Arduino Based Home Security System

Project Report

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1. ABSTRACT

Now a days, security has become one of the crucial aspect. As a part of this project we will design a novel human-machine interface integrated into a security system. Home security has been a major issue where crime is expanding and everyone needs to take legitimate measures to forestall interruption. This security system can be included for Home/ Bank/ Office and for the purpose of safety since everybody wants to take proper measures to prevent intrusion. The proposed system will consume comparably less power and focuses on the different security features of house. This system employs various sensors have been used, Magnetic switches to check the doors and windows, the ultrasonic sensor is used for detection of the change in the status or surroundings. Most of these components have very low price and by creating a low-cost integrated security system we will provide better security solutions in the field.

2. INTRODUCTION

The project will consist of various components where each piece will serve a specific purpose. Sensors such as ultrasonic sensors will detect the motion of the user and find the intruder and start the alarm the camera module using the servo motor module will move in the direction of the motion and start taking pictures of the intruder which can help in case the intruder decides to leave to avoid getting caught.

There will also be a numeric keypad which will activate or deactivate the security system this will contain a PIN for access to the controls the PIN will only be known to the master user and which will use this to check status of the system. There will be LCD screen to show the current status of the system and in case of a breach it will show the exact location of breach in the house, this will be done with the help of magnetic lever which will tell if any door has been opened or closed after the system has been activated.

3. LITERATURE SURVEY

[1] IoT forms the foundation of associated physical gadgets which is developing at a fast rate as gigantic number of gadgets and items are getting related to the Internet. Home security is an exceptionally helpful use of IoT and we are utilizing it to make a reasonable security system for homes and in addition mechanical utilize. The system will educate the proprietor about any unapproved passage or at whatever point the door is opened by sending a notice to the client. After the client gets the notice, he can take the essential activities. The security system will utilize a microcontroller known as Arduino Uno to interface between the segments, an attractive Reed sensor to screen the status, a bell for sounding the alert, and a WiFi module, ESP8266 to associate and impart utilizing the Internet. The fundamental points of interest of such a system incorporates the simplicity of setting up, bring down expenses and low support.

[2]The system is about remotely managed Door availability and voice cautioning through Smart Phone and get picture of guest at Door as Email alarm. Smart home security control system has turned out to be fundamental in everyday life. The plan and advancement of a home security system, in light of human movement location and remotely checking technology, to affirm guest character and to control Door availability has been accounted for in this paper. This paper depicts about the usage and organization of remote control system and openness in to a home environment for validated individuals as it were. An ultrasonic movement sensor and Camera module are utilized to recognize movement and catch pictures individually are

dedicatedly make the security system alive according to the demand. Electromagnetic door lock module work the door openness, has been composed and created.

[3] Today individuals are confronting more issues about security in all finished world, these days security is the most basic issue wherever on the planet. Here in this paper, trying to reproduce the exhaustive writing examine identified with the different door locks and entryway security systems that are vital in the fields, for example, home, enterprises and vehicle security where potential outcomes of invasion are expanding step by step. Because of the headway in ongoing procedures, some door lock security systems depend on microcontroller, GSM, GPS, numerous sensors, software like MATLAB, PROTEUS, biometrics like face acknowledgment, Iris scanner, RFID, Smart Card and secret key and so on. Each system has their own particular points of interest and disservices. In a large portion of systems, SMS method is utilized for correspondence so the system will progress toward becoming practical, more dependable and it will require less investment to convey message.

[4] Now a days, home security is a key concern. Remembering the abnormal state of security a home security gadget must give a security system is proposed in this paper. The proposed system gives the client a chance to control his door lock either by means of Bluetooth or a message over the internet. The proposed security capacities enable the client to keep a track of who visited his home and when alongside controlling the instances of conceivable interruption. Since Internet of Things has been the prevailing technology in the field of security items, thinking about its value, we have composed the system in view of this technology. It brings down the human exertion and gives security to individuals from undesirable interruptions or then again break-ins through the door locks. The camera in the proposed system transfers the clicked photographs on the cloud for either mailing them or informing according to the circumstance. This system has been planned conquering the detriments of existing systems and giving the security over the internet. It is a minimal effort system which takes a shot at movement finders and the ringing of the chime to order the individual as a gate crasher or guest. Along these lines, once executed, the system will turn out to be much helpful and more effective contrasted with existing cost insufficient systems.

[5] This paper talks about how the home security is growing concern in major cities with crime rates soaring all-time high. The paper proposes that we implement various sensors such as heat detection sensor and sound sensor. These sensors will report the break in to the concerned authorities and all to the owner of the house. This setup according to the authors will be very consume very less space and using the technology of IOT will help such cases. The authors also propose that it can also work in case of fires or anything other kind of tension which needs immediate attention like fires due to some appliance etc.

