



ADITUM CONNECT: Wi-Fi Based SMART LOCK

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Abstract: This paper introduces the necessity for a smart security system for every home and how our product 'Aditum Connect' comes with safety features like fire safety alert and break in alert, which deal with the hazards of house fire accidents and the break in possibilities, which can be dangerous at times leading to loss of property and lives. The product ensures maintenance of security and safety of the house at all instances with many accessibility features to avail. The other goal of this project is to provide an easy and convenient method for unlocking the front door by removing the need for the old-fashioned key. The user can now unlock their door through their smartphone or the keypad provided, and also monitor their house through the live monitoring.

Keywords- Fire Safety, Break-in Alert, Unauthorized Access detection, Keypad Functionality, Blynk Application, CC3200 Launchpad, CC3200 CAMBOOST, Energia IDE.

I. INTRODUCTION

The significance of security can't be denied in the present crime-ridden society. Burglary, home invasion and theft have become more common these days and up to 64% of population in India are not equipped to handle home safety threats. The house fire accidents pose a threat to the people as it can lead to disasters in no time. The rising concern towards security premises in residential and hospitality sector pose a problem too. Hence, the protection from burglary, trespassing, fire-hit scenarios has become the most important aspect of securing our home. Our idea

'Aditum Connect', which itself acts as a security system, provides safety features such as Fire-safety alert and Break -in alert, which detect the threats and alert the owner instantly about the happening and activate respective actuators, which can be helpful in preventing most of the house accidents. Also, the ineffectiveness of the traditional door locks and their inadaptability to the changing habits of modern time, lacks most of the required security features and are not advisable. Our system provides various ways of unlocking with the security features included.

II. LITERATURE SURVEY

The efficiency in regards with Wi-Fi technology in view of designing smart locks [1]. Growth of IoT applications is rapid and the convenience and security provided by the smart locks is and how efficient they are when it comes to secure authentication. [2] The keypad mode of entrance provides a safe entry and comes with lot of benefits. [3] secure authentication architecture for IoT and the cloud which pave the solutions of providing facilities like real time data capture, visualization, and device management related tasks through remote cloud servers.[4]

Smart Locks which are designed using IoT model create an ecosystem that connects different systems to different sensors for performing smart. They have impeccably integrated communication in a method which is effective and easy to use, just like unlocking and locking the door through your smartphone, monitoring your house through your phone and activating the buzzer alarm in cases of unauthorised access or break in detection. Everything's IoT based! The traditional door locks don't offer guaranteed security and also expose the house to various threats, as they are susceptible to breaks ins, and other possible interventions. With the advancement in the automation and growing need of security systems, the smart lock provides easy accessibility access along with security features which are need of the hour.

III. ACCOMPANYING

HARDWARE AND SOFTWARE

The design described in this paper includes using specific hardware Components like Raspberry Pi board, Raspberry Pi Cam V2, Force sensor, Fire sensor, Motion sensor, GSM module, Servo Motor, and a buzzer. Raspberry Pi board run on Raspberry Pi operating system with Linux commands.

The server we use is Blynk web service hosted in the Blynk cloud services. The server backend is responsible for serving requests coming from the mobile application, like tapping a button to open the door, or saving each user's personal information, providing emergency alerts and push notifications on what is happening at your door. Blynk Web Services have inbuilt APIs, hosted cloud, which makes it easy

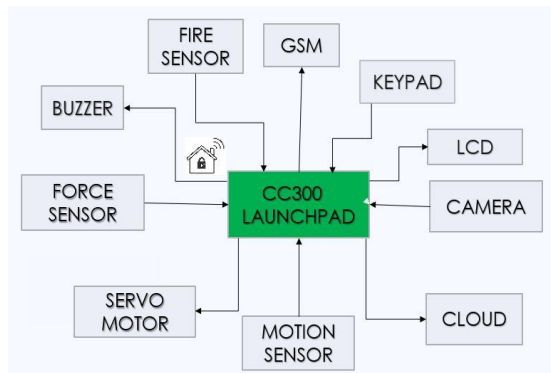
to quickly deploy a cloud application. The Blynk app is the forefront of the system, providing an intuitive User Interface, from this Blynk app, users have access to their saved passkeys and livestream of their front door.

