CHAPTER 1

1.1 INTRODUCTION

Nowadays new technology is creating a new way for security and automation. As people are busy in their day-to-day busy lifestyle so assuring safety of their things is a prioritized aspect now. The cases of Robbery are increasing day by day not only in home but also in industrial areas or in any organization. So, to be secured it is mandatory to restrict the stranger from entering into organization. To fulfil this, we need the IoT based Visitor's Authentication System.

Visitor Authentication System (VAS) provides an easy method for the front desk officer to search the ongoing visitor of the day. Thus, maintaining record of all incoming and outgoing visitor/employee is easy by using VAS. Currently, most organization is using the named method in keeping track all the incoming and outgoing visitor records in each of the department.

Problem raised when at curtain point of time the number of visitors visiting the department increasing and unable to manage and messed up. Furthermore, the log register has been used to track all the visitor records and it is not enough. Log register is not an efficient way to keep records of several years, and in order to produce reports, retrieve or inquiry previous records especially 2-3 years back is very hard to get and taking a lot of time to retrieve the records and reports.

VAS also helps user access information enquiry faster. By using VAS, the difficult manually searching procedure will become easy. Imagine there was hundreds of visitors coming in and out. However, with the new system, user only need to search via card number and as a result, the system will display related output that been entered by the user earlier. Problem such as waiting for a long-time queue will be no more a problem and will give an impression of well-organized system. Achieving a secure environment is very important for all organizations as it is a matter of security. Thus, by use of minimum resources, our application would help an organization to keep a track of visitors and maintain a record of the same for future substantiation.

1.2 PROBLEM STATEMENT

Problem in monitoring visitors all at once across different sites or location. It is important to identify how to track a visitor and his or her activity on the specific location. People come and go into the building, reception/security guards or any one front facing the public is unable to see who is coming on site, who is on site and who has left site. Visitor can walk into a building, get a visitor pass and the host has not yet met with the visitor, leaves the visitor to wonder with a visitor pass.

1.3 OBJECTIVE OF PROJECT

This Visitor Authentication System (VAS) provides an easy method for the front desk officer to search the ongoing visitor of the day and keep a track of their visit. Achieving a secure environment is very important for all organizations as it is a matter of security.

1.4 LITERATURE SURVEY

1. **Sujono, Putri Ananda Salung "Design and build a library visitor monitoring system based on microcontrollers" NEWTON: Networking and Information Technology Vol. 3 No.|1 June 2023**

   The system can automatically identify and track visitors entering and exiting the library.

   The performance testing of this device indicates that it provides convenience to library staff in monitoring the number of visitors entering and exiting.

2. **Dina Alkhodary , Ibrahim A. Abu-Al Sondos, Basel J. A. Ali 2, Maha Shehadeh1 and Hanadi A. Salhab "Visitor Management System Design and Implementation during the Covid-19 Pandemic" . Lett. 11|No. 4|1 Jul 2022**

Keeping track of visitors' arrival, presence, and departure on the premises and taking appropriate action**.** The suggested system would assist the company in simply achieving this goal by allowing visitors to grant their visit in very precise time with no registration wait.

3. **DR.P.D. Selvam, K. Nikhil, K. Ranjitha Reddy, A. Mounika, P. Reddy Sekhar, M. Reddy Siva Sai "SURVEILLANCE MONITORING USING ESP32-CAM MODULE" International Journal of Creative Research Thoughts (IJCRT) | Volume 10, Issue 4 April 2022**

The ability to pay attention and react to unusual events, is exceedingly difficult and prone to inaccuracy due to attention lapses. This system is implemented based on Arduino UNO that processes and detects the presence of an intrusion Captured picture and we can achieve the following goals: real-time monitoring, reduced human intervention.