# 4. PROPOSED SYSTEM DESIGN

4.1 Module Description

1. Arduino MEGA 2560

The Arduino Mega is a microcontroller board dependent on the ATmega1280. It has 54 advanced information/yield pins (of which 14 can be utilized as PWM yields), 16 simple data sources, 4 UARTs,a 16 MHz gem oscillator, a power jack, an ICSP, and a reset catch.

2. Numeric Keypad

The catches on a keypad are organized in lines and sections. A 3X4 keypad has 4 lines and 3 segments, and a 4X4 keypad has 4 lines and 4 sections.
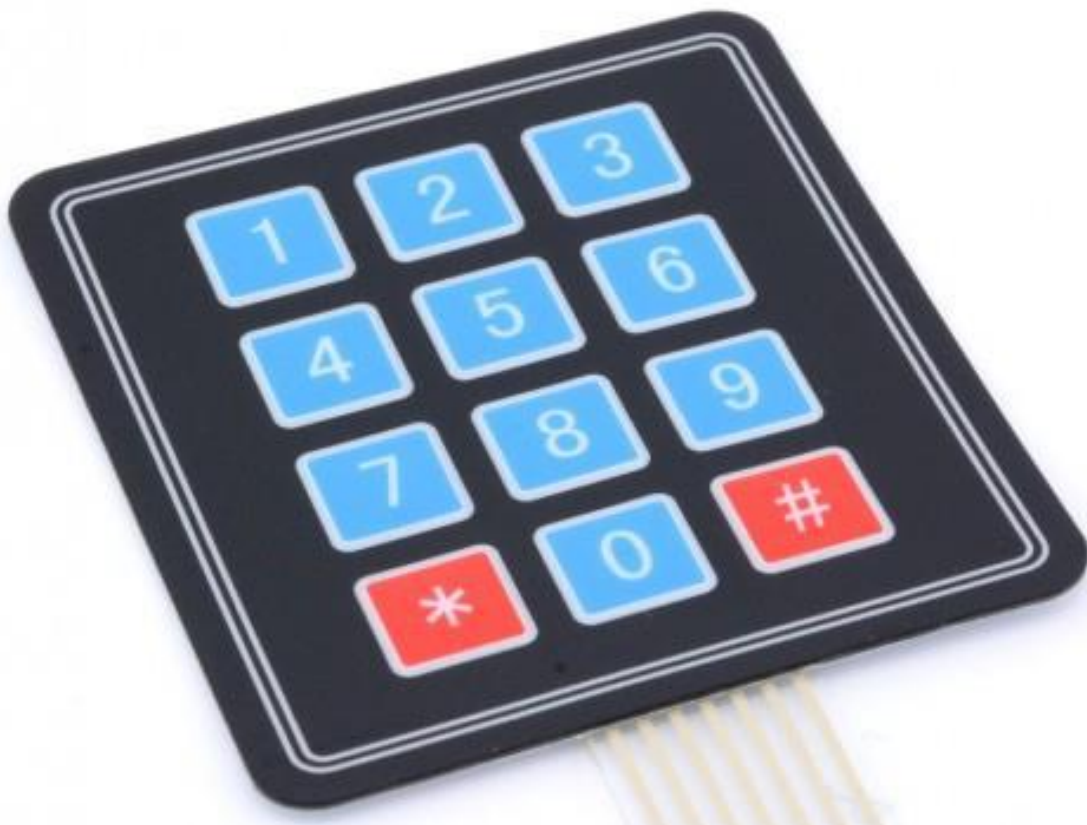
3. Ultrasonic Sensor

Ultrasonic sensors measure remove by utilizing ultrasonic waves.

The sensor head transmits a ultrasonic wave and gets the wave reflected once again from the objective. Ultrasonic Sensors measure the separation to the objective by estimating the time between the discharge and gathering

Distance: L
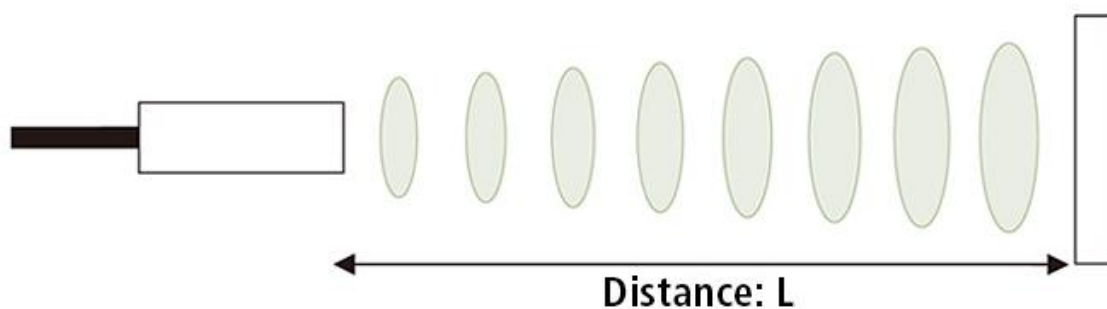
4. Magnetic Door Rid Switch

Magnetic/Attractive switch is an electrical switch that switches when an attractive field influences it. They are valuable in circumstances where moving components can't reach the switch, for example, in unstable conditions. They are additionally ready to work in water.

