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IOT BASED REMOTE LOCK SYSTEM USING ESP-32 MICROCONTROLLER

Shanskar Rai [*1], Depshika Thapa[*2], Odzer Zangpo Bhutia[*3], Supriya Rai[*4], Sarashwati Gurung [*5], Ms. Sujala Pradhan[*6]

*[*1*2*3*4*5]Student, Diploma in Computer Science and Technology CCCT Government polytechnic, Chisopani Namchi, South Sikkim, India*

*[*6]Senior Lecturer, Diploma in Computer Science and Technology CCCT Government polytechnic, Chisopani Namchi, South Sikkim, India*

Abstract- Security is the main issue that must be addressed in the present society. With the latest developments in emerging technologies, IoT stands out to be the Cutting-Edge technology solving many security related problems. In this project we implemented the remote lock system based on a microprocessor. It uses WiFi to connect to the companion app to give quick access to our door. It is a simple implementation of the Internet of Things (IoT). IoT is a rapidly growing area of computing, connecting different objects together that do not traditionally connect together. Our implementation of this concept is a basic one. Aimed specifically to bring a little more convenience, at no cost to security, to our lives. This project gives us remote access to our door using a simple microcontroller and a companion app. While there are many remote access door locks they are expensive to implement, our implementation is cheap and easy to install.

Keyword: Microprocessor, ESP32CAM, Internet Of Things (IOT), WiFi Network.

1. INTRODUCTION

IoT is the concept of connecting all objects, even traditionally non-smart objects, by making them "smart", essentially enabling them to gather data through sensors connect to the network via microcontrollers or other embedded circuits.

The Internet of Things is rapidly marking its presence in every field. Now we have IoT enabled home automation and security devices that can be controlled from anywhere in the world using the Internet of Things. Many kinds of Wi-Fi door locks available in the market which make our home more secure and saves time in finding the keys. Here, we are also building a similar Wi-Fi door lock which can be controlled from the smartphone.

In this project There are two important components of access control: Identification and authentication. Identification is the activity of the subject supplying information to identify itself to an authentication service i.e. the owner himself.

2. BLOCK DIAGRAM

The System architecture of remote lock system is shown in the figure 1. ESP-32 cam, camera module and Power supply forms the entire security system to be installed at the required place

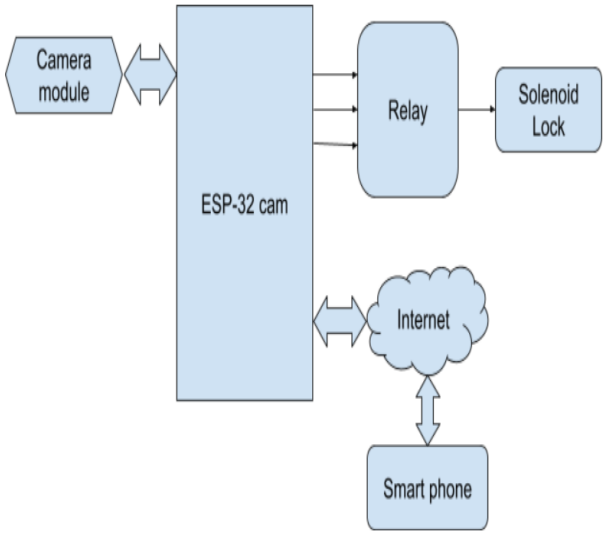


Fig 1 Block diagram

3. SYSTEM IMPLEMENTATION

The modular method is employed in the design. The design involves two parts; the hardware and software design.

3.1. Hardware design

The hardware part is designed to drive a solenoid lock. A solenoid lock was chosen because it is reliable and easy to work with.

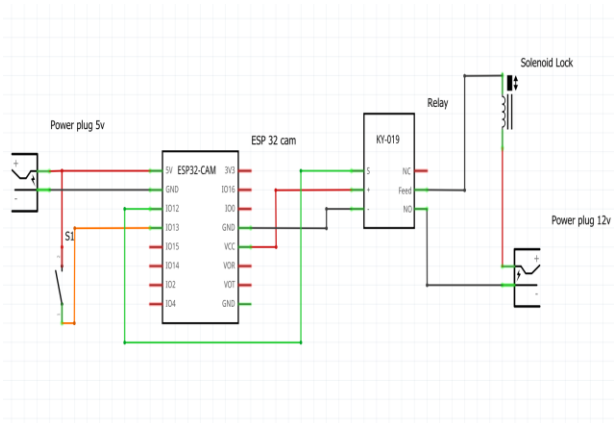


Fig 2: Electronic schematic for WiFi based door lock system

3.1.1. The control unit

The microcontroller ESP-32 is the main control unit. The ESP32 microcontroller was picked for several reasons. Firstly, it is operated on a +5 V DC supply and draws very little current. Furthermore, it has a very low power dissipation and high speed of operation, it has built in WiFi capability. Finally it has good storage memory. It processes images, and generates control signals to power the solenoid lock attached to it. This is done by waiting for a signal from the smart lock app connected to its WiFi network.

Fig 3. ESP32 CAM Microcontroller

3.1.2. Camera module

The ESP32-CAM includes an OV2640 camera module. The device also supports OV7670 cameras.

The OV2640 has the following specifications:

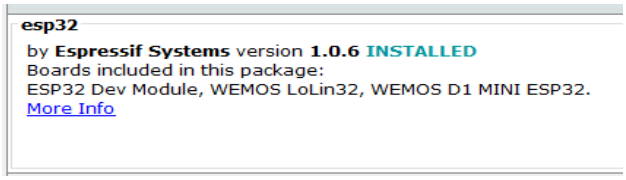
- 2 Megapixel sensor
- Array size UXGA 1622×1200
- Output formats include YUV422, YUV420, RGB565, RGB555 and 8-bit compressed data
- Image transfer rate of 15 to 60 fps

3.2. Software design.

The software is designed in order to support the effectiveness of the hardware device. The complex and intricate operating routine of the software is achieved by writing the program in modules. The software was written in C++ language, and will be written in sections for easy debugging and troubleshooting.