CHAPTER 2

HARDWARE DESIGN

2.1 BLOCK DIAGRAM

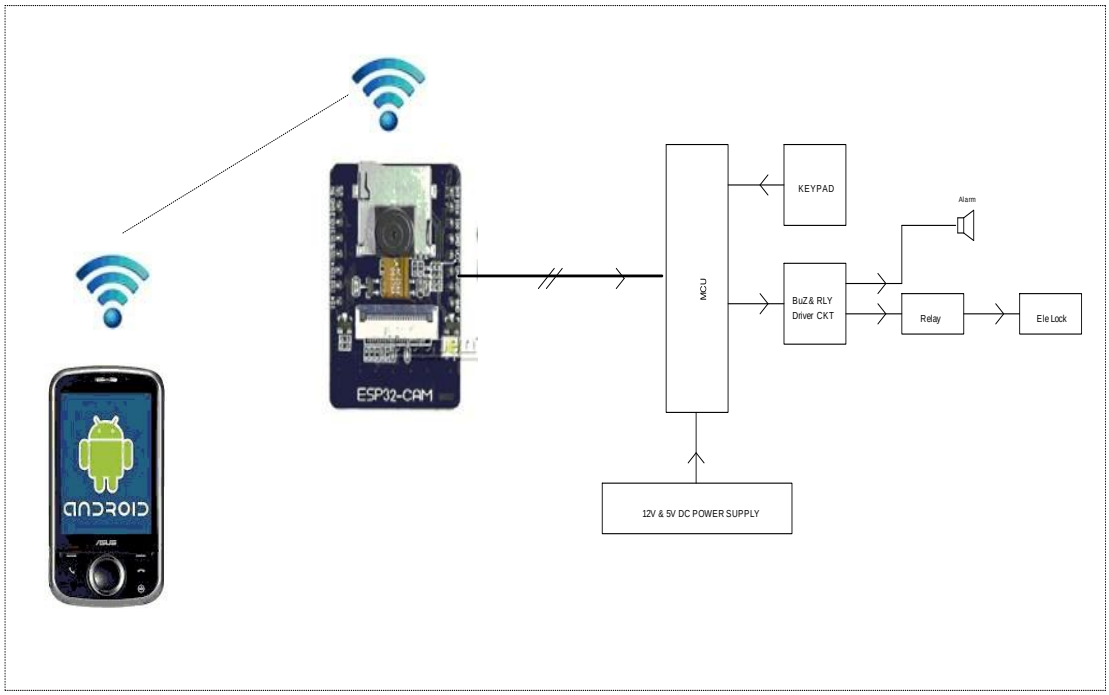


Fig 2.1 BLOCK DIAGRAM

2.2 ESP-32 CAM

Fig 2.2 ESP-32 CAM

The smallest 802.11b/g/n Wi-Fi BT SoC module. Low power 32-bit CPU, can also serve the application processor. Up to 160MHz clock speed, summary computing power up to 600 DMIPS. Built-in 520 KB SRAM, external 4MPSRAM.

ESP-32 Supports UART/SPI/I2C/PWM/ADC/DAC. Support OV2640 and OV7670 cameras, built-in flash lamp. Support image WIFI upload. Supports TF card. Supports multiple sleep modes. Embedded Lwip and Free RTOS. Supports STA/AP/STA+AP operation mode. Support Smart Config/AirKiss technology. Support for serial port local and remote firmware upgrades (FOTA).

2.3 MICROCONTROLLER UNIT (MCU)

Fig 2.3 MCU

A microcontroller is a type of processor that traditionally was a scaled-down, all-in-one embedded processor, memory and I/O for use in very specific operations. It isn't unusual to see microcontrollers embedded into everything from office machines to power tools and engine control systems in cars. And they frequently are the processing element of choice in IoT devices such as smart slippers, which can detect when a person has fallen.

In all cases, the idea behind the microcontroller unit (MCU) is that it is cost-effective, energy-efficient processor that can be purpose-built for a specific application. But some of these devices also have become much more capable over the past few years, blurring the definition of exactly what is a microcontroller. An MCU today may use off-chip memory and multiple, more powerful processing elements, and it may be connected to a co-processor for a specific application such as machine learning or AI. It also may contain its own wireless connectivity rather than using wireless technology that is embedded into an SoC or larger system.

Adding to the confusion, MCUs increasingly are being used in non-standard ways, in more places, and frequently they are embedded into more complex SoCs. So, while functionality may be limited to a specific task, such as waking up a CPU, getting multiple MCUs to synchronize across a device is much more difficult from a design, verification and coherency perspective. MCUs don ' t necessarily play nicely with each other and other processors, especially where devices are limited to on-chip memory.

The MCU market also is highly fragmented. So, while there still are many applications for 4-bit and 8-bit microcontrollers, some are being used for much more sophisticated tasks. One of the big issues being dealt with everywhere in system design is more data, particularly streaming image processing and pattern/image recognition. There are a couple high-level approaches to solving that. One is to have faster processors and more memory. The second is to have more processors that can do certain jobs more efficiently. Even if the individual processing units are slower, collectively they can get the job done in a reasonable amount of time, and they can be dialled down as needed. MCUs are one option here.