5. Servo Motor

A servomotor is a turning actuator or straight actuator that takes into account exact control of precise or direct position, speed and increasing speed. It comprises of an appropriate engine coupled to a sensor for position criticism.
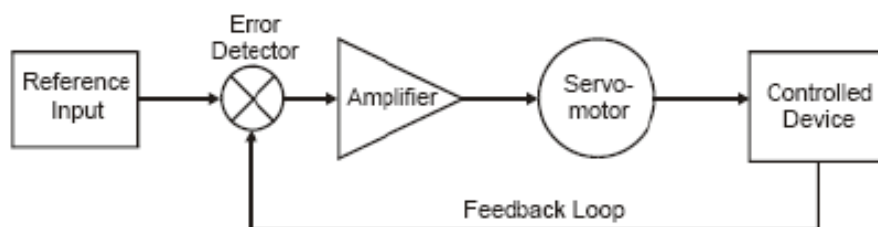

Figure 3-44. Typical servo system block diagram

## Figure: Block diagram of Servo Motor

6. RFID RC522

Mifare RC522 is the high incorporated RFID card peruser which takes a shot at non-contact 13.56 mhz correspondence, is composed by NXP as a low power utilization, ease and reduced size read and compose chip, is the best decision in the advancement of shrewd meters and versatile hand-held gadgets.

MF RC522 utilize the propelled balance system, completely incorporated at 13.56MHz with a wide range of postive non-contact correspondence conventions. Bolster 14443A good answer flag. DSP manage ISO14443A edges and blunder amendment. Futhermore, it likewise bolsters

fast CRYPTO1 encryption to approve Mifare arrangement items. MFRC522 bolster Mifare arrangement higher speed non-contact correspondence, duplex correspondence accelerate to 424 kb/s. As another relative in 13.56MHz RFID family, MF RC522 has numerous likenesses to MF RC5200 and MF RC530, and furthermore has all the more new highlights.

This module can fit specifically close by held gadgets for large scale manufacturing. Module utilize 3.3V power supply, and can discuss straightforwardly with any CPU board by interfacing through SPI convention, which guarantee solid work, great perusing separation.
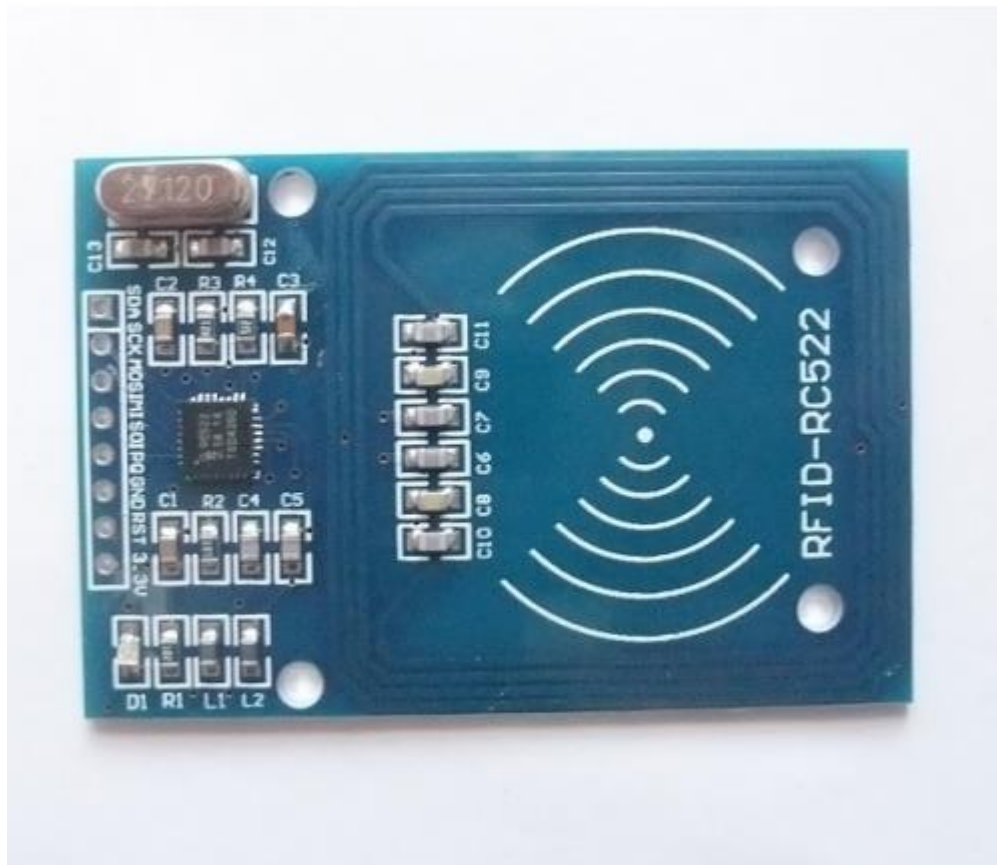
7. GSM Module

GSM module is utilized to build up correspondence between a PC and a GSM system. Worldwide System for Mobile correspondence (GSM) is a design utilized for versatile correspondence in a large portion of the nations.