UART (Universal Asynchronous Receiver Transmitter) protocol is used for GSM module interfacing, which helps sending messages via SMS in emergency scenarios. I2C (Inter-Integrated Circuit) connection protocol is used for LCD display interfacing.

Flask Web framework (written in python) along with HTML language are used for web streaming. D-lib library is used for facial recognition purpose, it also includes Open-CV.

IV. BLOCK DIAGRAM

Figure.1 shows the block diagram of the firmware



It is a multi-component system where all sensors are connected to a TI 3200 Board and a IoT based application is designed to access the door and also monitor the house using Open CV. All of these are linked to a server. It is a Wi-Fi enabled smart lock powered with batteries, which can read data from anywhere in the world. The individual working and specification of each component is as follows:

Force Sensors measure the amount of pressure exerted on them are placed at the core part of the device in our project. In cases of heavy amount of pressure detected on the system, it immediately alerts the owner, turns the buzzer alarm on and also captures the picture of the intruder trying to break in.

Fire sensors respond to the presence of smoke or extremely high temperatures that are present with a fire are installed in different places of the house where there is high susceptibility of fire accidents taking place. Once fire or smoke is detected, the cloud instantiates the steps

to inform the owner immediately and activates the buzzer alarm.

Buzzer is used in cases of unsuccessful attempts or any malfunctioning taking place.

LCD segment display is used to display the status of the door.

GSM module is used to send direct message to the owner and nearby fire safety stations in cases of emergency situations.

Servo Motor is used in automatic locking and unlocking the lock system triggered by motion sensors or access control. It determines the accurate spin of lock and the angles we require.

V. WORKING

V 1. Locking Unlocking Mechanism

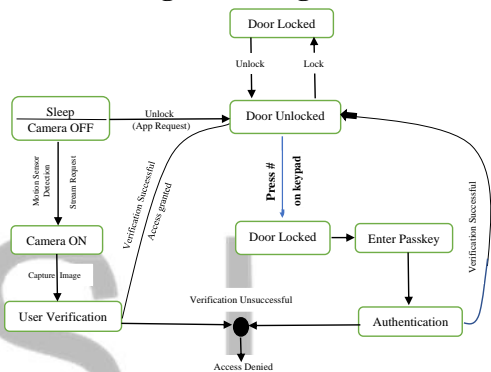


Fig: Working mechanism of the smart lock

The project has three main components: a Raspberry Pi board, a cloud backend, and a mobile application. The Raspberry Pi board is attached to the door and is responsible for controlling a servo motor, a camera, and an actuator. Users can open the door by either tapping a button on the mobile app, or entering the passkey in the keypad provided or just by approaching the door.

When a user is within a certain radius, a motion sensor detects them, and activates the camera. The system then sends an image of the person at the door to the owner for verification. The user can unlock the door with a tap on the mobile using the application.

In the case of keypad usage, the entered passkey is verified with the one in the dataset. The status of the door is displayed on the LCD display provided with the system. The buzzer alarm is activated in cases of any malfunctions or emergencies for alerting people around the house.

Keypad Functionality:

The keypad is another option of accessing the door, the user can keep multiple passkeys and change them anytime, these passkeys are stored in the dataset memory. On every entry, the entered key is crosschecked with the ones in the dataset, if it matches the door is opened, else the entry is denied.

In the case of OTP based entrance, the system's software follows a two-step verification service. It uses time-based One-time Password Algorithm for authenticating users, providing a secure verification process.

