Vellore Institute of Technology
(Deemed to be University under section 3 of UGC Act, 1956)

SCHOOL OF ELECTRONICS AND COMMUNICATION ENGINEERING (SENSE)

HOME SAFETY AND SECURITY SYSTEM

LAB SL.NO.	LAB SLOT	THEORY SLOT	REG.NO.	NAME	MOBILE NO.
1	L53+L54	E1	19BEC0008	UDHISI VEERA NAGA TRISAI	9347389696
15	L53+L54	E1	19BEC0478	VENKATA UJWALA	9704221682
17	L53+L54	E1	19BEC0530	P V S SREE LALITHA	7812069998
22	L53+L54	E1	19BEC0623	Y VENKATA DURGA SAI	8978895595
27	L53+L54	E1	19BEC0740	KATAKAM SRIKAR	9491011025

Project Report of

ECE 3003
Microcontroller and its Applications

Submitted to

Faculty: Dr.Dhanabal.R **Signature:**

Date:13/02/2021

Slot :L53+L54

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ABSTRACT

In the past, there have been instances of burglaries, gas leakages and fire breakouts in any normal household.These scenarios have increased the demand for a SMART system which keeps man's mind at peace in case of such unfortunate incidents.In this project, we are looking at 2 aspects for a SMART Home- Safety and Security.Using the 8051 Microcontroller as a base, we try to achieve the Safety aspect using a Flame Detector for fire detection.Security of our belongings and our loved ones is also a major requirement. This aspect is taken care of by the RFID Key and Passcode System for door lock system and a PIR Sensor for Intruder Detection.Using the Proteus software for simulation, we were able to rightly detect an intruder, a small flame which could have led to a major fire. Our RFID Key and passcode system also works correctly with the right user.

INTRODUCTION

Though the world today is racing towards progress, there are many fundamental problems on a more basic level that need to be addressed before moving on to bigger issues. With the growing use of technologies like Artificial Intelligence and Internet of Things, man has opened the gates for the appropriate usage of automation in almost every phase of his life.

One of the basic necessities of any human being is shelter and homes are also what make man feel safe. But in recent years, a lot of issues have attempted to endanger homes and the people living inside them. Fire accidents in houses due to gas leakages or any other cause lead to a lot of loss in property and valuables, and in many cases, deaths or casualties. Many times, situations in which one or more people are left inside the fire while a few others manage to escape and in the chaos of the circumstances, the thought of checking for every member skips the minds of the ones who manage to escape in time. Due to this, many lives have been lost and hundreds of people were left alive with about 50-90% burns on their body.

Although fires are accidents of large destruction, there exists another big issue. Thefts, robberies,house looting and unauthenticated break-ins have become so common these days that it is very difficult for normal people to leave valuables in their own houses. In spite of various industries working on security lockers, patterned locks for doors, technology is also being used in the wrong way by the robbers to either break into any house or even find tricks to open the safest of all lockers and loot all money and valuables in the house. Robberies have come to such a state that not only cash and jewellery but also appliances, furniture and other resources are being prone to thefts.

As it is the responsibility of every growing adult to try and do something for the society that we have got something from, we have also tried to do something of our capability and tried to address these two of the existing problems.In this project, we have attempted to try and resolve the two burning problems of the world by creating a "Home safety and security system" using the softwares Proteus and Keil Microvision. We have tried to resolve all possible test cases by implementing a C program with the circuit on proteus.

LITERATURE SURVEY

S.No	Paper title	Name of the Conference/journal Year	Technology used
1.	Home security and safety system	2018 IJRAR January 2019, Volume 6, Issue 1	Here used LPC812 Microprocessor and PIR and Gas sensor are used.
2.	Microcontroller based Home Security System with Remote Monitoring	International Conference on Electronic Design and Signal Processing (ICEDSP) 2012	Here used ATMEGA16 and IR,Temperature Sensor
3.	Microcontroller Based Home Automation System With Security	(IJACSA) International Journal of Advanced Computer Science and Applications, Vol. 1, No. 6, December 2010	Here AT89S52 and Temperature and Fire and smoke sensor is used.
4.	Design and implementation home security system and monitoring by using wireless sensor networks wsn/iot	International Journal of Electrical and Computer Engineering (IJECE) Vol. 10, No. 3, June 2020, pp. 2617~2624	Here used an ip camera ,lcd servo motor,NRF24l01
5.	SAFETY AND SECURITY OF THE PERSONAL BELONGINGS USING MICROCONTROLLER	ISSN 1999-8716 Vol. 08, No. 02, pp. 28-37, June 2015 Diyala Journal of Engineering Sciences	Here 8051 microcontroller and cameras and GSM module used.
6.	Development of Rome Monitoring System with Integration of Safety and Security Modules	2012 IEEE Conference on Sustainable Utilization and Development in Engineering and Technology (STUDENT) Universiti Tunku Abdul Rahman, Kuala Lumpur, Malaysia. 6 - 9 October 2012	Here zigbee,bluetooth and 802.11 protocols are used.
7.	Advanced Anti-Theft & Home safety and security system	International research journal of engineering and technology (IRJET) Volume:05 Issue:03 Mar-2018	Here ATmega328 microcontroller and smoke,fire sensors and GSM modem and DC

			motors are used.
8.	Microcontroller based home security system with GSM technology	Open Journal of Safety Science and Technology Vol.05 No.02(2015), Article ID:57161,7 pages 10.4236/ojsst.2015.52007	Here two PIC18F452 microcontrollers and GSM module and bluetooth and buzzer are used.
9.	Microcontroller Based Home Security and Load Controlling Using Gsm Technology	I. J. Computer Network and Information Security, 2015, 4, 29-36 Published Online March 2015 in MECS (http://www.mecs-press.org/) DOI: 10.5815/ijcnis.2015.04.04	Here 8051 microcontroller fire sensing and GSM technology and also it detects motion by using the technology.
10.	Implementation of Home Security System using GSM module and Microcontroller	ISSN Abhishek S. Parab et al, / (IJCSIT) International Journal of Computer Science and Information Technologies, Vol. 6 (3) , 2015, 2950-2953	Here 8051 microcontroller and GSM module are used.