GSM/GPRS module comprises of a GSM/GPRS modem collected together with power supply circuit and correspondence interfaces (like RS-232, USB, and so forth) for PC. GSM/GPRS MODEM is a class of remote MODEM gadgets that are intended for correspondence of a PC with the GSM and GPRS organize.

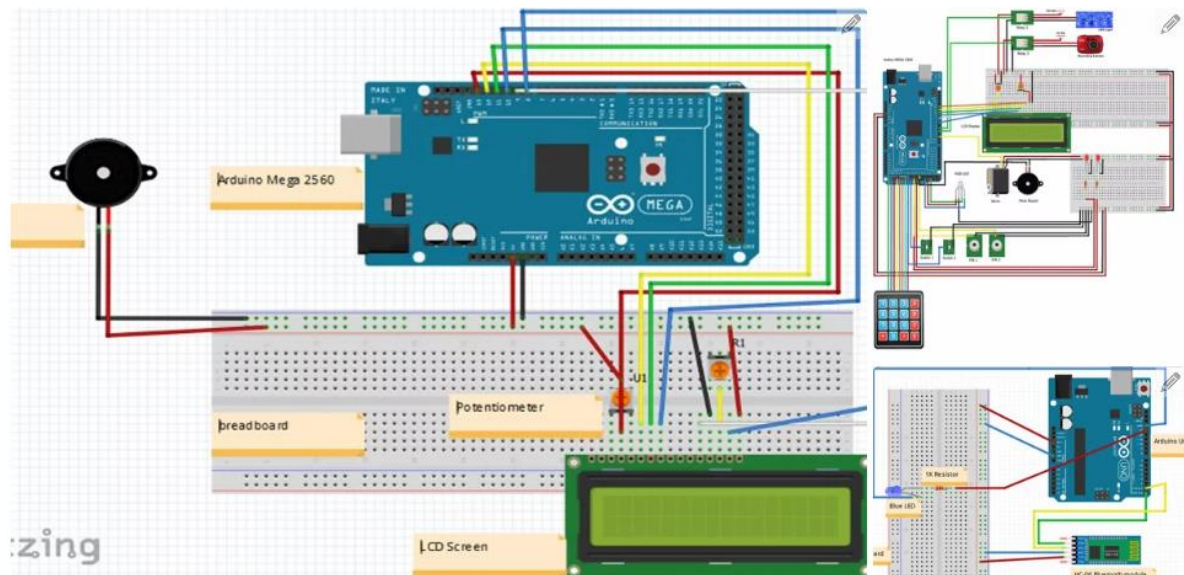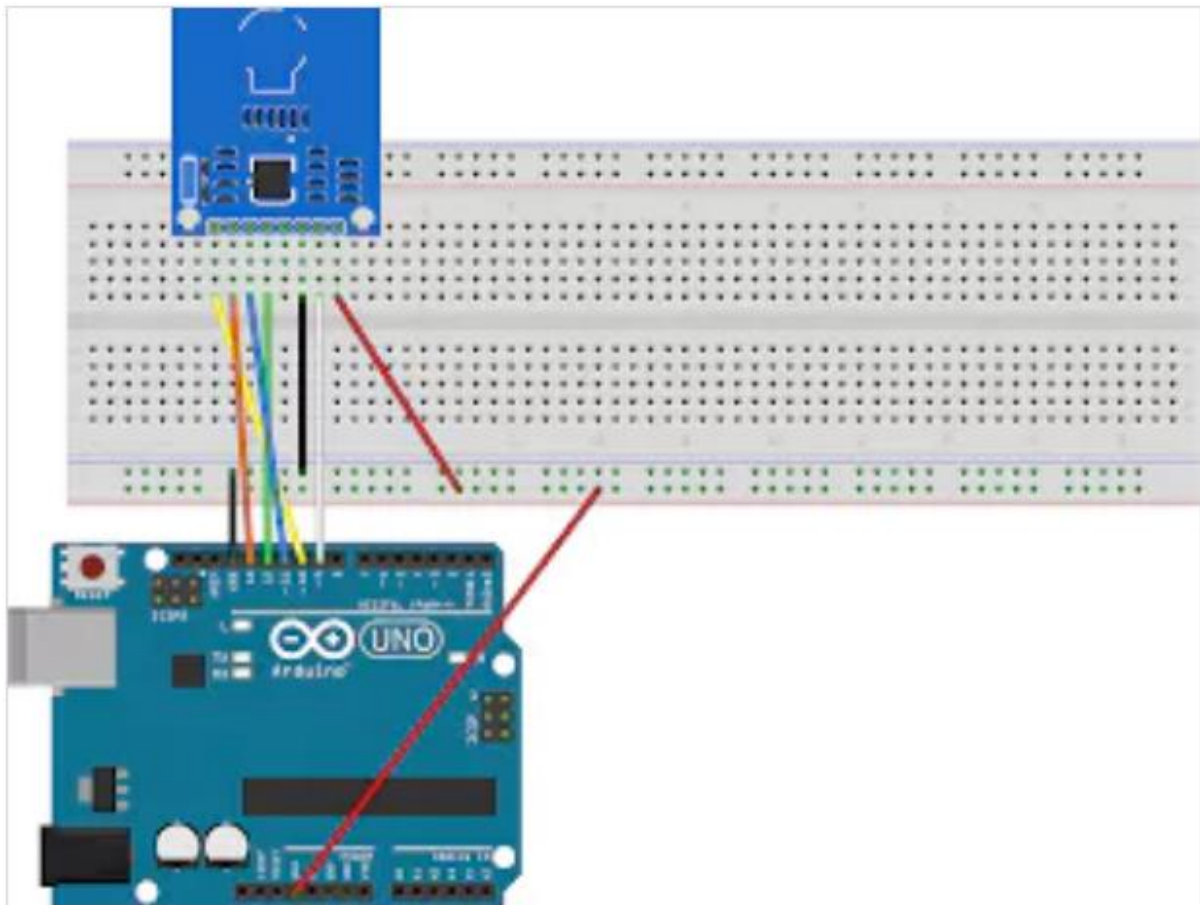A GSM/GPRS MODEM can play out the accompanying activities:

1. Get, send or erase SMS messages in a SIM.
2. Read, include, seek phonebook passages of the SIM.
3. Make, Receive, or reject a voice call.

4.2 Architecture Diagram of proposed system


Architecture Diagram
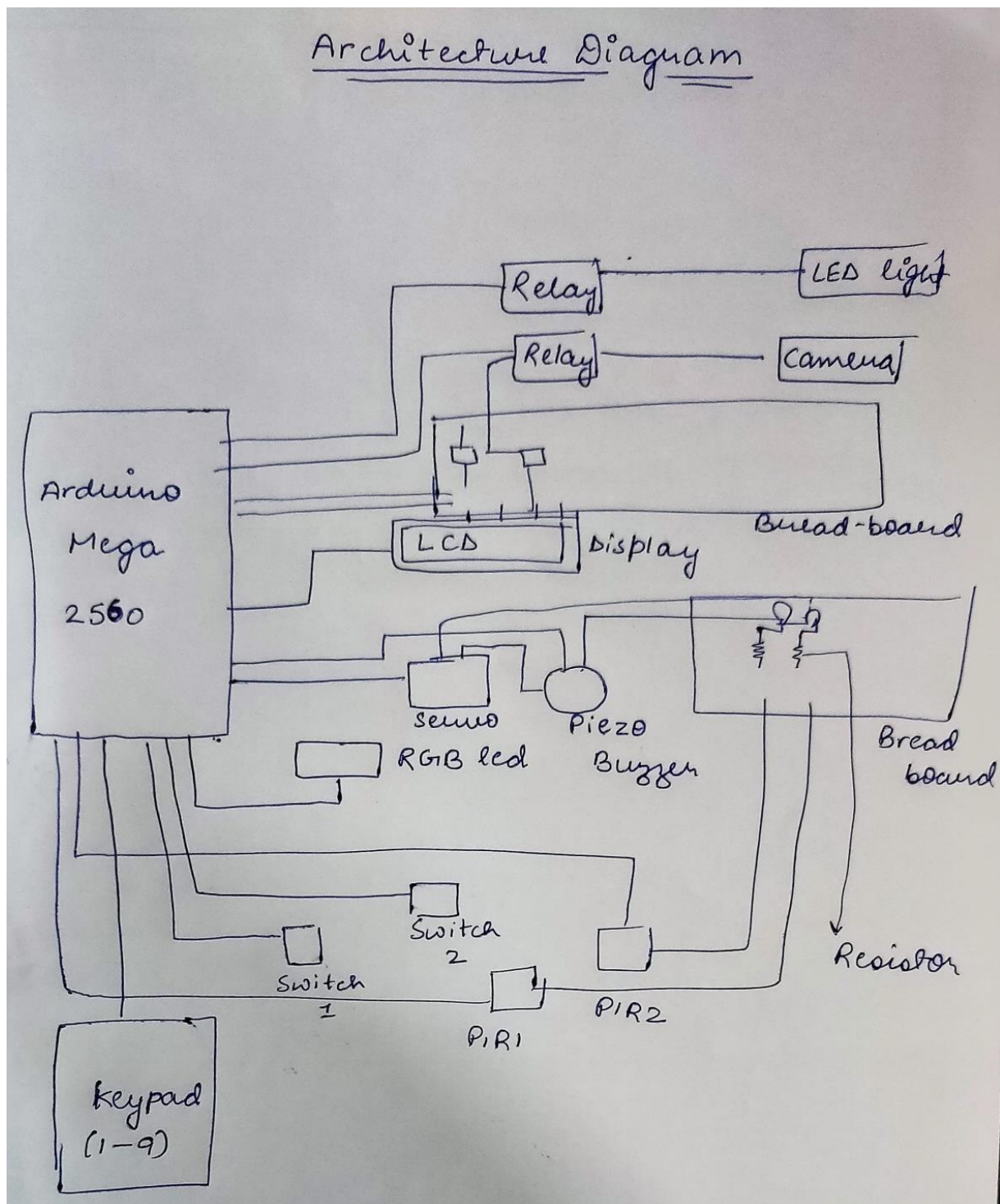
4.3 Circuit Diagrams