Microcontroller units (MCUs) started out using 4-bit instructions, but they now come in 8-, 16-,32- and 64-bit versions. Some of the more advanced designs are being used in MEMS applications.

In addition, they generally are coded in some high-level programming language today rather than assembly language, and some can be debugged using JTAG.

An MCU can be a single chip or die or sold as IP to be incorporated into an SoC or a die that will part of a 2.5D or 3D-IC.

2.4 IR SENSOR

IR sensor is an electronic device, that emits the light in order to sense some object of the surroundings. An IR sensor can measure the heat of an object as well as detects the motion. Usually, in the infrared spectrum, all the objects radiate some form of thermal radiation. These types of radiations are invisible to our eyes, but infrared sensor can detect these radiations.

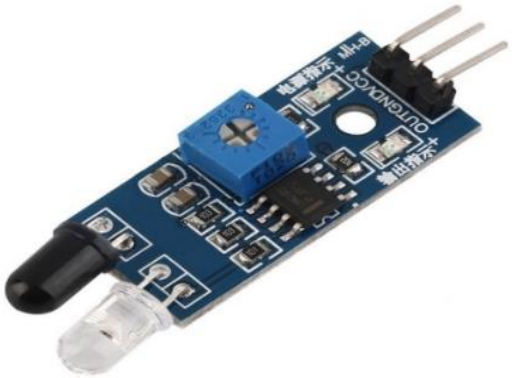


Fig 2.4 IR SENSOR

The emitter is simply an IR LED (Light Emitting Diode) and the detector is simply an IR photodiode. Photodiode is sensitive to IR light of the same wavelength which is emitted by the IR LED. When IR light falls on the photodiode, the resistances and the output voltages will change in proportion to the magnitude of the IR light received.

There are five basic elements used in a typical infrared detection system: an infrared source, a transmission medium, optical component, infrared detectors or receivers and signal processing. Infrared lasers and Infrared LEDs of specific wavelength used as infrared sources.

The three main types of media used for infrared transmission are vacuum, atmosphere and optical fibres. Optical components are used to focus the infrared radiation or to limit the spectral response.

Types of IR Sensor

There are two types of IR sensors are available and they are

1. Active Infrared Sensor
2. Passive Infrared Sensor

2.5 PIC CONTROLLER

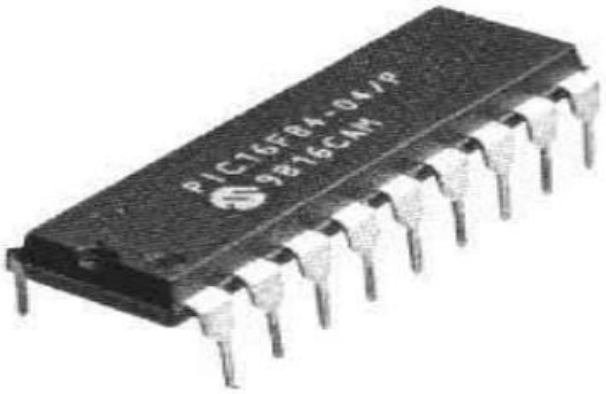


Fig 2.5 PIC CONTROLLER

PIC microcontrollers are meant to enable simple programming and interfacing in embedded system design. Most of the PIC microcontrollers that hit the market are 8-bits microcontrollers, although Microchip did introduce some 16-bits and 32-bits PIC microcontrollers. The Harvard Architecture used by PIC Microcontrollers.

1.PIC 16F84 MCU (U2)

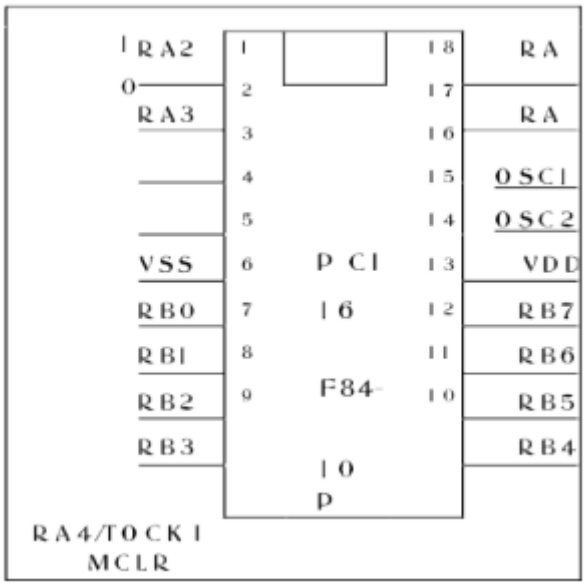


Fig 2.5.1 PIC 16F84 MCU

PIC (Peripheral interface controller) is the IC while was enveloped to control the peripheral device, dispersing the function of the main CPU. PIC has the calculation function and the memory like the CPU and is controlled by the software. However, the throughput, the memory capacity isn't big.

