

Chlad Apock-Iot Based Security Lock Safety at Your Hands

Aiswarya Laskhmi T, Prajeesh P A, Adithya Sukumaran, Aswathy PA, Athira K K

Abstract- In today's hectic schedule, it is obvious to forget to lock the doors or off the lights and then check for it frequently. Obsessive Compulsive Disorder(OCD) is an anxiety disorder in which some people have recurring ,unwanted thoughts, ideas or sensations that make them feel driven to do something repetitively .OCD can make it difficult for the people to perform everyday activities. This paper is all about modernising the conventional door lock and smart lighting system in order to help people. The product is solution to several difficulties faced by people experiencing .Here we use a leading edge technology namely mobile application for checking the status of door and light. The uniqueness of this product relies on the fact that using new technologies along with old ones will result in an agile and more dynamic system. Furthermore, the biggest advantage of the proposed system over existing ones is that it can be easily installed with minimal requirement of infrastructures and planning.

Keywords: Door Lock, Minimum Infrastructure, Mobile Application, OCD

I. INTRODUCTION

Safety is the prime indicator of Security. Security is a mechanism by which we can isolate hazard and resources by using access control[8]. Access control is a scrupulous regulation of access to places such as naval base, universities, buildings, laboratories, defense and military or other capital. The generation have gone by and so the technology. Today's generation is so busy in the virtual reality forgetting about the present and real one. Coming to the point, in this busy schedule it is clearly understood how technology has helped out. Today we can see smart homes around us and it is a fast growing technology to improve Quality of Life .One of the most commonly faced anxiety is forgetting the door keys and turning on and off light.

Manuscript published on 30 May 2019.

* Correspondence Author (s)

Aiswarya Lakshmi T, Student, Department of Electronics and Communication Engineering, Adi Shankara Institute of Engineering and Technology, Kalady.

Mr. Prajeesh P A, Assistant Professor, Department of Electronics and Communication Engineering, Adi Shankara Institute of Engineering and Technology, Kalady.

Adithya Sukumaran, Student, Department of Electronics and Communication Engineering, Adi Shankara Institute of Engineering and Technology, Kalady.

Aswathy P A, Student, Department of Electronics and Communication Engineering, Adi Shankara Institute of Engineering and Technology, Kalady.

Athira K K Student, Department of Electronics and Communication Engineering, Adi Shankara Institute of Engineering and Technology, Kalady.

© 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/>

So we introduce our product which can iron out the issue. Here we propose a system, which modifies conventional door lock with minimal infrastructure change and the lock can be controlled by a software or ordinary keys[5],[6]. Furthermore the system can also activate and deactivate the lighting system of the house which is integrated via Internet of Things..The user can access the status of the door and lighting system of the house and then perform the necessary actions.As we all know, the number of mobile phone users have been increasing rapidly, As a result many convenient applications have been developed for home automation. Here with the aid of a website, we try to introduce a new Home Security system. The website allows the user to analyze the status of the door and light

II. EXISTING TECHNIQUE

A. Smart Card Based System

The smart card contains an integrated circuit chip that acts like a card like device . The IC can be a microprocessor or a simply memory circuit[2]. A model entryway security scheme is required to permit an authorized person for getting a safe entry path where valid card of smart RFID is necessary for ensuring the pass of the door. Total control activity is performed by the microcontroller.

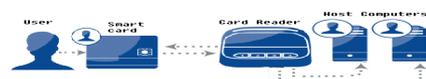


Fig. 1. Working of a Smart Card

B. RFID Based Systems

These types of security systems utilize inactive RFID tags. With this, it is ensured that only valid person can get entry. Such systems are working in real time basis to open the door in which user needs to place the tag in contact with RFID detector, then the entryway will open and the registration data is stored with necessary data of the users in the central server[7]. Attendance and person tracking can be done by using such type of a system. Such an RFID based system ought to have the capacity to minimize the trained or specialized human error during secured door access.