5. RESULT AND DISCUSSIONS

Technology now daily has gone up against a radical new importance. The Intelligent Home Security System utilizing Keypad Lock has been outlined and created for making our life all the more simple and anchored. We utilize 5v Arduino board and 5v-2A control connector control supply for running the machine. We additionally utilize ultrasonic sensor for identifying object accepting. At long last, we have outlined and built up the entire control system and tried utilizing keypad. We settle every one of the issues experienced amid the outline and testing of the system. The creation cost is low. Subsequently, our item is reasonable for business utilize.

5.1 Snapshots of system developed
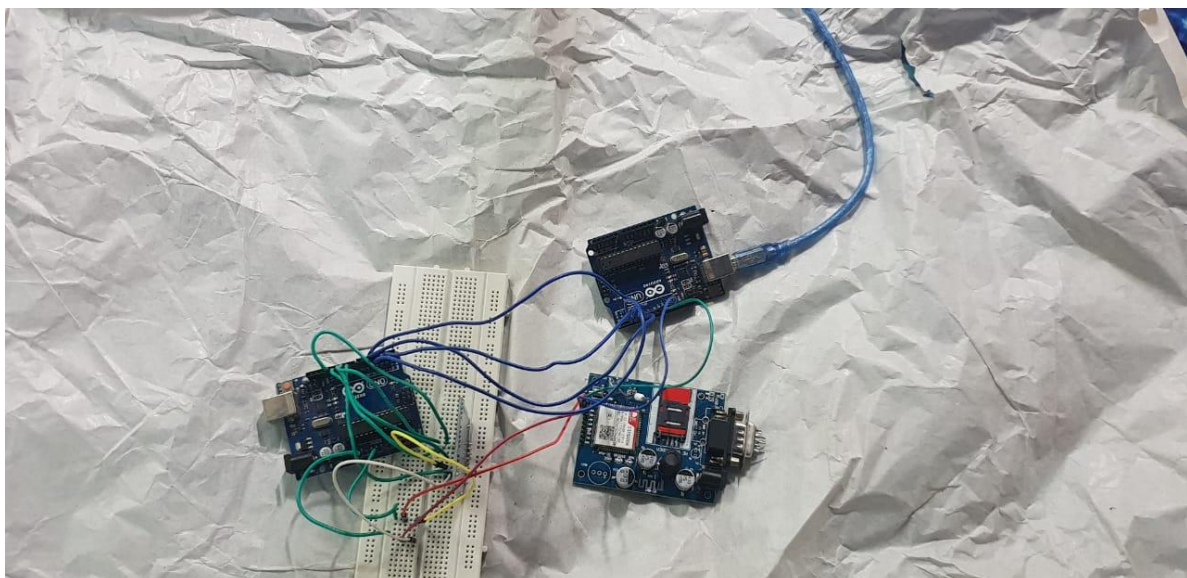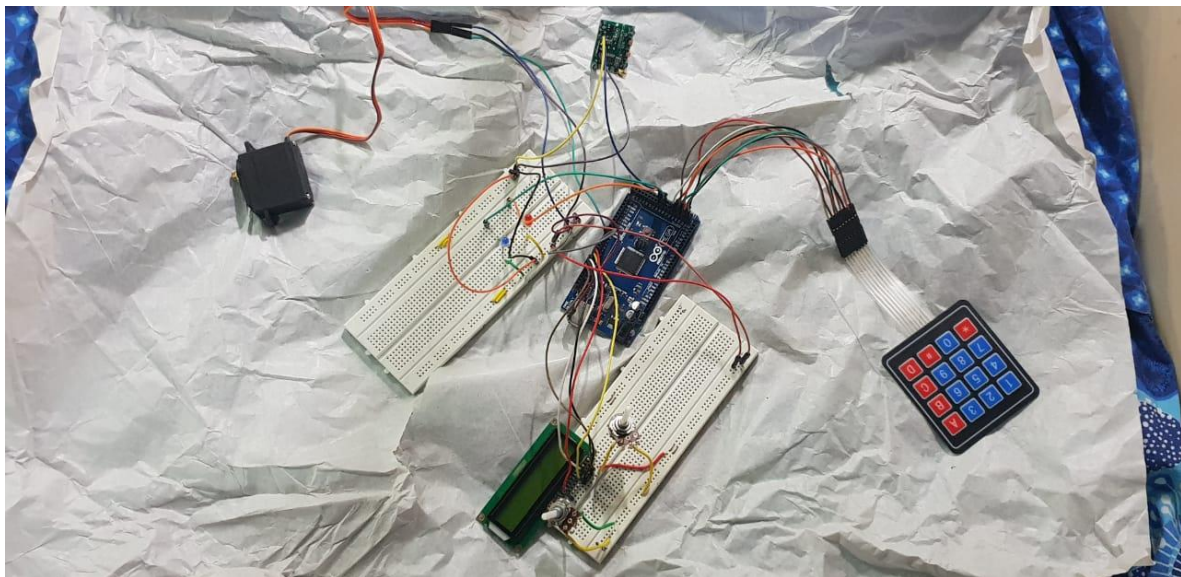
6. CODING

```cpp
#include <LiquidCrystal.h>
#include <Wire.h>
#include <Password.h>
#include <Keypad.h>
#include <Servo.h>
#include "RTClib.h"

//Servo
Servo myservo;              int pos = 90;
int passwd_pos = 15;

//Real Time Clock
RTC_DS1307 RTC;

//Password
Password password = Password( "1456" );

const byte ROWS = 4;
const byte COLS = 4;

char keys[ROWS][COLS] = {
  {
   '1','2','3','A'      }
  ,
  {
   '4','5','6','B'      }
  ,
  {
   '7','8','9','C'      }
  ,
  {
   '*','0','#','D'      }
};

byte rowPins[ROWS] = {
 46, 47, 48, 49};    byte colPins[COLS] = {
 50, 51, 52, 53};

// Create the Keypad
Keypad keypad = Keypad( makeKeymap(keys), rowPins, colPins,
ROWS, COLS );


LiquidCrystal lcd(7,8, 9, 10, 11, 12);


int ledDelay = 50; int redPin = 29;
```

```
int bluePin = 31;


//int blueLED = 36; int greenLED = 37; int redLED = 38; int pirPin1 = 39; int pirPin2 = 34;

int reedPin1 = 41; int reedPin2 = 42;
int speakerPin = 35;

int relay2 = 4;  int relay3 = 5; // Cam
int relay4 = 6; //

int alarmStatus = 0; int zone = 0;
int alarmActive = 0;

void setup(){   Serial.begin(9600);
 lcd.begin(20, 4);

 Wire.begin();
 RTC.begin();   RTC.adjust(DateTime(__DATE__,
__TIME__));

 myservo.attach(2);

 displayCodeEntryScreen();


 pinMode(redPin, OUTPUT);
 pinMode(bluePin, OUTPUT);


 pinMode(redLED, OUTPUT);   pinMode(greenLED, OUTPUT);
 pinMode(speakerPin, OUTPUT);


 pinMode(relay2, OUTPUT);  //12V Blue LED lighting
 pinMode(relay3, OUTPUT);  //camera, 5V external DC supply
 pinMode(relay4, OUTPUT);  //

 pinMode(pirPin1, INPUT); //Bedroom 2   pinMode(pirPin2, INPUT); //Garage
pinMode(reedPin1, INPUT);   pinMode(reedPin2, INPUT);

 digitalWrite(redLED, LOW);   digitalWrite(greenLED, HIGH);   digitalWrite(speakerPin,
LOW);

 //digitalWrite(relay1, LOW); //   digitalWrite(relay2, HIGH); // 12V Blue LED lighting
digitalWrite(relay3, HIGH);

 keypad.addEventListener(keypadEvent);   myservo.write(pos);
}
```

