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Advance Face Lock and Automation using ESP32cam

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***Abstract*--- Door plays a crucial role in home security. To secure the house, the occupants of the house will always have the door locked. However, sometimes the house occupants forget to lock the door because of hurry when leaving the house, or they'll doubt whether or not they need locked the door or not. We propose an application called Door Security System which is based on Android using Internet of Things (IoT) technology to observe the status of the door, controlling the door and increasing security during a house. By the utilization of ESP32 cam, the door will lock or unlock automatically. Blynk software is employed because the communication protocol between smartphone and door lock system. we will use this technique to access the live stream also, meaning we will monitor the condition of out of doors surrounding to avoid any threats. DHT-11 sensor will detect the space temperature and simultaneously MCU will detect the locations of owner, consistent with this data the MCU will control the heating or cooling of room if the owner is almost house. As we all know any sort of MCU has very limited amount of input and output pins, so by using them we will connect limited amount of output devices or home appliances.**

The project also aims to extend the input pins of microcontroller, because we've very limited amount of input/output pins. the utilization of shift registers which can increase the inputs of ESP-32 drastically.

***Keywords*---Home Automation, ESP32 cam MCU, 74HC595 Shift register IC, Blynk server, Internet of Things (IOT), Smartphone.**

I. INTRODUCTION

A house is an area where you dream or want to be during a long day of sorrow. People return home after each day of labor. Be a small device/technology that helps them close up the lights and switch off and play their favorite music to form the world feel better. This project may be a simple system. It Blynk software, and ESP32cam Controllers as vital devices, also as a relay panel. All components are connected to the web via Wi- Fi, which allows the system to figure on IOT. The IOT project also aims to make a wireless earth care system that uses the ESP32 CAM Node MCU module to send notifications to owners when people stand at the door and take pictures. If person is understood then door will unlock automatically and notification are going to be sent to the owner.[1]

It uses the Blynk application, and therefore the ESP32 camera because the major components alongside relay board comprising of 4/8 relays. All of the components are connected over the web using Wi-Fi which puts this technique under the IOT.

It also uses 74HC595 register IC to extend the input output pins of ESP32 cam.

1.1 **Internet of Things (IOT):**

The Internet of Things (IOT) is that the environment of physical objects connected to the web. By providing more information and new presentation models, IOT streamlines our global operations, allowing us to make new values for our specific needs through a voice response system that takes all devices or devices on earth. Goods that have an IP address and may collect and send data over the web without assistance and interference from hands. The system should be affordable, easy to put in, easy to use, and straightforward.

1.2 **Embedded Systems:**

The installed system is meant to perform specific tasks, but not as a purposeful computer. There are realtime limits that has got to be met for security and reason use; others can simplify system tools to scale back costs and reduce or eliminate operational requirements.[2]

The installed system isn't a separate device – it's usually installed on the device that manages it. Software written for embedded systems is named software all the time and is stored on a readable disk or convector light. Usually works with computer versions: small keyboard, monitor with little or no memory.

II. LITERATURE SURVEY

In recent years, the popularity of earth devices has increased because of efficiency and influence because of the blending and price of smart phones. Text up and implement relevant IOT information by introducing IOT concepts and foundations during a conscious state.

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- Now anyone can connect anywhere, anytime, and build relationships that observe dynamic networks. during this section, they solve the matter if there is a drag with the device connected to the system and thus the concept of data; use the solution so as that the only solution are often found.
- digital communication could also be a little field of computing that's used to track systems in big data, like statistics, machine learning, and database systems. This includes analyzing data and specific words and translating them into important information or knowledge.
- Administrators can access and control all devices that are not connected to each user, but only one user can connect devices to the user. With the help of the online of Things (IOT) system, mobile devices and computers can remotely control all the work and activities on earth devices over the online.

III. METHODOLOGY

3.1 Existing System:

In the existing system home appliances are controlled by Node MCU, but it has a limited amount of GPIO pins by that we can control the limited number of appliances. For Face lock currently we use Raspberry Pi which has very high cost as compared to our product.[3]

3.2 Proposed System:

In this planned system, ESP 32cam is put in with a Blynk application. In this system we have 8 AC loads (Bulb or Fan) connected to the microcontroller by 8 relays and solenoid door lock. Voice command controls the house appliances. It also focuses on building a sensible wireless home security system which sends alerts to the owner by using internet cam just in case of anyone standing on the doorstep the device captures the photo this is done by using ESP32 CAM Node MCU and it will send that image through email. This system is totally handled by the mobile phone. This project is much cost effective than the products available in market. This system can also be considered as CCTV to access the live stream. It also uses 74HC595 shift register IC to increase the input output pins of ESP32 cam.[4]

3.3 Block Diagram:

The main part is ESP32 cam MCU which has inbuilt Wi-Fi module, which will help in controlling devices over the Internet. It supports a good range of home automation devices like power management systems. In addition to that, an interface would be developed which will allow the user to control their devices using the Blynk software.