DRAWBACKS IN THE EXISTING WORK

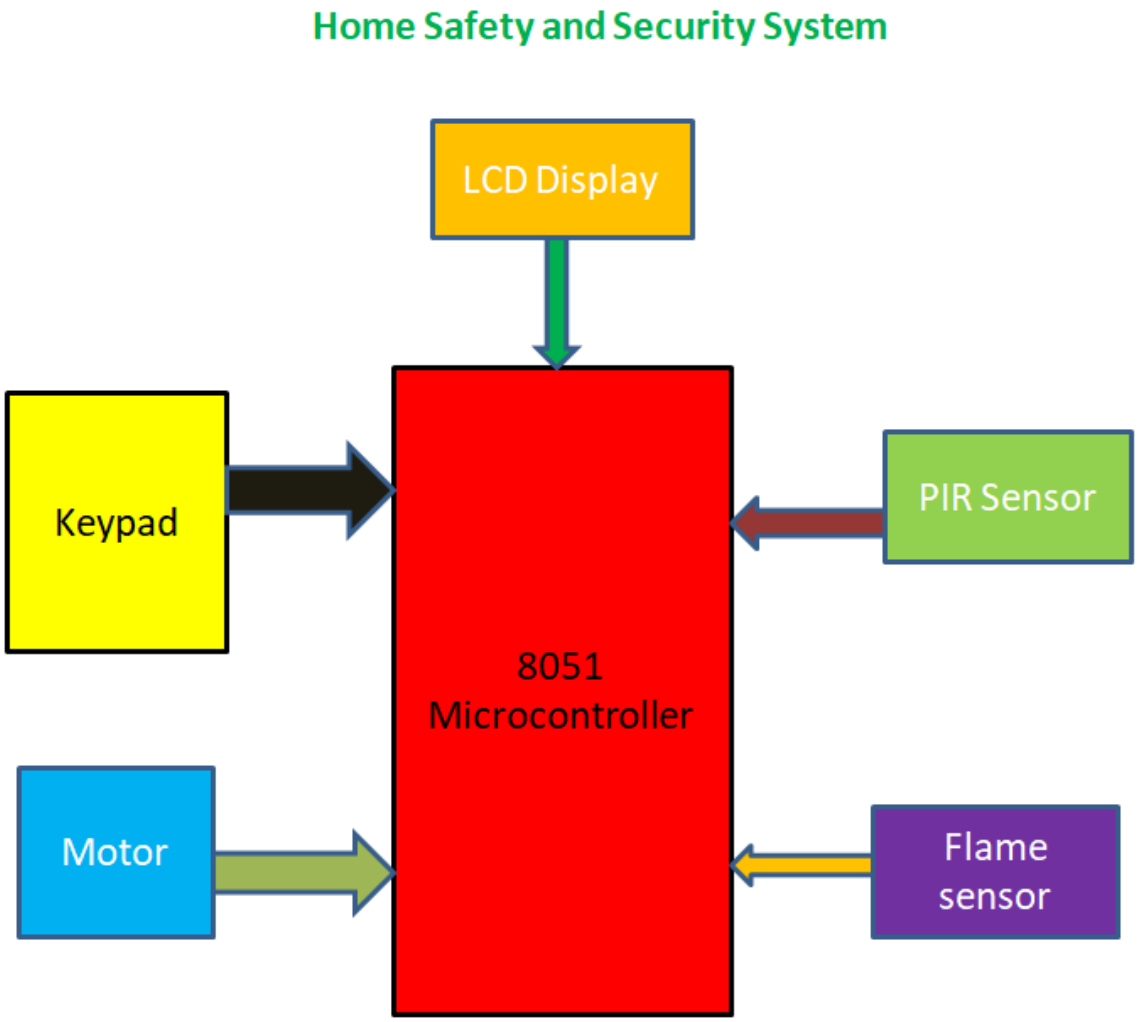
In the existing work the major drawback is that most of the home automation systems are unable to detect whether a theft or a gas cylinder has leaked to which has led to a fire inside the home. In other works many security purposes using GSM module and wifi module are implemented.we didn't implement that type of work or activity.we didn't use the GAS sensor to detect the fire, in place we used flame sensor to detect the fire and give alert in home or to a particular place using an lcd display and a buzzer sound.

PROPOSED WORK

In this project we have taken a smart solution to the problems from the existing work.
The basic idea for taking this idea is to reduce the problem of allowing intruders inside the home. By using a 8051 microcontroller we can operate the entry of an individual or authorised person into the home.
we have taken like door locking and like password detectors by using RFID method .We proposed just using RFID technology and fire detection and anyone

inside the home or not and gives indication sound by buzzer and we are using the servo motors to operate the working condition and stability of real time monitoring in our daily life.

BLOCK DIAGRAM



Components required:

- ➢8051 Microcontroller (AT89C51)
- ➢PIR SENSOR
- ➢FLAME SENSOR
- ➢KEYPAD
- ➢MOTOR

➢LCD DISPLAY

Figure 1:8051 microcontroller

Figure 2: PIR Sensor

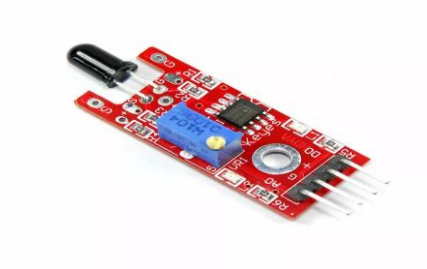


Figure 3: Flame sensor

Figure 4: Keypad

Figure 5: LCD Display

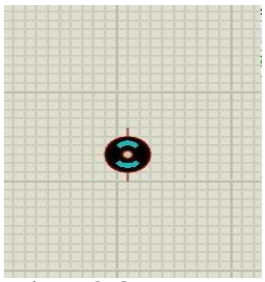


Figure 6: Servo Motor

DESCRIPTION ABOUT COMPONENTS:

1.PIR sensor

PIR sensors allow you to sense motion, almost always used to detect whether a human has moved in or out of the sensor's range. They are small, inexpensive, low-power, easy to use and don't wear out. For that reason they are commonly found in appliances and gadgets used in homes or businesses. They are often referred to as PIR, "Passive Infrared", "Pyroelectric", or "IR motion" sensors.

2.Flame sensor

A flame-sensor is one kind of detector which is mainly designed for detecting as well as responding to the occurrence of a fire or flame. The flame detection response can depend on its fitting. It includes an alarm system, a natural gas line, propane & a fire suppression system. The response of these sensors is faster as well as more accurate compared with a heat/smoke detector because of its mechanism while detecting the flame.

3.LCD

LCD or Liquid Crystal Display is a display device which is commonly used in hardware projects. It can be configured in various ways according to our needs. This can be done by sending commands to the LCD through the microcontroller. The data is also displayed on it through the function in the code which sends data to the LCD to display on it.

4. 8051 Microcontroller AT89C51

The AT89C51 is an age-old 8-bit microcontroller from the Atmel family. It works with the popular 8051 architecture and hence is used by most beginners till date. It is a 40 pin IC package with 4Kb flash memory. It has four ports and all together provide 32 Programmable GPIO pins. It does not have an in-built ADC module and supports only USART communication.

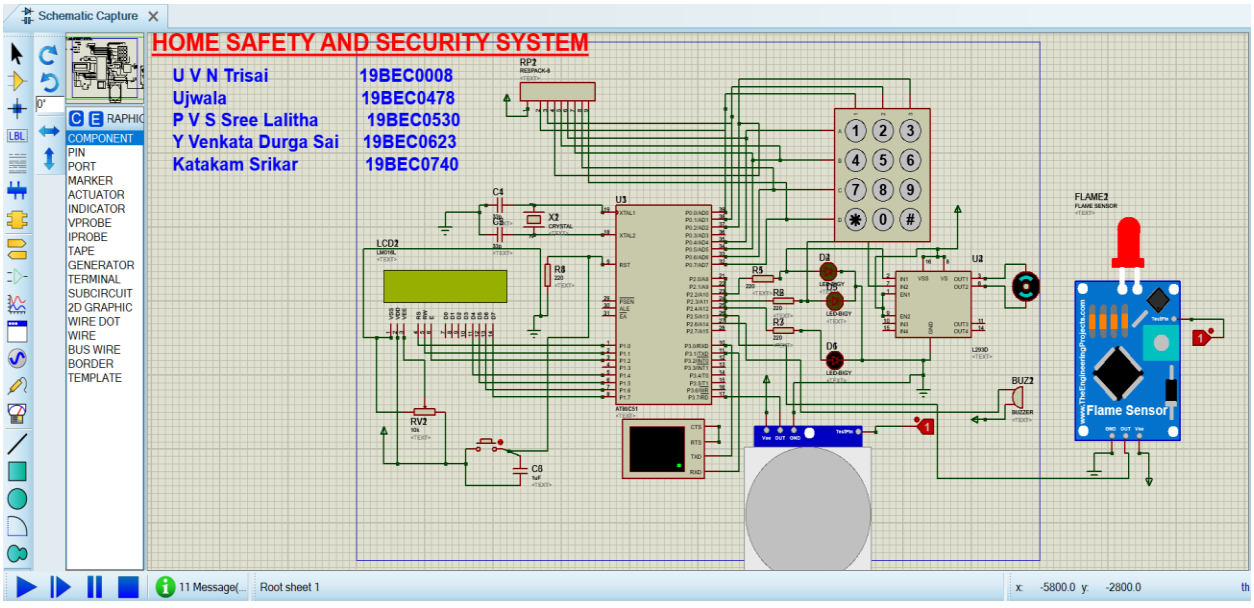
5.Keypad

A keypad is a set of buttons arranged in a block or pad which bear digits, symbols or alphabetical letters.Matrix keypad use a combination of four rows and four columns to provide button states to the host device, typically a microcontroller. Underneath each key is a push button, with one end connected to one row, and the other end connected to one column.

