/ Guest Lectures at various National & International Conferences in India and Abroad. He is a professional member of FISEEE, MASDF, IACSIT, IAENG, IAEST, IRACST, UACEE ISTE and Fellow Member Franklin London Journals Press.



Ch. Sriharika is a UG Student in K L University and belongs to the branch Electronics and Computer Engineering. His areas of interests are Internet of Things.