This IOT project also focuses on building a sensible wireless home security system which sends alerts to the owner by using ESP32 cam module just in case of anyone standing on the doorstep the device capture the photo and send it to the owner of the house.[5]

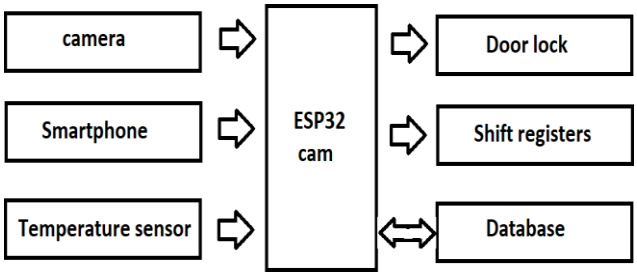

Fig 1: Block diagram of Advanced Face and Automation using ESP32cam

The system design is broken down into two main categories,

i. The hardware- It has the capability to connect to the Wi-Fi module. In hardware, the components are, power supply, relay module, ESP32 CAM MCU module and 74HC595 shift register IC, DHT-11 Temperature sensor.
ii. The software- Arduino IDE, Blynk software.

3.3.1 ESP32 CAM NODE MCU MODULE:

The ESP32-CAM may be a small size, low power consumption camera module supported ESP32. It has an OV2640 camera and provides onboard TF card slot. The ESP32-CAM are often widely utilized in intelligent IOT applications like wireless video monitoring, Wi-Fi image upload, QR identification, and so on.

The ESP32 CAM Wi-Fi Module Bluetooth with OV2640 Camera Module 2MP For Face Recognition features a very competitive small-size camera module which may operate independently as a minimum system with a footprint of only 40 x 27 mm; a deep sleep current of up to 6mA and is widely utilized in various IOT applications. it's suitable for home smart devices, industrial wireless control, wireless monitoring, and other IOT applications. This module adopts a DIP package and should be directly inserted into the backplane to know rapid production of products, providing customers with high-reliability connection mode, which is convenient for application in various IOT hardware terminals.

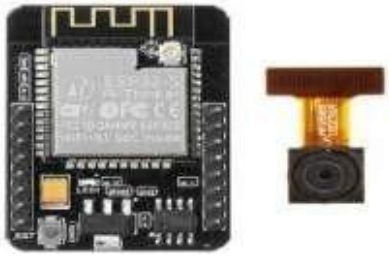

Fig 2: ESP32-CAM NODE MCU MODULE

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3.3.2 RELAY BOARD:

A relay is an electromagnetic switch. it's activated when a little current of some microampere is applied thereto. Normally a relay is employed during a circuit as a kind of switch, an automatic switch. There are differing types of relays and that they operate at different voltages. When a circuit is made the voltage, which will trigger it's to be considered. during this system the relay circuit is employed to show the appliances ON/OFF. The high/low signal is supplied from the Node MCU microcontroller. When a coffee voltage is given to the relay of an appliance it's turned off and when a high voltage is given it's turned on.[6]

Fig 3: Relay Module

3.3.3 POWER SUPPLY:

A regulated power supply is an embedded circuit that converts unregulated AC into a regulated DC. With the assistance of a rectifier, it converts AC supply into DC. Its function is to provide a stable voltage, to a circuit or device that has got to be operated within certain power supply limits. The output from the regulated power supply could also be alternating or unidirectional, but is almost always DC.[7]

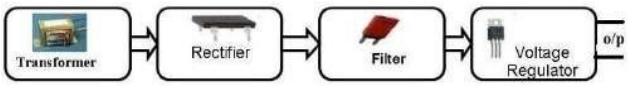


Fig 4: Power Supply

A regulated DC power supply is additionally called as a linear power supply, it consists of various blocks. The regulated power supply will accept an AC input and provides a continuing DC output. Figure below shows the diagram of a typical regulated DC power supply.[9]

3.3.4 74HC595 Shift register:

The 74HC595 is an 8-bit Serial In – Parallel Out shift register, that's it can receive data serially and control 8 output pins in parallel. This comes in very handy where don't have enough GPIO pins on our MCU/MPU to regulate the specified number of outputs. The 74HC595 register is usually used with microcontrollers or microprocessors to expand the GIPO functionalities. It requires only 3 pins connected to the MCU, which are Clock, Data and Latch.[10]

Fig 5: 74HC595 IC

3.3.5 DHT 11 TEMPERATURE AND HUMIDITY SENSOR:

DHT11 may be a low-cost digital sensor for sensing temperature and humidity. This sensor are often easily interfaced with any micro-controller like Arduino, Raspberry Pi etc. to measure humidity and temperature instantaneously.

DHT11 humidity and temperature sensor is out there as a sensor and as a module. The difference between this sensor and module is that the pull-up resistor and a power-on LED. DHT11 is a relative humidity sensor. To measure the encompassing air this sensor uses a thermistor and a capacitive humidity sensor.[11]

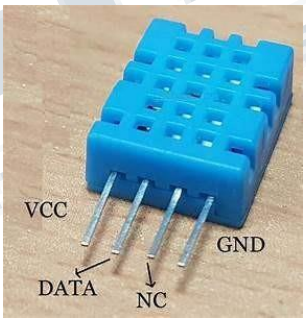
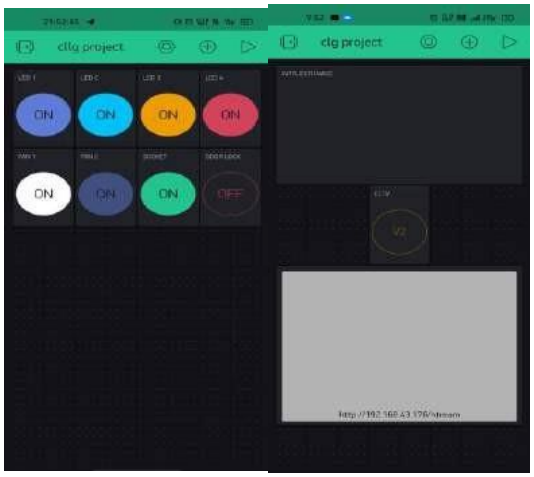


Fig 6: DHT11 TEMPRATURE AND HUMIDITY SENSOR

IV. RESULTS



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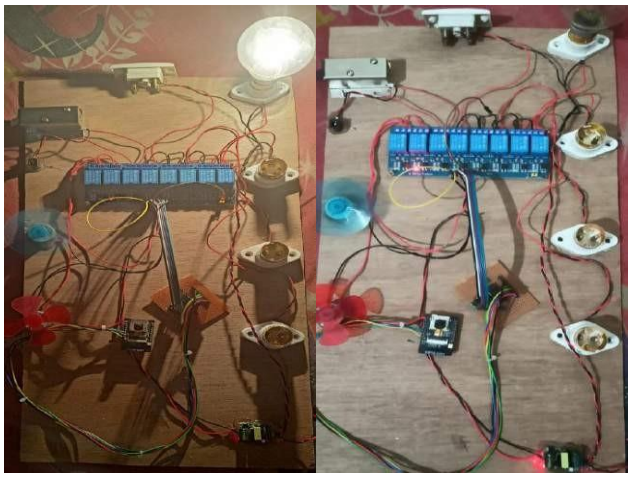

Fig 7: Advance Face Lock and Automation using ESP32cam

V. CONCLUSION

The home automation system which allows people to control household applications through a smartphone application. It is also focused on being able to lock or unlock a door lock. This is achieved by using a central device that connects to the door lock, and the Blynk software with an emphasis on low cost and open-source configurability. The project also aims to increase the input pins of microcontroller, because we have very limited amount of input/output pins. This device can also use as CCTV for security of our house.

Because of its enormous usage within the present society implementing this device is cheap. Even though it is a bit complex to implement, the device can be easily made with some time and ability to sort out things that are required. This device is very much useful for people who are physically challenged and visually impaired. It also makes the life of a busy individual easy. This project will reduce the cost and man power required to design an app to control appliances or devices.

VI. FUTERE ENHANCEMENT

Android apps also are easy to use. Android applications have fire tools that activate and deactivate the system. you can also add camera modules to the system to extend security. If anyone tries to enter the house, the camera is activated; the person finds then opens the door.

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