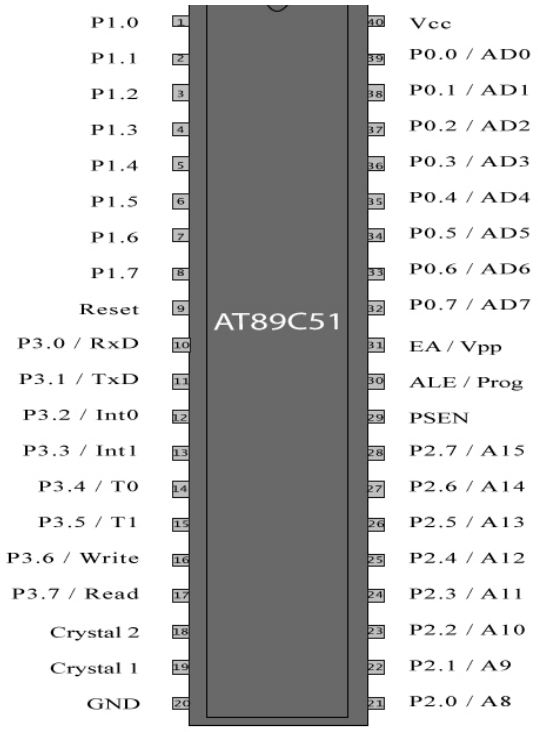
6.Servo motor

A servomotor is a rotary actuator or linear actuator that allows for precise control of angular or linear position, velocity and acceleration. It consists of a suitable motor coupled to a sensor for position feedback.

