IOT based Automation System for Smart Home

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Abstract: In present days most of the safe things are taken for home security because increasing a number of criminal cases due to thefts. So, we are using high security system for keep our things safe. In this project we are using digital door lock system for smart home using IOT. A digital door lock system is work with the help of digital automation like IP address, WIFI net- work and mobile devices for the legacy key method. This system is maintained by an WIFI network connection and emit the signals to the servo motor for controlling the doors. We are using an android system to controlling the door lock module. The advantage of this system is securing the lock system compare to the traditional door lock method.
Key words; WIFI module, servo motor, IOT

1. Introduction

Overview: The internet of things refers to the computing the concept that will describe the idea of everyday physical object being connected the internet and being able to identify themselves to other devices. In this present world the developing of IOT in the technical platform for communicating with the electronics devices. This device is controlled by the wireless and then it will share the information to the different fields such as home security and consumer electronics method. This system is developed by recent method of automation including the commercial and home automation system. The purpose of our project is to develop a smart door lock system it will easy to control and install in variety of door with the help of IOT for the security purpose. The prototype model was developed the integrates a WIFI module with servo motor are connected to door lock for controlling the motion of door. The WIFI module ESP8266 is used to control the servo motor for controlling the door lock system. The concept of locks and keys were invented about 4000 years ago and it had remained the same for the last century without much improvement. The intent had developed rapidly and several devices were connected to improve their productivity. Mobile phones now be used to remotely control various devices such as TV, projector, computer, etc. and it makes our lifetime convenient. Smart lock system has redesigned the ordinary door lock, where the keys have been digitalized and it is stored in a virtual key chain which can be kept on the user's device. The lock system can be connected by a Wi-fi and it is encrypted to increase connectivity and security. The normal lock system uses pin code, password, etc. However, there can be fewer drawbacks like misplacing the keys or forgetting the password. All these can be avoided by using the smart lock system. As it can be easily managed and its use can be extended into various things like locker, car, bicycle, etc. Existing Method: In this Existing method the home automation system consists of server hardware interface module (WIFI module). Server controls the hardware interface module and can be easily configured. Here the server used is the BLYNK will support and which can be operate through android smart phones. WIFI is selected to improve system security and to increase system mobility and scalability for door lock system. The main function of BLYNK server it will manage, control and monitor the system components that enables hardware module for assigned task. 1.3 Proposed Method In proposed method is done by using a WIFI module and by using a servo motor and the user interface (UI) is done. The medium is used for the interface is done by the help of hypertext markup language HTML page or web page in the code by producing the internet protocol (IP) Address is connected to hardware and it will produce the accessed as by simply using the Inter- net protocol address and texting in any web browser the web server will connect the hypertext markup language HTML page has been accessed and we can able to control the hardware by simply working with the help of the software in web page here servo motor controls are con- trolled for the lock or unlock the door.

2. Related works

In large apartment, there is a need to maintain keys for each apartment and also allow only authorized persons and vehicles in gate which will be very difficult. The keyless entry technique can be used to solve these problems. Likewise, nowadays many techniques have been developed for smart home to improve the quality of our life. There had been much progress and innovation to science and technology all over the world; however this also resulted in increasing the rate and refinement of crimes. Hence it is vital to improve the security to protect one's loved ones and valuables. However, the ordinary mechanical locks and other devices have not helped in this as there can be easily broken. This led to the improved mechanical lock which can be easily attached to a door and requires a 10-digit code to be unlocked. This is made in such a way that when a wrong code is entered it would alarm the owner making stealing difficult. However, even this has not stopped the wrong doing cheats, interloper, vandals. Hence this system requires further improved and opening action.

3. Hardware Components The hardware components used are

- Arduino Uno
- Servo Motor
- WIFI Module
- Rechargeable Batter

Arduino Uno: ARDUINO is a Microcontroller based development board which can be used to develop projects related to Electronics. Integrated Development Environment (IDE) is used to upload software code to the board.


FIGURE 1. Arduino uno

A programmable micro controller is based on absolutely development board for prototyping electromechanical devices. Then it can be part of Digital and Analog virtual signs that could interface sensors and actuators: Sensors (Temperature, Pressure, Gyroscopes, GPS Locators, accelerometers) Actuators (LEDS, Buzzer or motors). SPECIFICATION ATmega328 microcontroller .sixteen MHz, 32 KB FLASH, 2KB SRAM, 1K EEPROM. 14 DIO pins (6 may be 8-bits 500Hz PWM outputs).6 analog inputs (10 bits over 0-5V range, 15kSPS).5V working voltage, 20 MA DC Current consistent with IO Pin.I2C (TWI) absolutely supported and SPI in part supported. Atmega16U2 appearing as a USB-to-serial converter. The OS sees it as a digital serial port. Servo Motor: An output shaft is attached to the servo motor which is used to send coded signal by changing the angular position. The angular position can be changed by changing the coded signal. They are used in puppets, radio-controlled cars and airplane and robots. Variable resistor and potentiometers are connected to the shaft to monitor the angle of servo motor. If the shaft is not positioned at correct angle, the motor will be rotated until the desired angle is reached.