2.6 RELAY

Fig 2.6 RELAY

Relay is one kind of **electro-mechanical** component that functions as a switch. The relay coil is energized by DC so that contact switches can be opened or closed. A single channel 5V relay module generally includes a coil, and two contacts like normally open (NO) and normally closed (NC). This article discusses an overview of the 5V relay module & it's working.

5V Relay Module

The relay module with a single channel board is used to manage high voltage, current loads like **solenoid** valves, motor, AC load & lamps. This module is mainly designed to interface through different microcontrollers like PIC, Arduino, etc.

2.7 BUZZER

Fig 2.7 BUZZER

An audio signalling device like a beeper or buzzer may be **electromechanical** or **piezoelectric** or **mechanical** type. The main function of this is to convert the signal from audio to sound. Generally, it is powered through DC voltage and used in timers, alarm devices, printers, alarms, computers, etc. Based on the various designs, it can generate different sounds like alarm, music, bell & siren.

The pin configuration of the buzzer is shown below. It includes two pins namely positive and negative. The positive terminal of this is represented with the ' +' symbol or a longer terminal. This terminal is powered through 6Volts whereas the negative terminal is represented with the '-' symbol or short terminal and it is connected to the GND terminal.

2.8 ELE LOCK

2.8 ELE LOCK

The most basic type of electronic lock is a magnetic lock (informally called a "mag lock"). A large electro-magnet is mounted on the door frame and a corresponding armature is mounted on the door. When the magnet is powered and the door is closed, the armature is held fast to the magnet. Mag locks are simple to install and are very attack-resistant. One drawback is that improperly installed or maintained mag locks can fall on people and also that one must unlock the mag lock to both enter and to leave. This has caused fire marshals to impose strict rules on the use of mag locks and access control practice in general. Additionally, NFPA 101(Standard for Life Safety and Security), as well as the ADA (Americans with Disability Act) require "no prior knowledge" and "one simple movement" to allow "free egress". This means that in an emergency, a person must be able to move to a door and immediately exit with one motion (requiring no push buttons, having another person unlock the door, reading a sign, or "special knowledge").

Other problems include a lag time (delay), because the collapsing magnetic field holding the door shut does not release instantaneously. This lag time can cause a user to collide with the still-locked door. Finally, mag locks fail unlocked, in other words, if electrical power is removed, they unlock. This could be a problem where security is a primary concern. Additionally, power outages could affect mag locks installed on fire listed doors, which are required to remain latched at all times except when personnel are passing through. Most mag lock designs would not meet current fire codes as the primary means of securing a fire listed door to a frame.

2.9 ADAPTOR

2.9 ADAPTOR

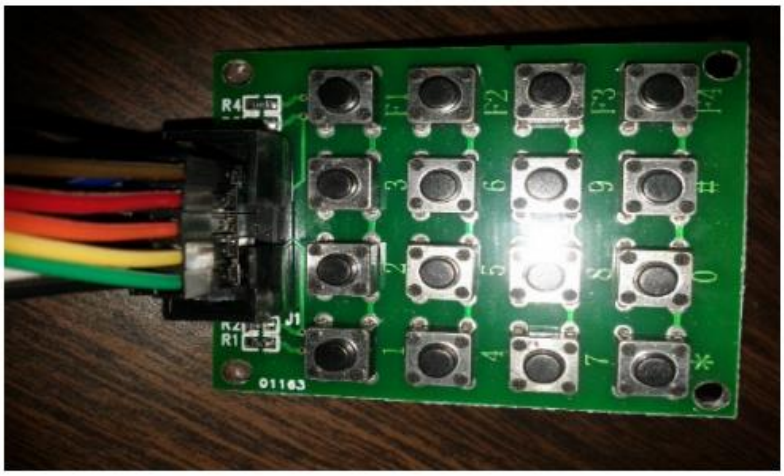
12V power supplies (or 12VDC power supplies) are one of the most common power supplies in use today. In general, a 12VDC output is obtained from a 120VAC or 240VAC input using a combination of transformers, diodes and transistors. 12V power supplies can be of two types: 12V regulated power supplies, and 12V unregulated power supplies.12V regulated power supplies come in three styles: Switching regulated AC to DC, Linear regulated AC to DC, and Switching regulated DC to DC.