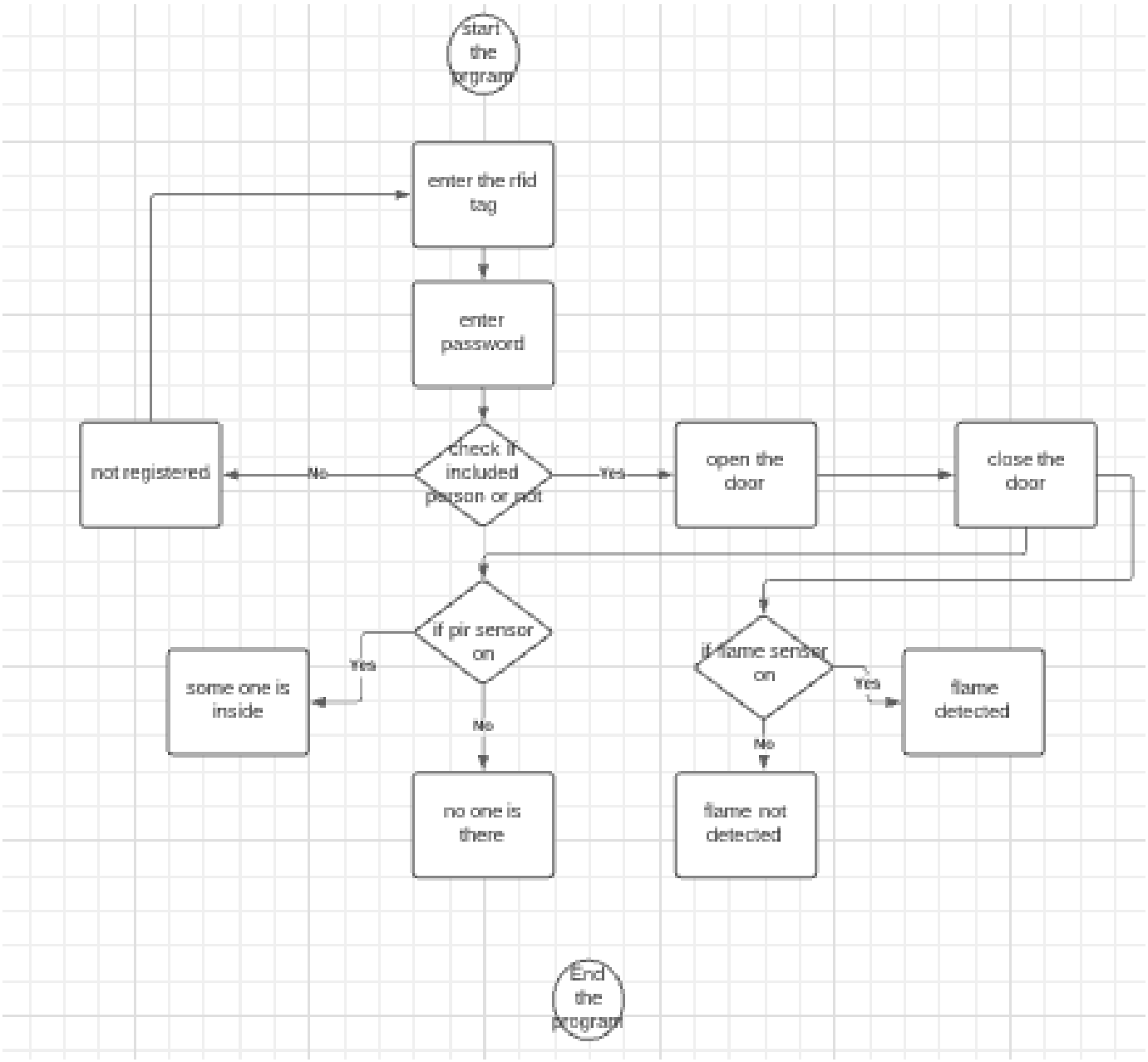
CIRCUIT DIAGRAM



PIN DIAGRAM

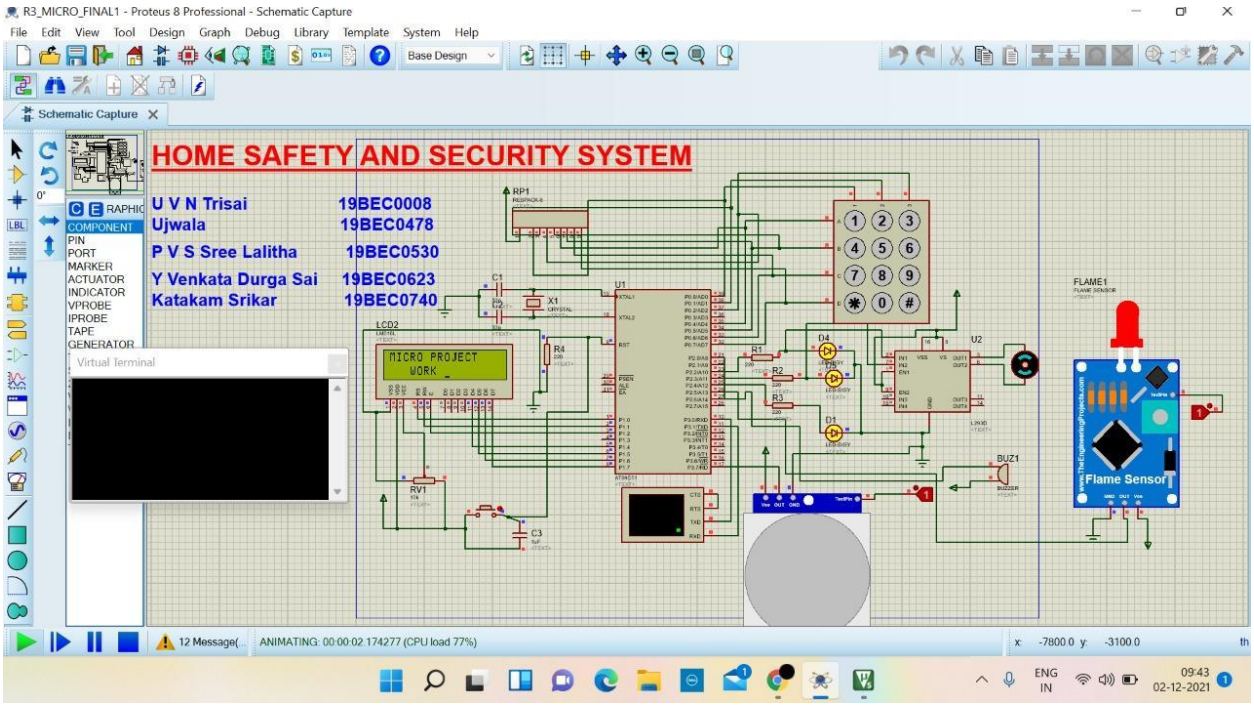


FLOWCHART OF THE ALGORITHM

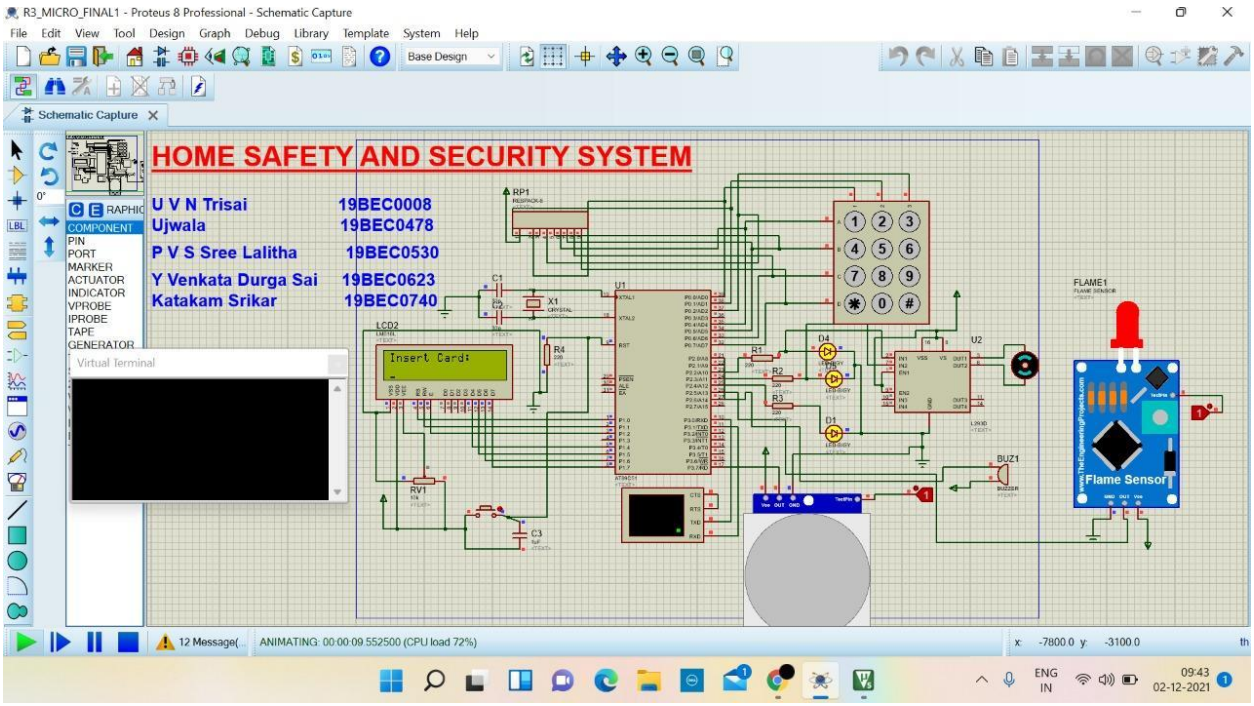


Results and Discussions

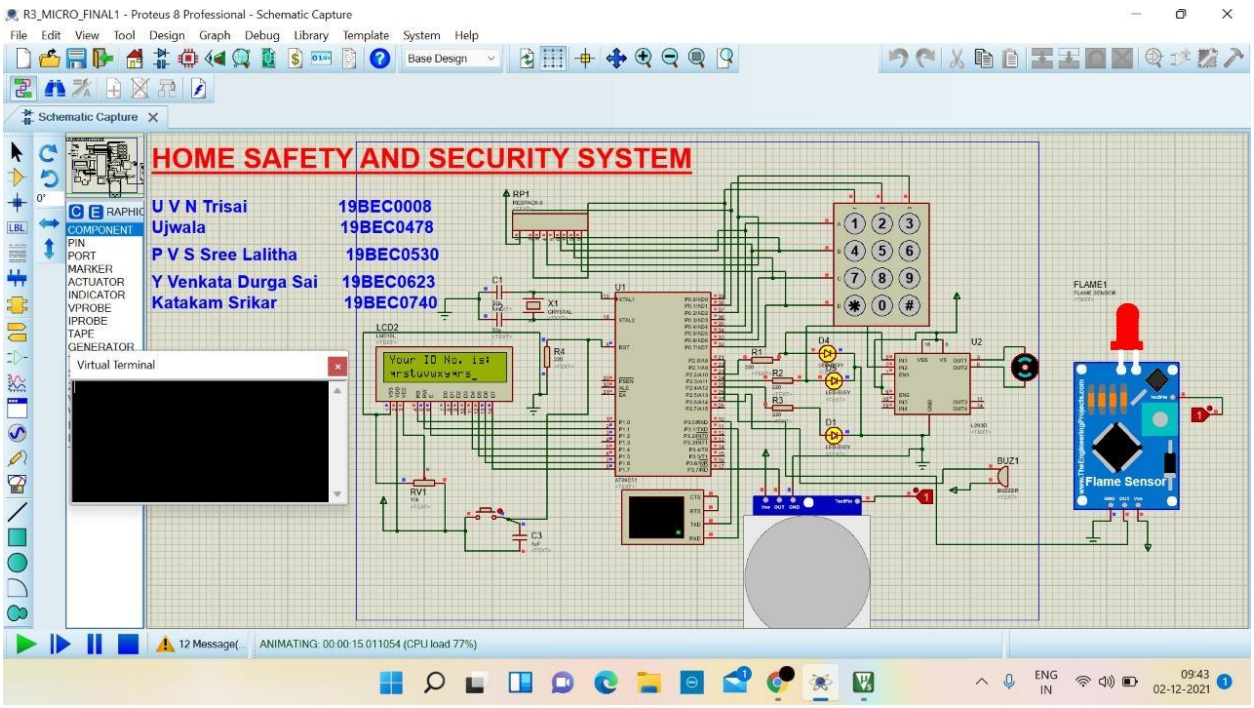