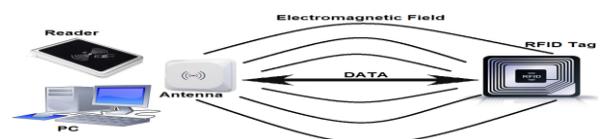


Fig. 2. Working of RFID

C. Biometric Based System

The palmtop recognition is followed by fingerprint recognition. It functions on the palmtop image. Initially, the palmtop image is taken by the system and then it works on that image by partitioning it and processing is done. At the end, identity of the right person is verified. Hence, it reduces the chances of error in other human recognition methods and clarifies the problems which were faced in the fingerprint recognition. The biometric technique is very useful in bank lockers[7]. Except fingerprint recognition the vein detector and iris scanner gives best and accurate result so, in the bank security system [9], microcontroller continuously monitors the Vein Detector and Iris Scanner through keypad authenticated codes. During night the wireless motion detector will be active, if any variation occurs in its output, it will be sensed by the controller and alert sounds will be given by it.

D. Door Phone Based System

A specific system in which identification of a visitant is done by direct communication with the set of the housing estate concerned. A dial up to the sets over the hands free telephone is created by the framework at the entryway. The gate is controlled by the telephone set and the visitors enter inside through the gate. The latest system is based on video door phone surveillance and that is used to identify the visitors. The work utilized a novel power line communication chip to build up a digital networked video door phone. Moreover, audio and visual information was exchanged between them and upgraded the passageway guarding capacities.

E. OTP Based Systems

This method does not need administrator's help to access the facility if the user knows OTP technique and has a registered mobile phone. Likewise the OTP is generated and sent to the proprietor's mobile phone whenever user requests to access facility [7]. Then the OTP should enter through keypad on the door, the door will open. In case if the mobile is not available or off then an option is available to answer the security question asked by the system.

F. Password Based Systems

The programmable electronic code lock device is programmed in such a way that, it will operate only when the predefined digits entered is correct. It is called an integrated combinational type lock. An example is electronics safe [2],[7]. Based on the programmable electronic code lock, the reprogrammable digital door locks were invented in which the password can be changed any time as it is stored in PROM. A GSM/CDMA module can be used for operating the device. When any person calls up from his phone, the call will be received by the system and the door will be opened only if the call is from the specified user. A cell phone controlled password protected door lock system proposed in which the door is opened with the help of a cell phone by entering a specific code, in that, the user can make a call to a system's number. The same call is

responsible for opening or closing of the entry with the use of correct password

III. PROPOSED SYSTEM

As of now, provision for door status integrated with lights are not available. The one available is for checking status of lights and doors separately. If both the facilities are integrated that would be more useful for the users, that is CHLAD APOCK. The website/application provided helps to check the echelon very easily, i.e, it displays the status of doors and lights on the website provided making it easier for the user, especially people with OCD[1] to recognize whether the purpose is compassed. It would be helpful for the people with chaotic schedules, reducing the time consumption. Moreover, this can be implemented in academic institutions, hospitals, schools, big houses etc. The contribution of IoT[6] has enhanced the home security by being able to check-up the status from anywhere at any time as needed.

The intended system consists of a hardware part and software part. The web application or the software part accepts the input from the user and forward it to the hardware part where it is executed with the help of MQTT protocol. It can be done with the help of wireless fidelity,Bluetooth module which is readily available on the IoT development board esp32.According to the instructions given by the user ,the FTDI programmer[4] programs the code and the door is locked/unlocked and light is put off/on based on the input .The new system can be implemented on the existing solenoid locks by interjecting the hardware circuitry. The electrical circuit of the house/building can be integrated with this hardware. An android application can be installed in the user's smartphone which will be secured using a password and a username. The user can login to the application, which will be directed to the homepage where the product name and options for usage is displayed. If the user need to lock the door, then he/she can press the lock button and check the status of the door on the display, same in the case of light. The security of the system is thus in the hands of the user itself. The added advantage of the system is that apart from using the IoT technology [1] ,we can use the conventional method of using metallic keys. In case the system gets down due to poor connectivity, the user need not be afraid; he can simply manage it using the keys.