FIGURE 2. Servo motor

Nodemcu: ESP8266 Node MCU is based on wifi module which combines Arduino IDE and wifi capability. It has voltage regulator, GPIO pins, Micro-USB port, ADC are built in the same board. At the top of the board,wifi connection to connect into internet and smart phone. It consists of 32-bit MCU and an analog input, RAM and ROM. The module has an integrated AT command and firmware which can be used with any MCU via COM port.
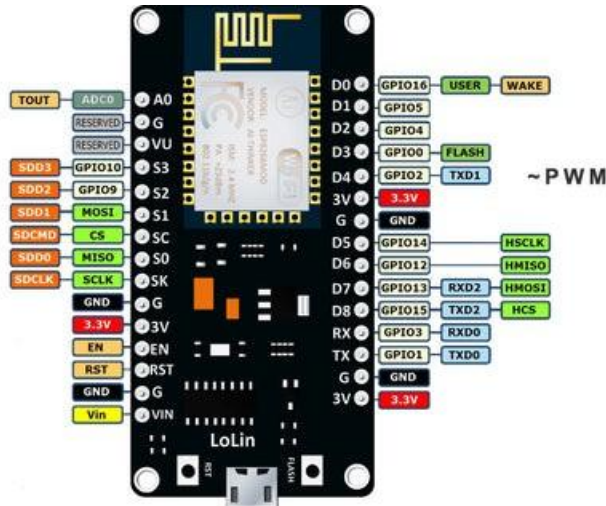
FIGURE 3. Nodemcu - Esp8266

Processor: The ESP8266EX integrates a ten silica L106 32-bit RISC processor, which achieves extra- low strength intake and reaches a most clock velocity of a hundred and sixty MHZ. The Real- Time Operating System (RTOS) and Wi-Fi stack permit 80% of the processing strength to be to be had for consumer utility programming and development. Solenoid Lock: A solenoid which is shown in fig. 5 is a type of coil which is made of long wound cables and its length is greater than the diameter. The Solenoid Key is a combination of Solenoid and a key which is used in the automatic lock The Solenoid was found by Andre Marie Ampere. It converts energy into a linear motion. When the coil is illuminated by an electric current, an emf will be appeared and it will pull the iron into the center of the coil linearly.

FIGURE 4. Solenoid Lock

Rechargeable Battery: Rechargeable battery can be charged many times and can be reusable. But primary battery cannot be reusable. But primary battery can not be reusable after use. Electrochemical cell also called as accumulator which is used to accumulate the energy. The various combinations of electrolytes and electrode materials such as lead-acid, Nickel cadmium, zinc-air, etc. are used. Even though the cost of rechargeable batteries is more, it can be reusable many times with low cost. The positive active material is oxidized and it produces electrons while during charging. Due to flow of these electrons, the current flows through the external circuit.

4. Software Components

Integrated development environment IDE for ARDUINO: ARDUINO is a open source platform and it is simple to use the hardware and software. The integrated development environment for ARDUINO it is consist of textual content editor for writing source code a tex- tual content of combined a console window and a tool bar with buttons for not meanest place with a chain of a menu. It contact with a ARDUINO and Genuine hardware component to add some packages can be installed by using a library manager And the source code can be done by using the ARDUINO integrated development environment are known as the sketch window. The sketches is written with inside the text content editor and stored with a extension. The editor has capacity of offering the cutting and pasting and searching and changing text content. The modulating vicinity offering the error codes at the same time saving and changing the text con- tent. The console window show the text content and the output is produced in console window for ARDUINO Software(IDE), shows with entire mistakes. The black-side right hand of the window shows the configuration of board and serial port where the board is connected. Toolbar the buttons will let you add packages, create, open and stop sketches and open the serial moni- tor. Verify the source code and the errors you can get while compelling the source code. Once the source code is over then it will run and upload to the ARDUINO board. 5 Smart Door Lock System The maximum vital necessities of our device are (1) User pleasant interface: User can without difficulty manipulate device remotely via smooth BLYNK software interface. (2) Security and Authentication: Only legal consumer can login to the device that allows you to manipulate, manage and monitor. (3) System Scalability: Scalability is the capacity of a device, com-

munity or manner to deal with developing quantity of labor in a successful way or its capacity to be enlarged to house that growth. After putting in the BLYNK app at the smart phone, an account needs to be created with in- side the app to get entry to its services. First time whilst the app is opened, it'll ask to register or create an account. Create an account first after which upload a brand new mission to get started. Each mission has its very own authentication code. To set up reference to our addi- tives we want to feature widget to our model. The app gives neat interface to feature all of the required widget and placing them. The BLYNK wishes to be walking with inside the history for the consumer to get actual time notifications. One greater vital element of the mission is the connectivity among ESP8266 (WIFI module) and the BLYNK server. The device correctly linked to the BLYNK server the use of the authentication and the BLYNK libraries. As a result, we have been ob- tained a posi- tion get the notification on our clever phones. It changed into found that the BLYNK app labored easily and finished all conver- sation among the hardware and app accurate- ly.