Switching regulated 12VDC power supplies, sometimes referred to as SMPS power supplies, switchers, or switched mode power supplies, regulate the 12VDC output voltage using a complex high frequency switching technique that employs pulse width modulation and feedback. Apopain switching regulated power supplies also employ extensive EMI filtering and shielding to attenuate both common and differential mode noise conducted to the line and load. Galvanic isolation is standard in our 12VDC switchers

affording our users input to output and output to ground isolation for maximum versatility. apopain switching regulated power supplies are highly efficient, small and lightweight, and are available in both AC-DC single and wide-adjust output and DC-DC configurations. Our Low Profile wide adjust output switchers can be voltage or current regulated and are externally programmable.

Linear regulated 12VDC power supplies regulate the output using a dissipative regulating circuit. They are extremely stable, have very low ripple, and have no switching frequencies to produce EMI. Galvanic isolation is standard in our 12VDC linear, affording our users input to output and output to ground isolation for maximum versatility. apopain linear regulated power supplies are available AC to DC single and wide adjust outputs.

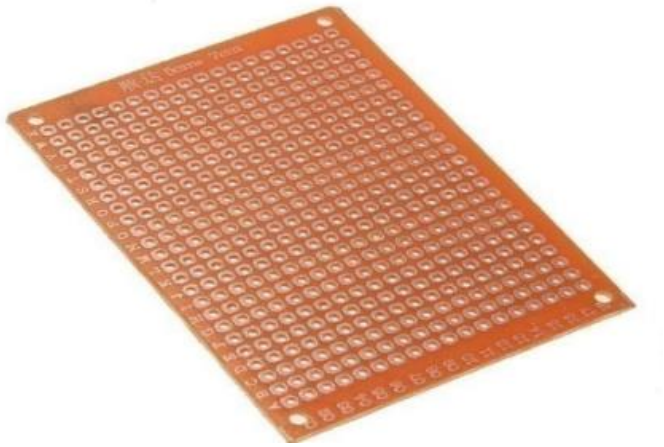
2.10 KEYPAD



2.10 KEYPAD

Most of the time we are used key, button, or switch to get input value in our projects. When we interface one key, button, or switch to the microcontroller then it needs one GPIO pin. But when we want to interface many keys like 9, 12 or 16, etc., then it needs many GPIO pins of a microcontroller and we will lose many GPIO pins. Don ’ t worry! The 4× 4 matrix keypad is a device that can solve this problem. The 4× 4 matrix keypad is an input device, itusually used to provide input value in a project. It has 16 keys in total, which means it can provide 16 input values. The most interesting thing is it used only 8 GPIO pins of a microcontroller. These Keypad modules are made of thin, flexible membrane material. The 4 x4 keypad module consists of 16 keys, these Keys are organized in a matrix of rows and columns. All these switches are connected to each other with a conductive trace. Normally there is no connection between rows and column s. When we will press a key, then a row and a column make contact.

2.11 PRINTED CIRCUIT BOARD (PCB)



2.11 PRINTED CIRCUIT BOARD

The two most popular boards are the single sided board and the double-sided board. The single sided printed circuit boards are widely used for general purpose application, where the cost is low and the layout is simple. However, the circuit performance is also dependent on selecting the appropriated board to jump over a conducting track, jumper wires are used. If the number of jumper wire are more than the board then the double-sided printed circuit boards are preferred.