A. MQTT Protocol



Fig.3. MQTT protocol

MQTT is one of the most common protocol used in IoT projects[4]. It stands for Message Queuing Telemetry Transport. Designed as lightweight messaging protocol that broadcast/subscribe operations to exchange data between client and the server.

This can make for extremely efficient applications. Clients subscribe to narrow selection of topics and only receive the information they are looking for. This saves both processing time and band width. MQTT is an open standard, which having many open source employment of both client and server. As it is bidirectional It maintains stateful session perception. The light weightness' and efficiency of MQTT makes it possible to significantly increase the amount of data being monitored or controlled. Prior to the invention of MQTT, approximately 80% of data was being left at remote locations, even though various lines of business could have used this data to make smarter decisions. MQTT was originally developed for the low-bandwidth, high-latency data links used in the oil and gas industry. However, MQTT is now used in many applications beyond oil and gas — from controlling smart lighting systems to the Facebook Messenger application. Distribute information more efficiently, increase scalability, reduce network bandwidth consumption dramatically, Reduce update rates to seconds, Very well-suited for remote sensing and control and Maximize available bandwidth, extremely lightweight overhead these are the advantages of MQTT[4].



Fig.4.MQTT Connection

IV DESIGN AND IMPLEMENTATION

A. Block Diagram

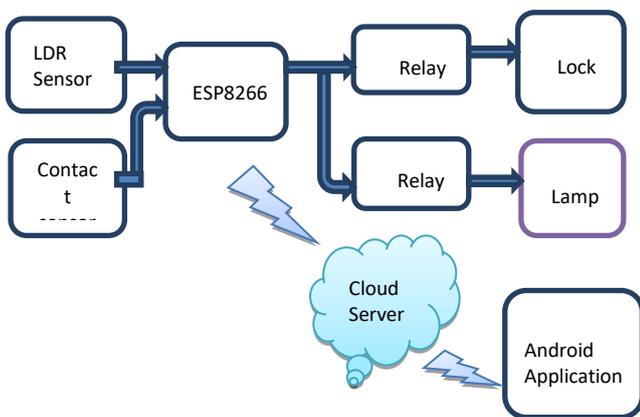


Fig .5. Chlad Apock Hardware Diagram

The system continuously monitors the status of door and lights and updates it to the application. The user can verify that the door locked or not or the lights are on or off using the application and also can control the lock and light from the application.

The host controller using is a Raspberry PI board which has a built-in Wi-Fi module so it can act as a gateway device in the IoT network. For checking the status of lock and the door using two sensors IR proximity sensor and LDR sensor. By sending the commands from the android application user can control the door lock and light.

B. Design For Door Lock Using Tinkercad

Tinkercad is a free, easy-to-use app for 3D design, electronics, and coding. Here we used Tinkercad for 3D modelling and aspect studies.

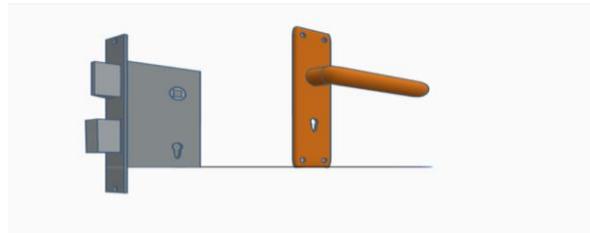


Fig.6.Side view

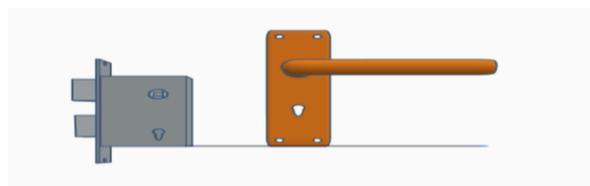


Fig.7.Front View

V. RESULT

A. Website Development

As a part of Study, we have developed a simple website from where the client can get information about the product and its history. The client can also query their doubts regarding the product. This website serves as an additional assistance to the Mobile Application. The website is very much optimized so as to have user registration.