1. Start of the project



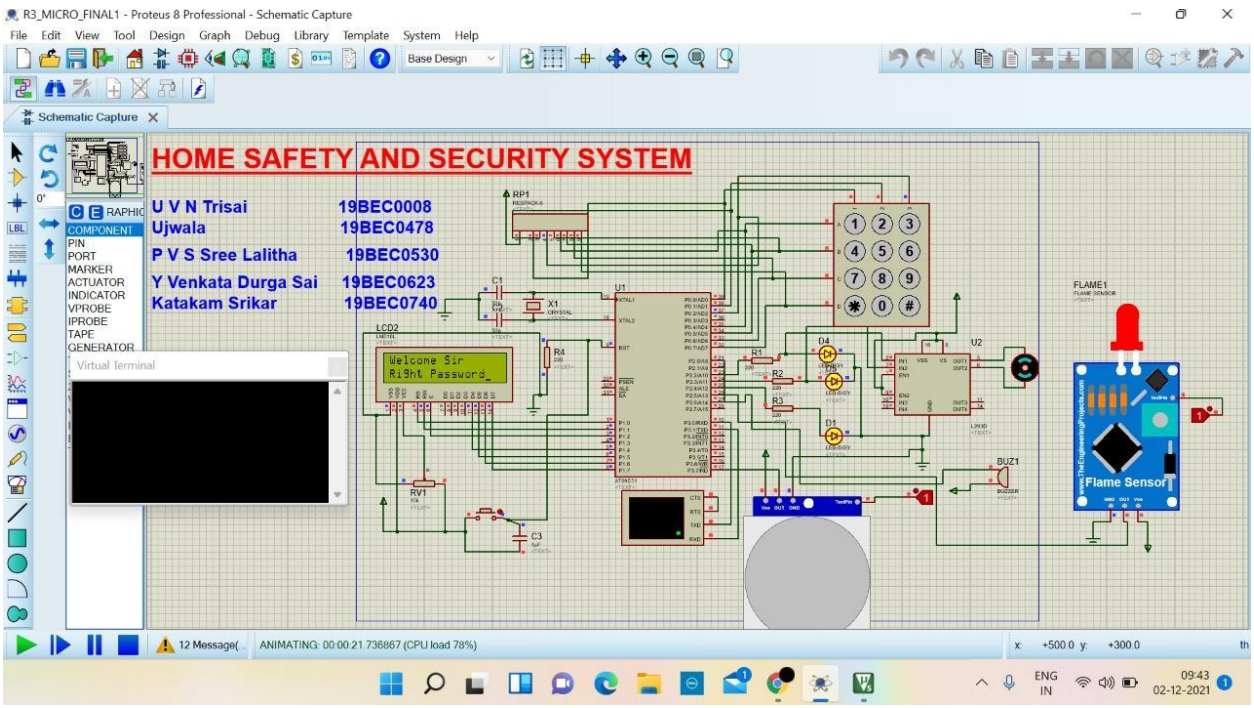
2.Input of RFID Tag id



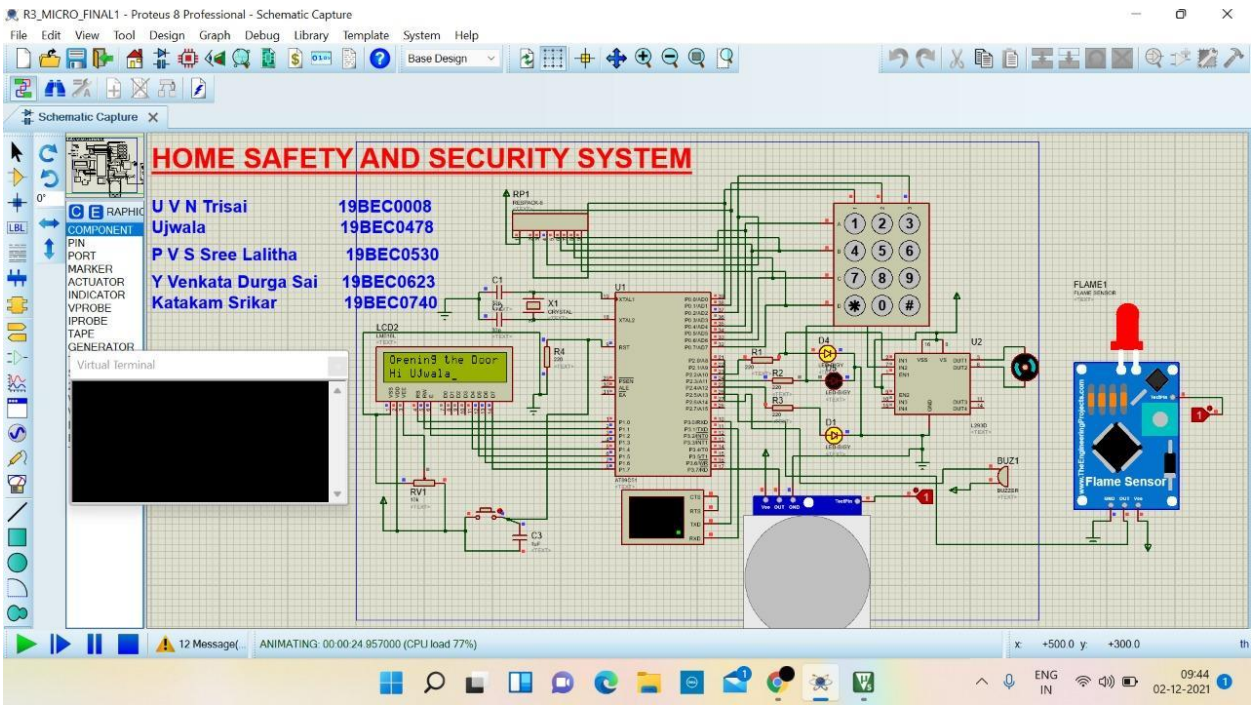
3. Input of password



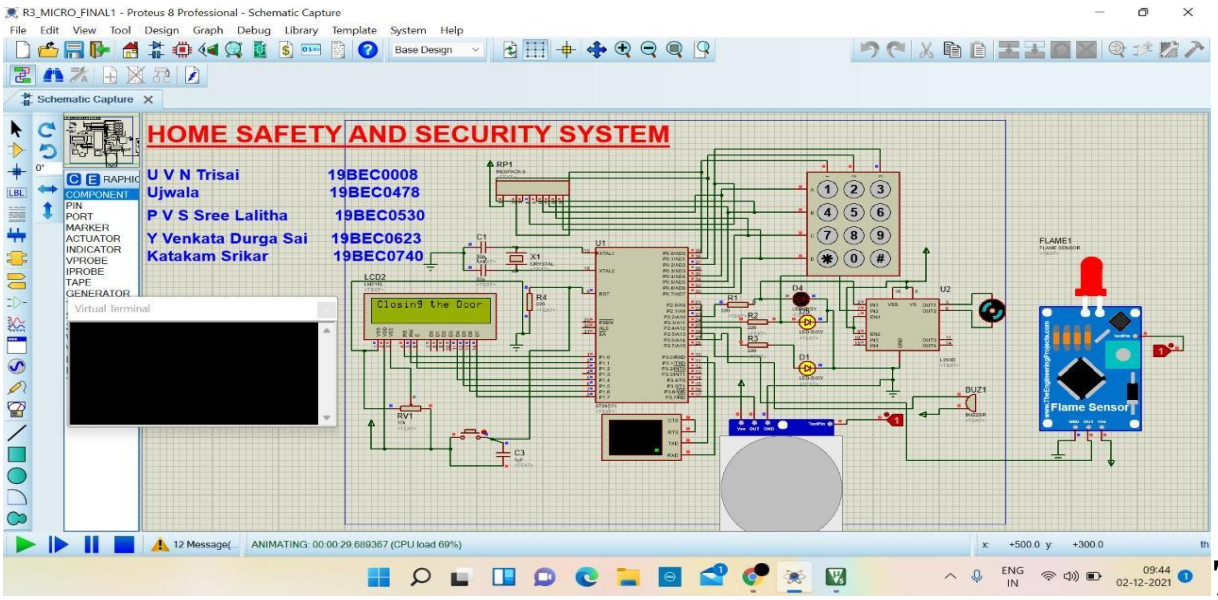
4.Display of right password in lcd display