Block Diagram: In our project, we have implemented a door locking and unlocking system which can be controlled by a mo- bile application remotely. To do so, we have used a traditional lock, a micro servo motor and an ESP8266 module, all of these components, when assembled, forms the smart lock module as shown in fig.4.1. For controlling this lock remotely, we have used an android application BLYNK, which is programmed to work with the specific lock module. In the lock module, the mo- tor pulls the lever of the traditional lock to perform the locking and unlocking operations. This motor is a 4 Volt Micro servo motor(model no), which is connected to the ESP8266 module with the motor's data wire connected on AD7 pin of ESP8266 and 4V supply and GND connections on their appropriate pins. ESP8266 module has been in-built by Wi-Fi system which can be configured to get connected to the internet or by any network by writing and burning the specific program code. When the ESP8266 gets con- nected to the internet, the smart lock is online to accept commands from the user. To control and send com- mands to the lock, BLYNK app is used. BLYNK application is a programmable android application which can be configured to work with ARDUINO module, ESP8266 mod- ule or Raspberry Pi module. In our case we are using ESP8266 module and so the BLYNK application is configured to send commands on the AD7 pin of the ESP8266 module. These commands serves as a guideline for the movement of servo motor's hand, which eventually locks or unlocks the traditional lock attached to the motor.
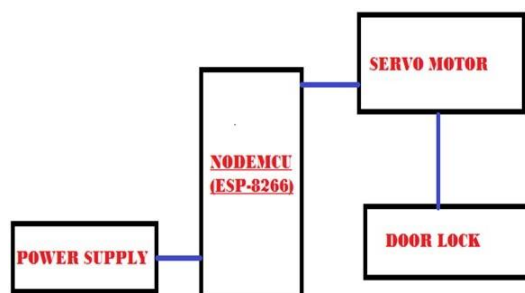

FIGURE 5. Solenoid Lock. Block diagram of Smart door lock

5. Results and Discussion

In our proposed system, via way of means of the use of a WIFI module and a servo motor the interface is carried out. And the medium used for this interface is carried out via way of means of growing a HTML web page or an internet web page with in- side the software and via way of means of generating the IP cope with of the Node MCU that is related to the hardware and it will likely be accessed via way of means of in reality the use of the IP cope with and typing in any internet browser, the HTML web page might be accessed in which we are able to manage the hardware via way of means of in reality working in that web site in which the servo motor controls might be given via way of means of controlling that we are able to lock or free up the door. For electricity generating electricity deliver to the Node MCU might be 5V USB Aluminum Body electricity financial institution case for 18650 power supply can be used in this method. It is rechargeable if has enter electricity of 5V and DC pro- duces output of 5V DC. By this rechargeable battery electricity deliver is carried out. After this system is uploaded with inside the node MCU pick the serial port that is with inside the proper nook of the ARDUINO IDE software program programming web page in which the port of the node MCU is shown.
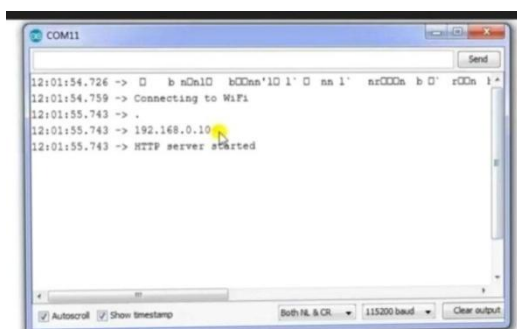
FIGURE 6.
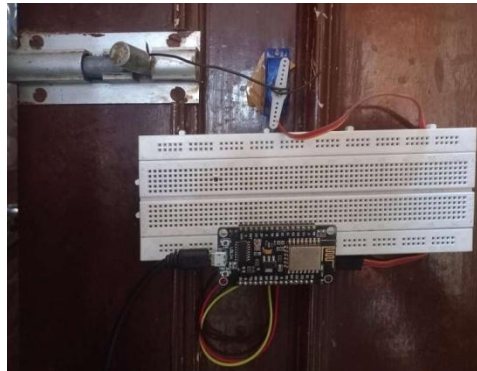
FIGURE 7. Output of Smart Door Lock System

6. Conclusion

Smart locking system assure you that which gives more security and also simply offer greater locking and unlocking of doors in a greater handy manner. No need to walk up to front door by taking keys. By using punch with access code, we can do all things in a smart way. This project explains about how to lock and unlock the system by using smart phone with installed blynk software to communicate via wired as well as wireless network. It allows the users to control the lock using smart mobile phone without keys. In order to prevent the access by unauthorized users and also missing of mobile phone, key system usage is also available.

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