V 2. Safety and other features:

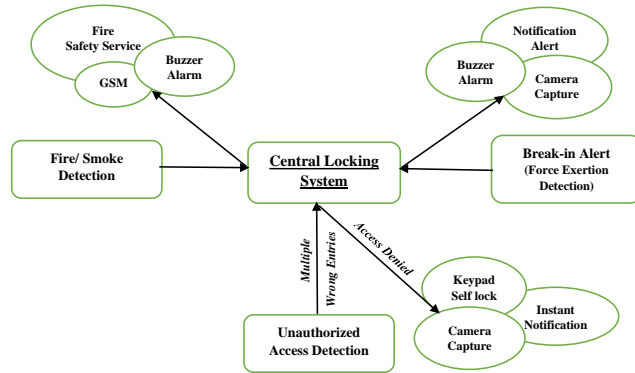


Fig: Safety features & their emergency Alerts

Facial Detection & Motion Sensing [Open CV]:

The camera module Aptina MT9D111 is fixed on the top of the door along with the motion sensor. The motion sensor detects persons and activates the camera from sleep if any person is detected. The picture taken is sent to the owner for verification. The Camera functionality is also used to monitor the house and provide live streaming in the mobile application. In cases of break-ins and unauthorized access detection, the camera is used to capture images of intruder.

The safety features included are **Fire safety alert** which on detecting certain level of smoke/ fire, will alert the owner and nearby fire safety service with a direct message about the emergency through GSM module and will turn on the buzzer alarm for emergency help; **Break-in alert** feature is activated when someone tries to enter forcibly by applying heavy thrust which is detected by the force sensor implanted inside the system, in such cases the camera is activated to capture the picture of the intruder, buzzer alarm is activated and an emergency alert about the incident along with the picture of the intruder is sent to the owner; The **Unauthorized access detection** feature is activated in cases where multiple wrong entries are detected, in such cases emergency alert via notification along with the picture of the unauthorized person is sent to the owner and buzzer alarm is activated.

VI. RESULTS

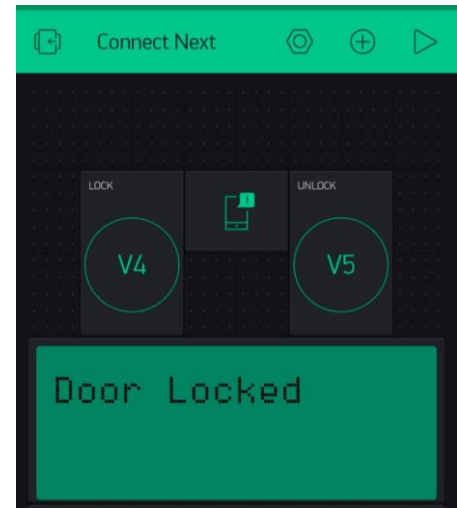


Fig: Locking/ Unlocking Mechanism

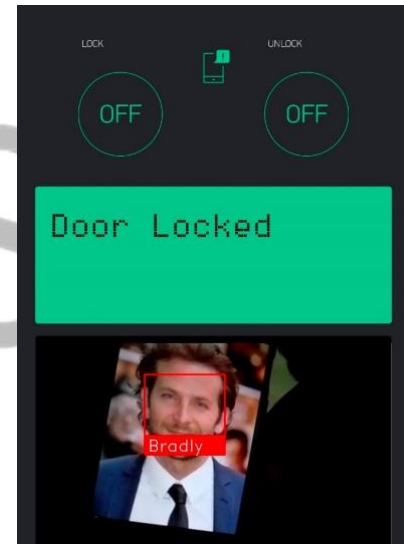


Fig: Facial Recognition

VIII. CONCLUSION

As, security of our homes is of the highest priority, no one would take a step back to be protected at all instances. With the increasing need of security systems, our smart lock '**Aditum Connect**' can be the best solution to the possible security threats as it can tackle harsh situations like detecting fire accidents, prevents break-ins, burglaries and provide secure authentication of users, along with easy accessibility techniques. The product ensures giving a feel of peace to the owner as he can check on his door anytime with the real time monitoring and many other features available.

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