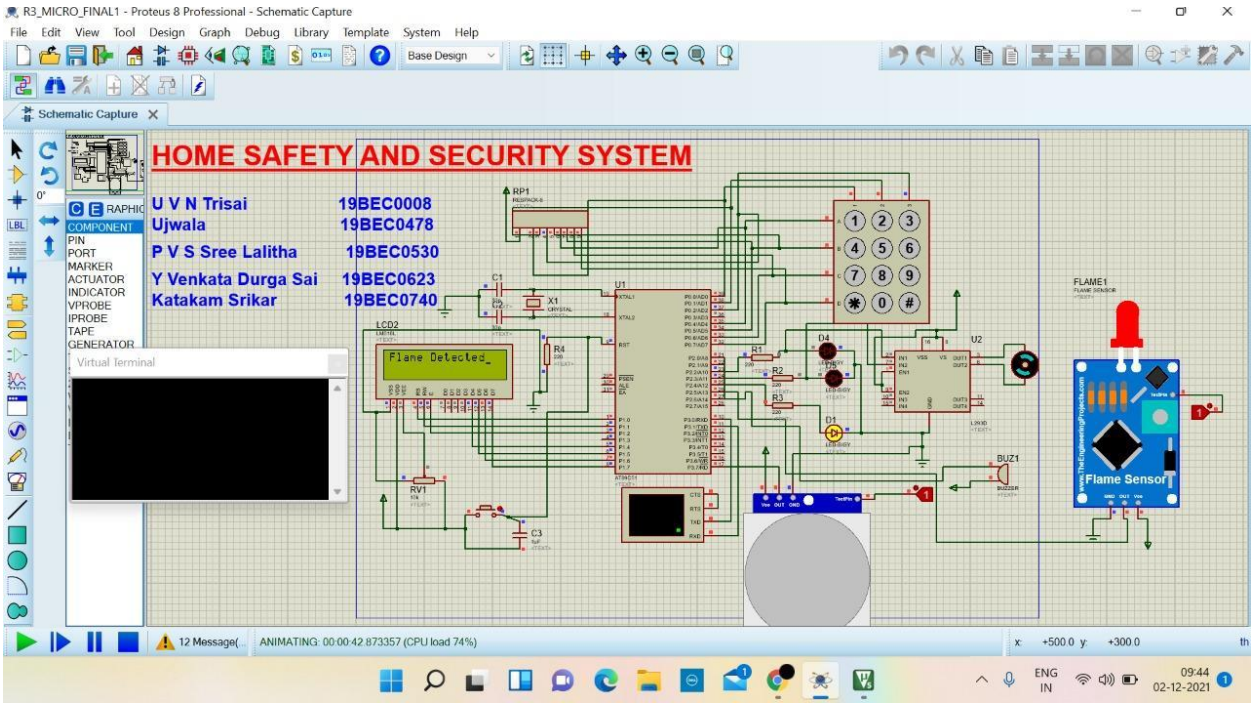
5.Servo motor runs and opens the door



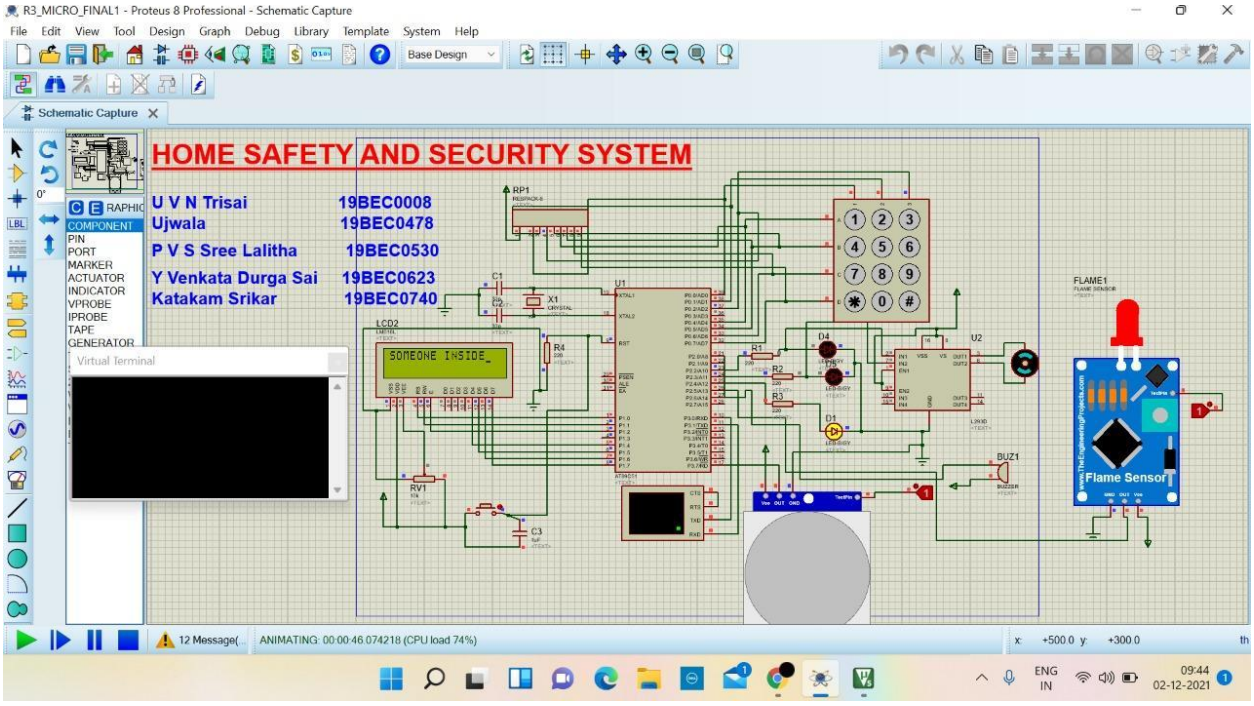
6.Closing of door



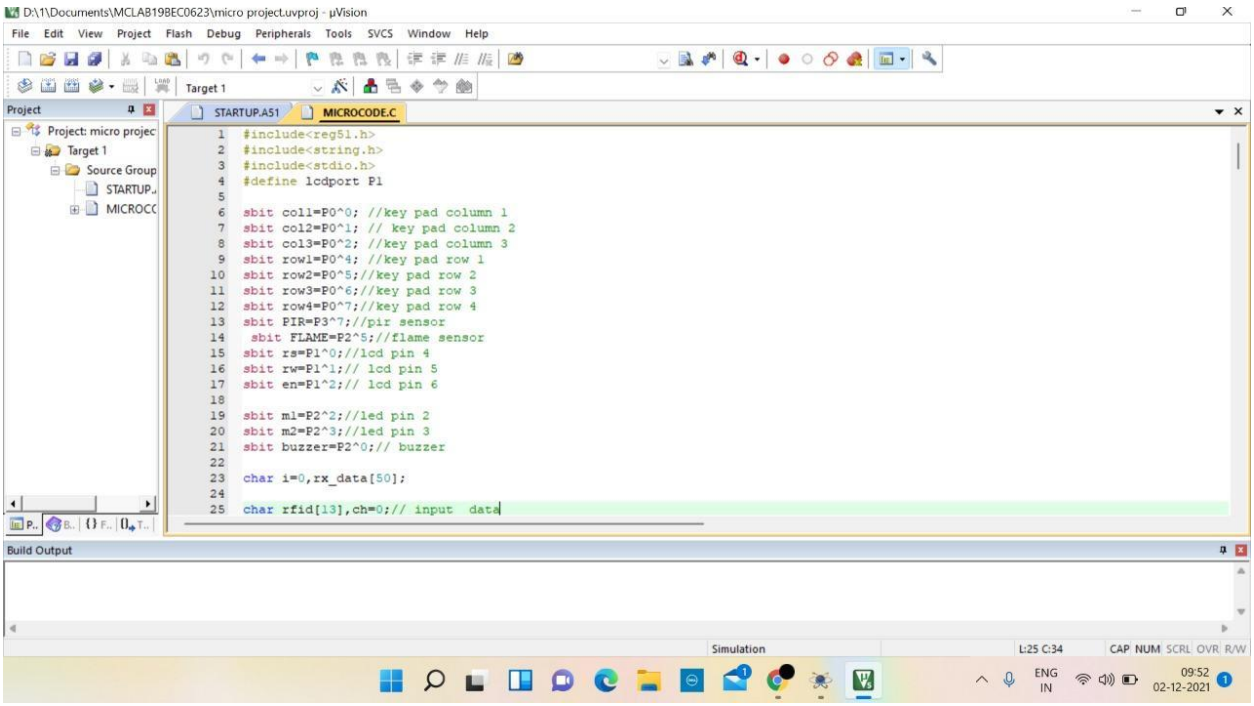
7. Flame sensor activated



8. Pir sensor activated



APPENDIX/CODE: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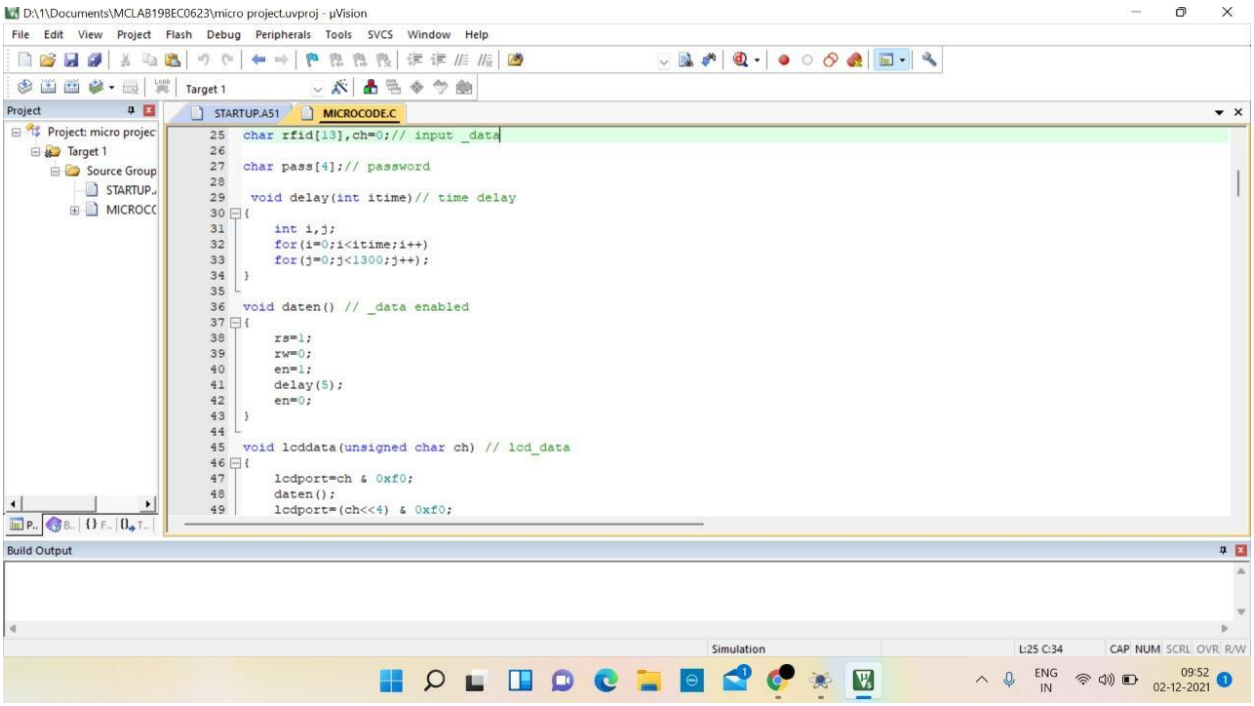
File Edit View Project Flash Debug Peripherals Tools SVCS Window Help
Target 1
Project
Project: micro projec
Target 1
Source Group
STARTUP.
MICROCC
STARTUP.A51
MICROCODE.C
1 #include<reg51.h>
2 #include<string.h>
3 #include<stdio.h>
4 #define lcdport P1
5
6 sbit col1=P0^0; //key pad column 1
7 sbit col2=P0^1; // key pad column 2
8 sbit col3=P0^2; //key pad column 3
9 sbit row1=P0^4; //key pad row 1
10 sbit row2=P0^5;//key pad row 2
11 sbit row3=P0^6;//key pad row 3
12 sbit row4=P0^7;//key pad row 4
13 sbit PIR=P3^7;//pir sensor
14 sbit FLAME=P2^5;//flame sensor
15 sbit rs=P1^0;//lcd pin 4
16 sbit rw=P1^1;// lcd pin 5
17 sbit en=P1^2;// lcd pin 6
18
19 sbit m1=P2^2;//led pin 2
20 sbit m2=P2^3;//led pin 3