Fig.8.Home View



Fig.9.Door Lock/Unlock



Fig.10 .Bulb ON/OFF

By using the website, one can get to know more about the product and its usefulness.

B. Mobile App Development

As the number of mobile users are increasing rapidly mobile Applications is an effective way to grasp common people attention. Here we have used open source software namely the Blynk App. It helps to quickly build interfaces to monitor and control hardware pieces. It's a digital dashboard where you can build a graphic interface for your project by simply dragging and dropping widgets.

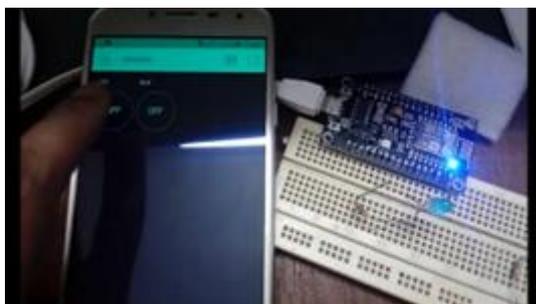


Fig.11.Hardware Model with Software

The Fig.11 shows the syncing of hardware and software Sections .This is how we control the lighting systems of the house via Internet of Things.

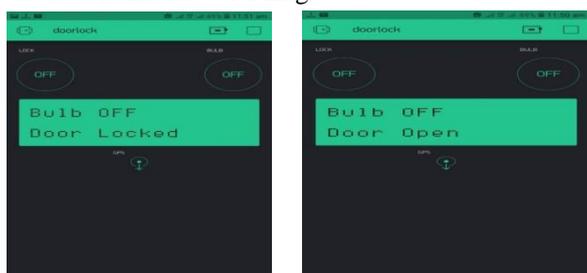


Fig .12.Blynk App

This is how the typical app interface looks. The user can view the status of the door and light from a remote place and perform appropriate actions.

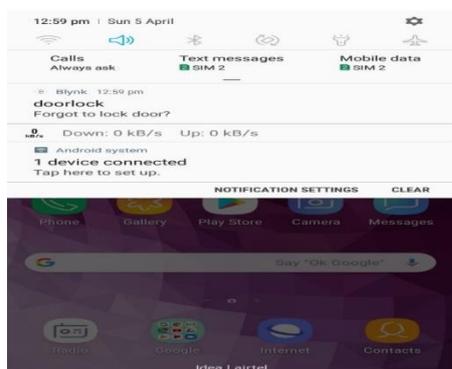


Fig.13.Notification

As seen from above figure, the app is equipped to send notifications to the user in case he forgets to lock the door or turn off lighting system of the house. This is an added advantage of the product.

VI. CONCLUSION

Security of door locks and saving of electricity is a prime concern. Today various types of door locks are available .But all of these are restricted by some kind of limitations. Technology has been increasing at a rapid rate and we need to build a stronger but more flexible system to compact with current scenarios. Here we proposed a system that is smart and unbreakable. The lock and unlock features as well as activating and deactivating features are controlled via the Smartphone where MQTT is used as the communication protocol ESP32 is used as the server system. By doing so, here we try to Implement IoT applications, identify and promote those beneficial for the society .And observed the relevance and the future scope of home security in day to day life. It provides a helpful measure for OCD affected people and the reduction of man power. This system can be extended to embody the control of fan and other electrical appliances in the future. Moreover we can build customized Apps for the product with more extra and efficient features.