CHAPTER 3

3.1 CIRCUIT EXPLAINATION

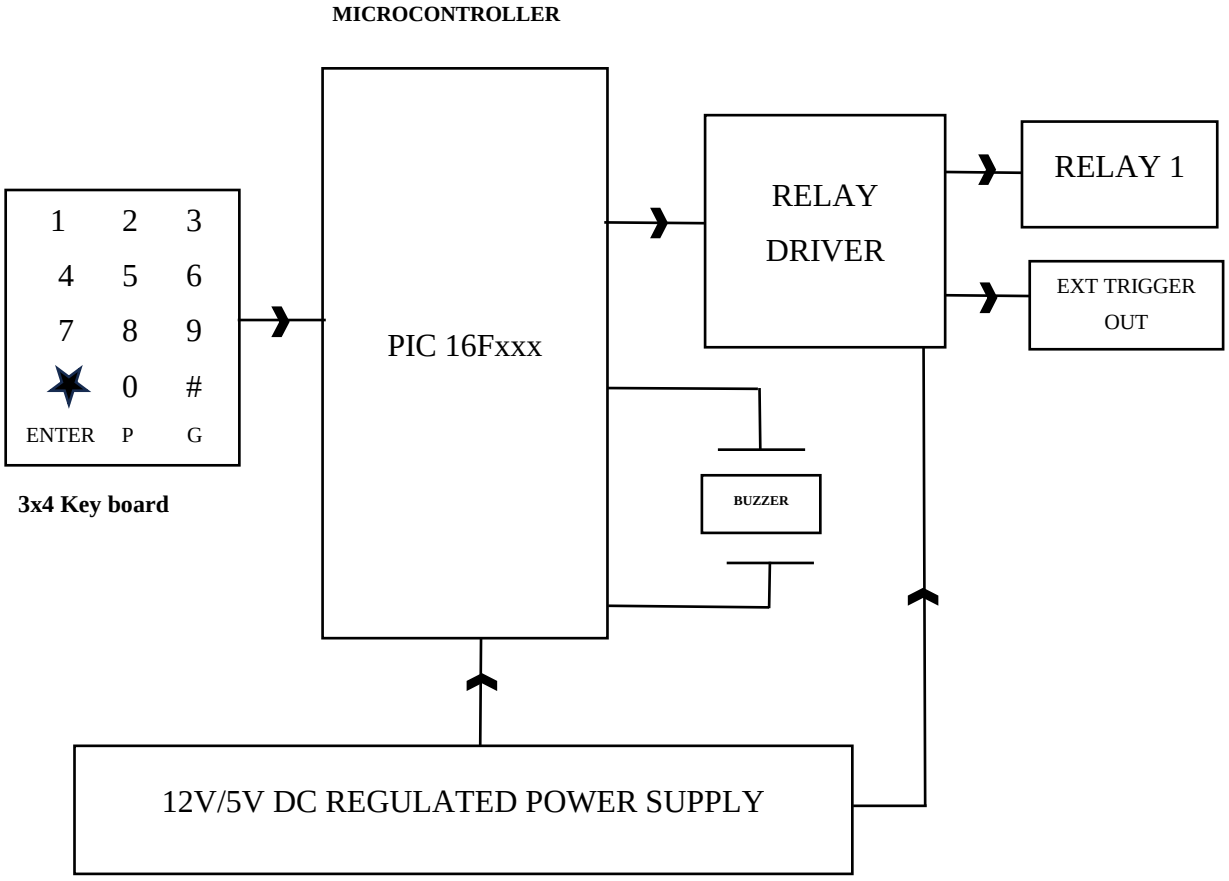


FIG 3.1 CIRCUIT DIAGRAM

This is device, built around a PIC16Fxxx, which activates an output when the correct access code has been entered on a keypad. This code consists of four digits in the range 0 to 9. The code can be changed by the user and is also remembered when the power is off. A buzzer has been added to provide input feedback; the number of beeps indicates weather the input has been entered correctly or not. This circuit is eminently suitable as an electronic door lock, the switching section of a burglar alarm or as an ignition-blocking device. This unit has two outputs. One of these (J1) provides a TTL signal, which is normally ‘ low ’ and becomes ‘ high’ when activated. The other output (J2) consists of relay (RL1). the output is active for about ten second after entering the access code; this is common for use with electronic door locks.

The output will go to the 5 V level and the relay will be energized. If the code is correct, the buzzer sounds a single beep. If it is incorrect, three beeps will follow in short succession.

ALARM MODE

When the code has been incorrectly entered four times in a row, the code lock will switch to alarm mode. In this state, all key presses are ignored for one minute and at the same time the buzzer will sound the alarm signal. This function thwarts any attempt by ‘ hackers ’ to quickly try a large number of codes in a sequence.

OPEARTING

The output is active for about one second after entering the access code. This is the common for use with electronic door locks. The keyboard layout is as follows

The output is inactive when the circuit is powered up. # is used as 'enter' after you type in the valid code. The initial code (master code) is 1234 after power-on. You could activate the output with typing in:

1234 # * Is used to change the code. Type in the actual code then press *, then type in the new code.

E.g.: 1234 * 5678 # 5678 #

Will change the code to 5678. The code changes immediately after typing the 4th digit.

(J5) can be used to drive a Trigger signal, if just the TTL output is used then there is no need to fit the relay. A 12V power supply is indicated, but in principle any voltage between 8 V and 15 V is allowed, provided of course that the relay is suitable for this voltage. In the inactive state, the current consumption of the circuit is about 2.5ms.