21 sbit buzzer=P2^0;// buzzer
22
23 char i=0,rx_data[50];
24
25 char rfid[13],ch=0;// input data
Build Output
Simulation
L:25 C:34
CAP NUM SCRL OVR R/W
ENG
IN
09:52
02-12-2021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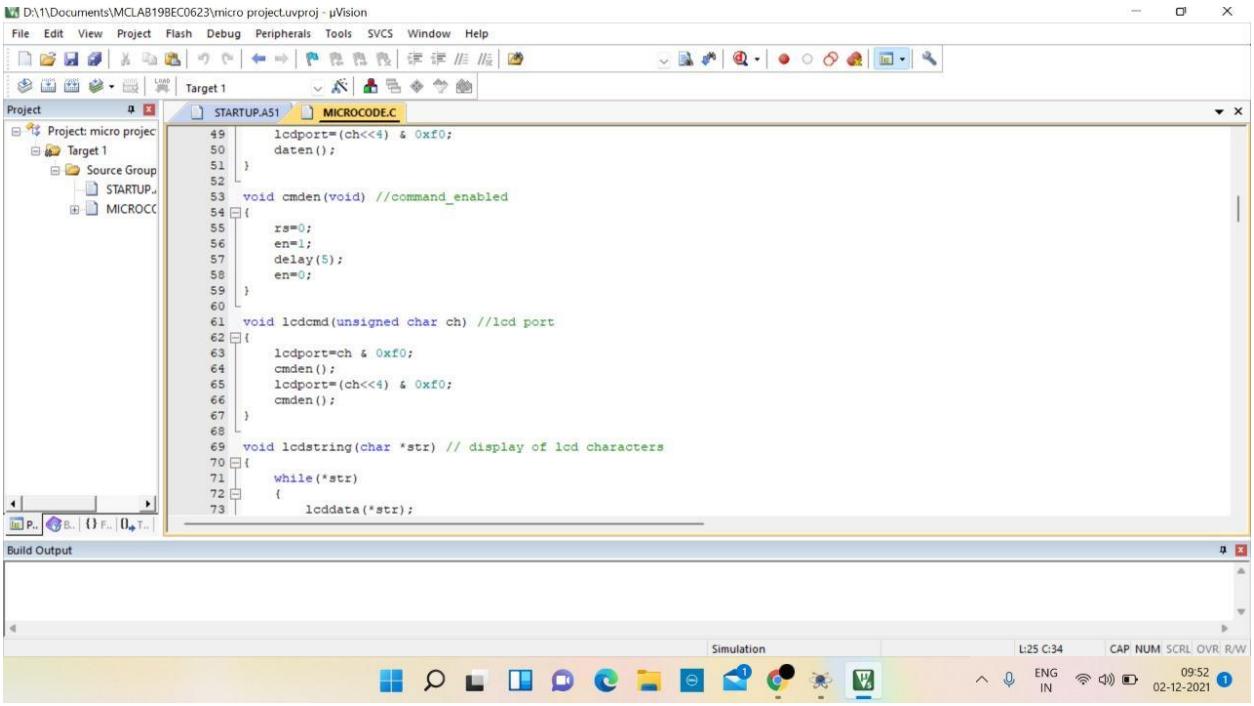
Target 1
Project
Project: micro projec
Target 1
Source Group
STARTUP.
MICROCC
STARTUP.A51
MICROCODE.C
25 char rfid[13],ch=0;// input _data
26
27 char pass[4];// password
28
29 void delay(int itime)// time delay
30 {
31 int i,j;
32 for(i=0;i<itime;i++)
33 for(j=0;j<1300;j++);
34 }
35
36 void daten() // _data enabled
37 {
38 rs=1;
39 rw=0;
40 en=1;
41 delay(5);
42 en=0;
43 }
44
45 void lcddata(unsigned char ch) // lcd_data
46 {
47 lcdport=ch & 0xf0;
48 daten();
49 lcdport=(ch<<4) & 0xf0;
Build Output
Simulation
L:25 C:34
CAP NUM SCRL OVR R/W
ENG
IN
09:52
02-12-2021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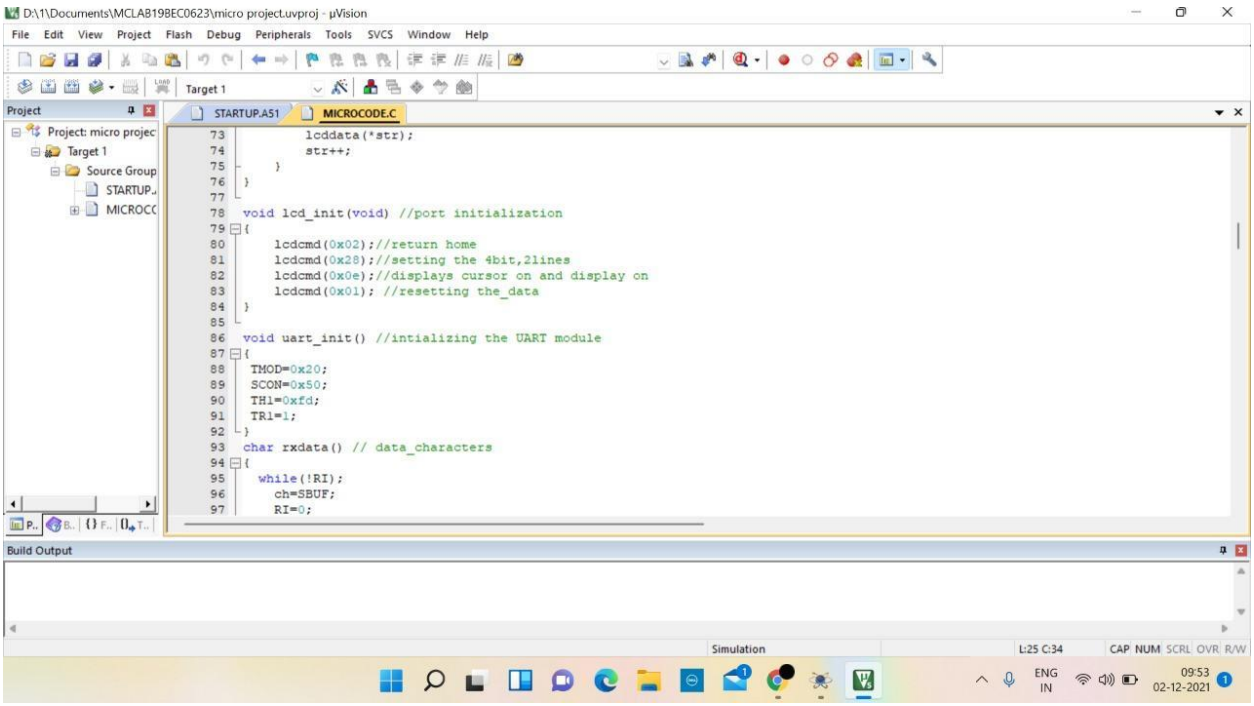
Target 1
Project
Project: micro projec
Target 1
Source Group
STARTUP.
MICROCC
STARTUP.A51
MICROCODE.C
49 lcdport=(ch<<4) & 0xf0;