REFERENCE

1. Adrian Ioan Lita et al., "Door automation system for smart home implementation," in [2017 IEEE 23rd International Symposium for Design and Technology in Electronic Packaging (SIITME)], [2017] © [IEEE]. doi: [10.1109/SIITME.2017.8259925]
2. Vikram Puri and Anand Nayyar, "Real time smart home automation based on PIC microcontroller, Bluetooth and Android technology"[2016 3rd International Conference on Computing for Sustainable Global Development (INDIACom)], [2016] © [IEEE].
3. Meera Mathew and R S Divya, "Super secure door lock system for critical zones," in[2017 International Conference on Networks & Advances in Computational Technologies (NetACT)],[2017] © [IEEE]. doi : 10.1109/NETACT.2017.8076773
4. Chieh-An Lo ,Yutzu Lin,Chengchic Wu "Which Programming Language Should Students Learn First? A Comparison of Java and Python," in [2015 International Conference on Learning and Teaching in Computing and Engineering], [2015] ©[IEEE]. doi: 10.1109/LaTiCE.2015.15
5. Abdallah Kassem, Sami El Murr, Georges Jamous, Elie Saad, Marybelle Geagea "A smart lock system using Wi-Fi security" in [2016 3rd International Conference on Advances in Computational Tools for Engineering Applications (ACTEA)], [2016] ©[IEEE]. doi : 10.1109/ACTEA.2016.7560143
6. Charoen Vongchumyen , Pakorn Watanachaturaporn, Chompoonuch Jinjakam, Akkradach Watcharapupong,Watjanapong Kasemsiri, Kiatnarong Tongprasert "Door lock system via web application" in [2017 International Electrical Engineering Congress (iEECON)],[2017] ©[IEEE]. doi: 10.1109/IEECON.2017.8075909
7. R. S. Divya and Meera Mathew , "Survey on various door lock access control mechanisms" in [2017 International Conference on Circuit ,Power and Computing Technologies (ICCPCT)],[2017] ©[IEEE]. doi : 10.1109/ICPCT.2017.8074187
8. Mehmet Akif Özçoban ,Oguz Tan, Aydin Akan "Analysis of frontal phase synchronization in OCD patients" in [2018 26th Signal Processing and Communications Applications Conference (SIU)],[2018] ©[IEEE]. doi : 10.1109/SIU.2018.8404465

AUTHORS PROFILE



Aiswarya Lakshmi T is a final year student in Electronics and Communication Engineering at Adi Shankara Institute of Engineering and Technology, Kalady graduating in the year 2020.She was an active member of IEEE,IETE and NSS. Volunteered various programs. Participant of APJ Innovation Challenge. She have received 3 NPTEL certificates form IIT Madras.



Mr. Prajeesh P A, Assistant Professor ,ECE obtained his Bachelor's degree from Sree Narayana Gurukulam college of Engineering and Masters in VLSI & Embedded System from Viswa Jyothi college of Engineering. He has published "Analysis of merged MAC with Pipeline Technology "in volume 2, issue 4- april 2017 of international Journal of advanced research in Managment, engineering and Technology .And "Analysis of Merged MAC with Pipeline Technology" in IJARMET, Volume 2, issue 4, April 2017, ISSN: 2456-2998(online)/pages 746-755.



Adithya Sukumaran is a final year student in Electronics and Communication Engineering at Adi Shankara Institute of Engineering and Technology, Kalady graduating in the year 2020. She has received 2 NPTEL certificate from IIT Madras .She was a participant of APJ Innovation Challenge 2017 and also active member of IEEE, IAS, WIE and have participated in various IEEE Events



Aswathy P A, is a final year student in Electronics and Communication Engineering at Adi Shankara Institute of Engineering and Technology, Kalady graduating in the year 2020. .She have received a NPTEL certificates from IIT Madras. Also a participant of "APJ Abdul Kalam innovation Challenge 2017.



Athira K K is a final year student in Electronics And Communication Engineering at Adi Shankara Institute of Engineering and Technology graduation in the year 2020. She have received 3 NPTEL certificates from IIT Madras and was also an active member of IEE, IETE. She have also passed Cambridge BEC Exam in 2019. Also volunteered activities and was a participant of APJ Innovation Challenge 2017