BUZZER

The buzzer is connected to pin 2 (RA3) of the micro controller. It beeps to indicate key and password entry. The buzzer gives a small beep whenever a key is pressed. In the case of wrong password entry, the buzzer gives a long beep, and in the case of right password entry the buzzer gives three short beeps.

RELAY

A single pole dabble throw (SPDT) relay is connected to pin 17(RA0) of the micro controller through a driver transistor. The relay requires 12 volts at a current of around 50 mas, which cannot be provided by the micro controller. So, the driver transistor is added. The relay is used to operate the external solenoid forming part of a locking device or for operating any other electrical device. Normally the relay remains off. As soon as pin of the micro controller goes high, the relay operates. One relay for external solenoid and one for external alarm or control the any other device.

CHAPTER 4

APPLICATIONS

4.1 APPLICATIONS

- Museums and art galleries
- Library
- Guest access tracking
- Easy Navigation of task

4.2 ADAVANTAGES

- Custom permission
- Guest identification
- Guest access tracking
- Enhanced security

4.3 DISADAVANTAGES

- Expensive
- Stressful atmosphere

CHAPTER 5

RESULT

By this project, we are implementing a smart surveillance system using **ESP32-CAM** module. So, by using this system, if an intruder is entered into the home or any suspects were walking around your home one can get an immediate alert to their mobile through SMS along with-it buzzer will generate an alarm. This system is implemented based on Arduino UNO that processes and detects the presence of an intrusion Captured pictures are sent to the registered Email account.

CHAPTER 6

CONCLUSION AND FUTURE SCOPE

6.1 CONCLUSION

As a result, we may infer that our system is capable of achieving all of the aforementioned goals and of overcoming the existing system's challenges. With our proposed system, surveillance is vastly improved. The designed system enabled us to achieve the following goals: real-time monitoring, reduced human intervention, and use of active sensors in the field.

6.2 FUTURE SCOPE

More home appliances will be controlled by incorporating various sorts of sensors in the next years. Sensor fusion, low-power digital components, and smartphone cellular capabilities can all be used to extend the life of such devices. Physically handicapped persons will benefit greatly from this equipment in the future.

REFERENCE

[1]. Sujono, Putri Ananda Salung "Design and build a library visitor monitoring system based on microcontrollers" NEWTON: Networking and Information Technology Vol. 3 No.|1 June 2023

[2]. Dina Alkhodary , Ibrahim A. Abu-Al Sondos, Basel J. A. Ali 2, Maha Shehadeh1 and Hanadi A. Salhab "Visitor Management System Design and Implementation during the Covid-19 Pandemic" . Lett. 11|No. 4|1 Jul 2022

[3]. DR.P.D. Selvam, K. Nikhil, K. Ranjitha Reddy, A. Mounika, P. Reddy Sekhar, M. Reddy Siva Sai "SURVEILLANCE MONITORING USING ESP32-CAM MODULE" International Journal of Creative Research Thoughts (IJCRT) | Volume 10, Issue 4 April 2022

APPENDIX A – COMPONENT LIST

Sl. No.	Component Name	Specifications	Part Number	Price/Unit	Quantity Per Prototype	Total Price
01	ESP-32 CAM	32-bit CPU	-	Rs.900/-	01	Rs.900/-
02	Microcontroller	32-bit CPU	ESP8266	Rs.1205/-	01	Rs.1205/-
03	Power Supply Adaptor	+12V, 2A	-	Rs.250/-	01	Rs.250/-
04	Relay		-	Rs.650/-	01	Rs.650/-
05	Buzzer		-	Rs.280/-	01	Rs.280/-
06	PCB Board		-	Rs.120/-	01	Rs.120/-
07	ELE Lock		-	Rs.2250/-	01	Rs.2250/-
08	Key pad		-	Rs.100/-	01	Rs.100/-
09	Cable		-	Rs.40/-	01	Rs.40/-
10	Connecting Wires	Male – Female	-	Rs.10/-	5	Rs.50/-
11	Connecting Wires	Male – Male	-	Rs.10/-	5	Rs.50/-
					Total Cost Per Prototype	**Rs.5940/-**