```
void loop(){

 DateTime now = RTC.now();  lcd.setCursor(0,1);  lcd.print(now.month(), DEC);
 lcd.print('/');

 lcd.print(now.day(), DEC);
 lcd.print('/');

 lcd.print(now.year(), DEC);
 lcd.print(' ');


 lcd.setCursor(13,1);  lcd.print(now.hour(), DEC);
 lcd.print(':');  lcd.setCursor(16,1);  lcd.print(now.minute(), DEC);



 keypad.getKey();

 if (alarmActive == 1){
  if (digitalRead(pirPin1) == HIGH)
  {    zone = 0;    alarmTriggered();
  }
  if (digitalRead(reedPin1) == LOW)
  {    zone = 1;
   alarmTriggered();
  }
  if (digitalRead(reedPin2) == LOW)
  {    zone = 2;
   alarmTriggered();
  }

  if (digitalRead(pirPin2) == HIGH)
  {    zone = 3;    alarmTriggered();
  }
 }
}



void keypadEvent(KeypadEvent eKey){  switch (keypad.getState()){  case PRESSED:
  if (passwd_pos - 15 >= 5) {      return ;
  }
  lcd.setCursor((passwd_pos++),0);  switch (eKey){    case '#':
   passwd_pos = 15;    checkPassword();    break;  case '*':
password.reset();
   passwd_pos = 15;

   break;  default:
   password.append(eKey);    lcd.print("*");
```

```
    }
   }
  }

  void alarmTriggered(){
   int expected_pos;
   int incr;
   digitalWrite(speakerPin, HIGH);  digitalWrite(relay2, LOW);  digitalWrite(relay3, LOW);
   digitalWrite(redPin, HIGH);


   password.reset();  alarmStatus = 1;

   lcd.clear();
   lcd.setCursor(0,2);  lcd.print(" SYSTEM TRIGGERED ");  lcd.setCursor(0,4);
   if (zone == 1)
   {
    lcd.print(" Front Door Open ");    expected_pos = 65;
    delay(1000);
   }  if(zone == 0){    expected_pos = 40;    lcd.print("Motion in Bedroom 1 ");
delay(1000);
   } else if(zone == 2){    expected_pos = 10;    lcd.print("Backdoor Open");
    delay(1000);
   } else if(zone == 3){    expected_pos = 145;    lcd.print("Motion in Garage");
delay(1000);
   }

   if (expected_pos > pos) {    incr = 1;   } else {    incr = -1;
   }

   for (pos = pos; pos != expected_pos; pos
+= incr) {    myservo.write(pos);               delay(5);
   }


   for(pos = 0; pos < angle; pos += 1)
   {
    myservo.write(pos);               delay(20);
   }
   for(pos = angle; pos>=1; pos-=1)
   {
    myservo.write(pos);               delay(20);
   }


   {
    StrokeLight();
   }
  }        }
```

```cpp
void StrokeLight(){                                              void invalidCode()
   digitalWrite(redPin, HIGH);        delay(ledDelay);    digitalWrite(redPin, LOW);
delay(ledDelay);    digitalWrite(redPin, HIGH);         delay(ledDelay);
digitalWrite(redPin, LOW);            delay(ledDelay);    digitalWrite(redPin, HIGH);
delay(ledDelay);    digitalWrite(redPin, LOW);           delay(ledDelay);    delay(10);
digitalWrite(bluePin, HIGH);         delay(ledDelay);    digitalWrite(bluePin, LOW);
