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**END SEMESTER ASSESSMENT (ESA) B.TECH. (CSE)**

**IV SEMESTER**

**UE18CS256 – MICROPROCESSOR AND COMPUTER ARCHITECTURE LABORATORY**

**PROJECT REPORT**

**ON**

BUILDING SECURITY SYSTEM USING ARDUINO

**SUBMITTED BY**

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**ABSTRACT OF THE PROJECT:**

# This project is implemented using Arduino circuit board.

# In this project we made “ BUILDING SECURITY SYSTEM ” using following sensors.

1) Arduino boards

2)LCD screen

3)Buzzer

4)Servo motors.

5) Number Keypad

6)Gas sensor

7)Led lights

8)Bread boards.

# Our project helps to maintain security of the building.

#We have used 2 Arduino boards to implement the security

system. First arduino board is connected with number keypad, servo motor (Main door), buzzer. The second Arduino board is connected with leds (indicator), pair of servo motors (emergency exit doors), gas sensors etc

# We have installed keypad with LCD screen to prompt the user to type his password to enter into the building.

If the user fails to enter the correct password multiple times,

the system will lock and the door remains closed.

# If any intruder tries to enter into the building and types incorrect password multiple times, then the system buzzer starts to make a emergency sound.

# If the building catches fire accidently or by terrorists (manually) the gas sensor will sense the smoke from the building and this will automatically opens the exit door,

so that the people who were residing inside the building can escape out from the building and save there lives.

**CIRCUIT DIAGRAM:**

**Diagram

Description automatically generated**

**ARDUINO CODE:**

**#include <LiquidCrystal.h>**

**#include <Keypad.h>**

**#include <Servo.h>**

**// initialize the library with the numbers of the interface pins**

**LiquidCrystal LCD( 8, 9, 10, 11, 12, 13 ) ;**

**Servo servo ;**

**const int buzzerPin = 14 ;**

**const int servoPin = 15 ;**

**const byte ROWS = 4, COLS = 4 ;**

**// Define the Keymap**

**char keys[ROWS][COLS] = {**

**{'1','2','3','A'},**

**{'4','5','6','B'},**

**{'7','8','9','C'},**

**{'\*','0','#','D'}**

**} ;**

**byte rowPins[ROWS] = { 16, 17, 2, 3 } ;**

**byte colPins[COLS] = { 4, 5, 6, 7 } ;**

**// Create the Keypad**

**Keypad kpd = Keypad( makeKeymap(keys), rowPins, colPins, ROWS, COLS ) ;**

**char password[16], string[16] ;**

**int flag\_h\_setpassword = 1, flag\_inputpassword = 0, flag\_inputstring = 0, flag\_opendoor = 1, flag\_state = 0, flag\_remoteopen = 0, flag\_lockdown = 0 ;**