APPENDIX B – CODE

```
#include “esp_camera. h”
#include “ESP 32_Mail client. h”
#include <SPI FFS. h>
#include <wiFi. h>
const char * ssid = “M_X2”
const char * password = “12345678”
#define email Sender Account “iotkits4u.gmail.com”
#define email Sender Password “cxqnasdrtwbcipdz”
        #define PWDN_GPIO_NUM    32
        #define XCLK_GPIO_NUM     0
        #define SI OD_GPIO_NUM    26
        #define SI OC_GPIO_NUM    27

        #define Y9_GPIO_NUM       35
        #define Y8_GPIO_NUM       34
        #define Y7_GPIO_NUM       39
        #define Y6_GPIO_NUM       36
        #define Y5_GPIO_NUM       21
        #define Y4_GPIO_NUM       19
        #define Y3 _GPIO_NUM      18
        #define Y2_GPIO_NUM       5
        #define VSYNC_GPIO_NUM  25
        #define HREF_GPIO_NUM     23
        #define PCLK_GPIO_NUM     22

#define LED_OnBoard  2
#define IR_IN            12
#define PASS_OK       11
#define STS_LED        4
byte obj                  = 0;
```

```
#define FILE_PHOTO "/photo.jpg"

Void setup()
{

pinMode(IR_IN. INPUT);
pinMode(PASS_OK. INPUT);
pinMode(STS_LED. OUTPUT);
pinMode(LED_OnBoard. INPUT);

delay(100);

wiFi. Begin(ssid.password);
Serial.print("Connecting to wiFi…");
while(wiFi.status()!=wl_CONNECTED)
{
delay(500);
Serial.print(" . ");
}
Serial.println("wiFi CONNECTED OK");
Digital write(STS_LED.1);
camera_config_t config;
config.| edc_channel = LEDC_CHANNEL_0;
config. pin_d0 = Y2_GPIO_NUM;
config. pin_d1 = Y3_GPIO_NUM;
config. pin_d2 = Y4_GPIO_NUM;
config. pin_d3 = Y5_GPIO_NUM;
config. pin_d4 = Y6_GPIO_NUM;
config. pin_d5 = Y7_GPIO_NUM;
config. pin_d6 = Y8_GPIO_NUM;
config. pin_d7 = Y9_GPIO_NUM;
config. pin_vsync = VSYNC_GPIO_NUM;
config. pin_href = HREF_GPIO_NUM;
```

```
config. pin_sscb_sda = SIOD_GPIO_NUM;
config. pin_sscb_scl = SIOC_GPIO_NUM;
config. pin_sscb_pwdn = PWDN_GPIO_NUM;
config. pin_sscb_reset = RESET_GPIO_NUM;

esp_err_t err = esp_camera_init(&config);
if (err! = ESP_OK)
{
        Serial.printf("Camera init failed with error 0x%x.err");
        return();
}



}

void loop()
{

if(digital Read(PASS_OK) == 0)
{
        obj = 0;
        sendPhoto();;
        }
    }
}

bool checkPhoto(is:: FS&fs)
{
        File f _pic = fs.open(FILE_PHOTO);
        unsigned int pic_sz = f _pic.size();
        return (pic_sz<100);
}
```

```
void capturePhotoSaveSpiffs(void)
{
camera_fb_t*fb=NULL;
do
{
        Serial.printtln("Taking photo…");

        fb = esp_camera_fb_get();
        if (!fb)
{
        Serial.println("Camera capture failed");
        return;
}
File file = SPIFFS.open(FILE_PHOTO.FILE_WRITE);
If(!file)
{
        Serial.println("Failed to open file in writing mode");
}
else
{
        file.write(fb->buf.fb->len);
}
file.close();
esp_camera_fb_return(fb);
ok = checkPhoto(SPIFFS);
}
while(!ok);
}

Void sendPhoto(void)
{
digitalWrite(STS_LED.1);
capturePhotoSaveSpiffs();
```

```
Serial.println("Sending email…");
smtpData.setSender("ESP-Security SYS".email Sender Account);
smtpData.setPriority("HIGH");
if(obj == 1)
{
        smtpData.setSubject("OBJECT_DETECTED !");
        smtpDta.setMessage("<h2> This Mail Send By VISITOR'S AUTHENTICATION
SYSTEM</h2>".true);
}

smtpData.addRecipt("hobbykits4u@rediffmail.com");
smtpData.addRecipt("rakeshkumar.ar1212@gmail.com");
smtpData.addRecipt("intriscinnovations@gmail.com");
smtpData.addAttachFile(FILE_PHOTO. "image/jpg");
smtpData.setFileStorageType(Mail Clinet Storage Type::SPIFFS);
smtpData.setSendCallback(sendCallback);
digitalWrite(STS_LED.0);
}

Void sendCallback(SendStatus msg)
{
        Serial.println(msg.info());
}
```