delay(ledDelay);    digitalWrite(bluePin, HIGH);          delay(ledDelay);
digitalWrite(bluePin, LOW);           delay(ledDelay);    digitalWrite(bluePin, HIGH);
delay(ledDelay);    digitalWrite(bluePin, LOW);
   delay(ledDelay);
    }

void checkPassword(){
 if (password.evaluate())
 {
  if(alarmActive == 0 && alarmStatus ==
0)
   {     activate();
   }
   else if( alarmActive == 1 || alarmStatus
== 1) {     deactivate();
   }  }   else {    invalidCode();
 }
{   password.reset();   lcd.clear();
 lcd.setCursor(1,0);   lcd.print("INVALID CODE! LOL!");   lcd.setCursor(5,2);
lcd.print("TRY AGAIN!");   digitalWrite(greenLED, LOW);   digitalWrite(redLED, HIGH);
delay(2000);   digitalWrite(redLED, LOW);   delay(1000);   displayCodeEntryScreen();
}

void activate()      {
 if((digitalRead(reedPin1) == HIGH) && (digitalRead(reedPin2) == HIGH)){
digitalWrite(redLED, HIGH);    digitalWrite(greenLED, LOW);    digitalWrite(2, HIGH);
lcd.setCursor(0,0);    lcd.print("SYSTEM ACTIVE!");      alarmActive = 1;
password.reset();
   delay(2000);
 } else{    deactivate();
 }
}

void deactivate()
{

 alarmStatus = 0;   digitalWrite(redLED, LOW);
 digitalWrite(greenLED, HIGH);   lcd.clear();
 lcd.setCursor(0,0);
 lcd.print(" SYSTEM DEACTIVATED!");   digitalWrite(speakerPin, LOW);   alarmActive
= 0;   password.reset();   delay(5000);   digitalWrite(relay2, HIGH);   digitalWrite(relay3,
HIGH);
```

```
  displayCodeEntryScreen();
}

void displayCodeEntryScreen()
{  lcd.clear();  lcd.setCursor(0,0);  lcd.print("Enter PIN:");  lcd.setCursor(0,2);
lcd.print("Home Security System 1");  lcd.setCursor(0,3);
}
```

7. CONCLUSION

Today, with the progression of science and technology, home computerization alongside security has turned out to be one of the quickest creating application based innovations on the planet. Mechanized security systems assume a critical job of giving an additional layer of security through client validation to forestall break-ins at passage focuses and furthermore to track unlawful interruptions and spontaneous exercises inside the region of the home.

We effectively built up an arduino based home security system with extra highlights like RFID detecting with Thingspeak.

7.1 Future Scope

With home security as the most great driver in the reception of keen home systems, it's no big surprise that the universe of shrewd locks are developing. The proposed system of Keypad bolt and ultrasonic sensor based home security system to distinguish the burglary or any moving article. The future work of this system will incorporate a concentrated control for the gathering of specific house for current reaction for any sort unapproved section or illicit issues of system.

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