**int count = 0, trial\_count=0, pos = 0, state = 0 ;**

**// flag\_setpassword = flag for setting the password,**

**// flag\_stringinput = flag for taking input the string,**

**void setup() {**

**for(int k=8 ; k<14 ; k++) {**

**pinMode(k,OUTPUT) ; //pins 8-14 are enabled as output**

**}**

**LCD.begin(16, 2) ; //initializing LCD**

**// for the Peizo-buzzer**

**//Serial.begin(8600) ;**

**pinMode(buzzerPin, OUTPUT) ;**

**// for Servo-Motor**

**//pinMode(servoPin, OUTPUT) ;**

**servo.attach(servoPin) ;**

**// Now, the Welcome message...**

**LCD.setCursor(0,0) ;**

**LCD.print(" WELCOME !!") ;**

**LCD.setCursor(0,1) ;**

**LCD.print("Set a Password :") ;**

**InitializePassword(), InitializeString() ;**

**CloseDoor() ;**

**}**

**void loop() {**

**if( Serial.available() > 0 ) {**

**state = Serial.read() ;**

**flag\_state = 0 ;**

**}**

**//if( state != 0 ) flag\_lockdown = 1 ;**

**// ##### Keypad #####**

**if( trial\_count < 3 ) {**

**char key = kpd.getKey() ; //storing pressed key value in a char**

**if( key != NO\_KEY ) {**

**if( flag\_h\_setpassword == 1 ) {**

**H\_SetPassword() ;**

**}**

**if( key == '\*' ) {**

**if( flag\_inputpassword == 1 ) {**

**InitializePassword(), H\_SetPassword() ;**

**}**

**else if( flag\_inputstring = 1 ) {**

**InitializeString(), H\_EnterPassword() ;**

**}**

**}**

**else if( key == '#' ) {**

**if( flag\_inputpassword == 1 && count > 0 ) {**

**flag\_inputpassword = 0 ;**

**password[count] = '\0' ;**

**H\_EnterPassword() ;**

**}**

**else if( flag\_inputstring == 1 && count > 0 ) {**

**flag\_inputstring = 0 ;**

**string[count] = '\0' ;**

**if( Compare\_Password\_and\_String() == 1 ) {**

**LCD.clear() ;**

**LCD.print("\*\*\*VERIFIED!!\*\*\*") ;**

**Serial.println("UNLOCKED !!") ;**

**trial\_count = 0 ;**

**for( int i=0 ; i<3 ; ++i ) {**

**tone(buzzerPin, 500, 200) ;**

**delay(230) ;**

**tone(buzzerPin, 100, 200) ;**

**delay(300) ;**

**OpenDoor() ;**

**}**

**}**

**else {**

**LCD.clear() ;**

**LCD.print("Wrong Password !") ;**

**Serial.println("Someone unsuccessfully attempted to open the lock !") ;**

**++trial\_count ;**

**tone(buzzerPin, 100, 1000) ;**

**delay(1000) ;**

**H\_EnterPassword() ;**

**}**

**}**

**}**

**else if( flag\_inputpassword == 1 || flag\_inputstring == 1 ) {**

**LCD.print(key) ;**

**delay(100) ;**

**LCD.setCursor(count,1) ;**

**LCD.print('\*') ;**

**if( flag\_inputpassword == 1 ) password[count] = key ;**

**else if( flag\_inputstring == 1 ) string[count] = key ;**

**++count ;**

**}**

**}**

**}**

**else {**

**LCD.clear() ;**

**LCD.setCursor(0,0) ;**

**LCD.print("SYSTEM LOCKDOWN!") ;**

**tone(buzzerPin, 1000, 1000) ;**

**delay(1500) ;**

**flag\_lockdown = 1 ;**

**}**

**}**

**void InitializePassword() {**

**for( int i=0 ; i<16 ; ++i )**

**password[i] = 0 ;**

**}**

**void InitializeString() {**

**for( int i=0 ; i<16 ; ++i )**

**string[i] = 1 ;**

**}**

**void H\_SetPassword() {**

**LCD.clear() ;**

**LCD.setCursor(0,0) ;**

**LCD.print("Set a Password :") ;**

**LCD.setCursor(0,1) ;**

**flag\_h\_setpassword = 0 ;**

**flag\_inputpassword = 1, count = 0 ;**

**}**

**void H\_EnterPassword() {**

**CloseDoor() ;**

**LCD.clear() ;**

**LCD.setCursor(0,0) ;**

**LCD.print("Enter Password :") ;**

**LCD.setCursor(0,1) ;**

**flag\_inputstring = 1, count = 0 ;**

**}**

**int Compare\_Password\_and\_String() {**

**int i ;**

**for( i=0 ; password[i]!='\0' && string[i]!='\0' ; ++i ) {**

**if( password[i] != string[i] )**

**return 0 ;**

**}**

**if( password[i] == '\0' && string[i] == '\0' )**

**return 1 ;**

**else return 0 ;**

**}**

**void OpenDoor() {**

**if( flag\_opendoor == 1 )**

**return;**

**for( pos=15 ; pos<=100 ; ++pos ) {**

**servo.write(pos) ;**

**delay(15) ;**

**}**

**flag\_opendoor = 1 ;**

**}**

**void CloseDoor() {**

**if( flag\_opendoor == 0 )**

**return;**

**for( pos=100 ; pos>=15; --pos ) {**

**servo.write(pos) ;**

**delay(15) ;**

**}**

**flag\_opendoor = 0 ;**

**}**

**2 Aurdino**

**#include<Servo.h>**

**int sensor=0;**

**Servo m1;**

**Servo m2;**

**int pos1 = 0;**

**int pos2 = 0;**

**int flago1=0;**

**int flago2=0;**

**void setup() {**

**m1.attach(9);**

**m2.attach(10);**

**pinMode(13, OUTPUT);**

**Serial.begin(9600);**

**}**

**void loop() {**

**sensor = analogRead(A0);**

**if (sensor > 250)**

**{**

**digitalWrite(13, HIGH);**

**Serial.println(sensor);**

**open1();**

**Serial.print("FIRE !! Please Exit ");**

**}**

**else {**

**digitalWrite(13, LOW);**

**close1();**

**}**

**}**

**void open1()**

**{**

**m1.write(90);**

**m2.write(90);**

**}**

**void close1()**

**{**

**m1.write(0);**

**m2.write(0);**

**}**

**SCREEN SHOTS OF THE OUTPUT:**

**welcome.set password**

**Diagram

Description automatically generated**

**Set password**

enter password

Diagram

Description automatically generated

Verified as correct password

Diagram

Description automatically generated

Wrong password

Diagram

Description automatically generated

System lockdown if wrong password entered 3 times

**Diagram

Description automatically generated**

**REFERENCES**

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**<https://www.arduino.cc/en/guide/introduction>**

**<https://learn.sparkfun.com/tutorials/what-is-an-arduino/all>**

**https://www.seeedstudio.com/blog/2019/12/04/introduction-to-the-arduino-what-is-arduino/**