3.2.1. C++ program for the control unit

The c++ program is the main drive for all the operations to be carried out by the system. First, we need to include the required libraries for the blynk application, initialize



variables and define pins for the push button, lock and other components.

First we install the required libraries

After importing the modules we define the different pins and configure the WiFi.

```
#include "camera_pins.h"

#define BUTTON 13
#define PHOTO 14
#define LOCK 12
#define LED 4

const char* ssid = "MyWifi";
const char* password = "lysf1433";
char auth[] = "WKEUcTo8OojHGpZK0IeKfu_qBBkN7KLX";

String local_IP;
```

```
void takePhoto()
{
  digitalWrite(LED, HIGH);
  delay(200);
  uint32_t randomNum = random(50000);
  Serial.println("http://"+local_IP+"/capture?_cb="+ (String)randomNum);
  Blynk.setProperty(V1, "urls", "http://"+local_IP+"/capture?_cb="+(String)randomNum);
  digitalWrite(LED, LOW);
  delay(1000);
}
```

```
void loop() {
  Blynk.run();
  if(digitalRead(BUTTON) == HIGH){
  Serial.println("Send Notification");
  Blynk.notify("Someone is at the door...");
  }
  if(digitalRead(PHOTO) == HIGH){
  Serial.println("Capture Photo");
  takePhoto();
  delay(1000);
  }
  if(digitalRead(LOCK) == HIGH){
  Serial.println("Unlock Door");
  }
}
```

After this we create a module to send the clicked image

Then the main code to drive the lock

3.2.2. Blynk Application

Blink app is designed for IOT bases application, purpose of this app is to control hardware remotely, it can display sensor data, it store data and visualize it.

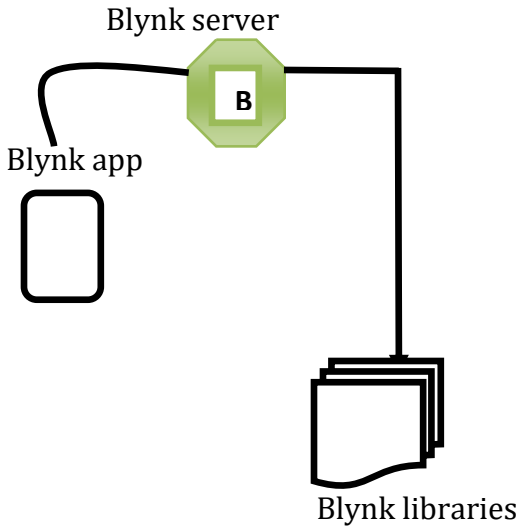


Fig 4. Major components of blynk app

3.2.3. Blynk app setup

Step 1: Open the project in the app.

Step 2: Select the option image gallery widget from the widget box.

Step 3: Select the style button from widget box.

Step 4: Then select Notification Function for the notification of the person who want to access the door.

4. Result

In this paper we have designed a smart IOT based door lock system using,ESP-32CAM and software application i.e. Blynk app. Here, the designed system responds to the request as when someone pushes the doorbell button, the notification is shown on the smart phone. A picture is taken using Blynk app on smart phone when the user writes C take picture. And on the smartphone when the Lock door button is pressed the door will get locked and as well the door will get unlocked when the button for Unlock dooris pressed.

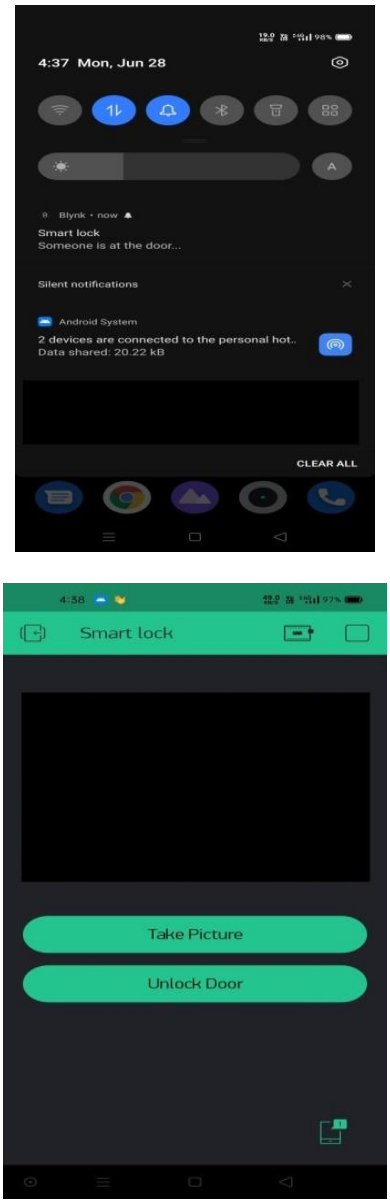


Fig5: top: Notification pop up, bottom: Controlling of door access through blink app

5. Conclusions

The lock was designed to improve user convenience by allowing him to check the image of a valid visitor and open or close the door lock remotely. Another efficient system function is that when a valid user approach, he can switch the camea on ar will.

Now the owner doesn't have to worry about losing the key, getting locked out, or having hands full with groceries, because the Smart Lock system has it covered. The proposed system can be commercialized into a useful product, such as a secure security system with enhanced convenience, especially when compared to existing digital door lock systems.

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