50 daten();
51 }
52
53 void cmden(void) //command_enabled
54 {
55 rs=0;
56 en=1;
57 delay(5);
58 en=0;
59 }
60
61 void lcdcmd(unsigned char ch) //lcd port
62 {
63 lcdport=ch & 0xf0;
64 cmden();
65 lcdport=(ch<<4) & 0xf0;
66 cmden();
67 }
68
69 void lcdstring(char *str) // display of lcd characters
70 {
71 while(*str)
72 {
73 lcddata(*str);
Build Output
Simulation
L:25 C:34
CAP NUM SCRL OVR R/W
ENG
IN
09:52
02-12-2021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Target 1
Source Group
STARTUP.
MICROCC
STARTUP.A51
MICROCODE.C
73 lcddata(*str);
74 str++;
75 }
76 }
77
78 void lcd_init(void) //port initialization
79 {
80 lcdcmd(0x02);//return home
81 lcdcmd(0x28);//setting the 4bit,2lines
82 lcdcmd(0x0e);//displays cursor on and display on
83 lcdcmd(0x01); //resetting the_data
84 }
85
86 void uart_init() //intializing the UART module
87 {
88 TMOD=0x20;
89 SCON=0x50;
90 TH1=0xfd;
91 TR1=1;
92 }
93 char rxdata() // data_characters
94 {
95 while(!RI);
96 ch=SBUF;
97 RI=0;
Build Output
Simulation
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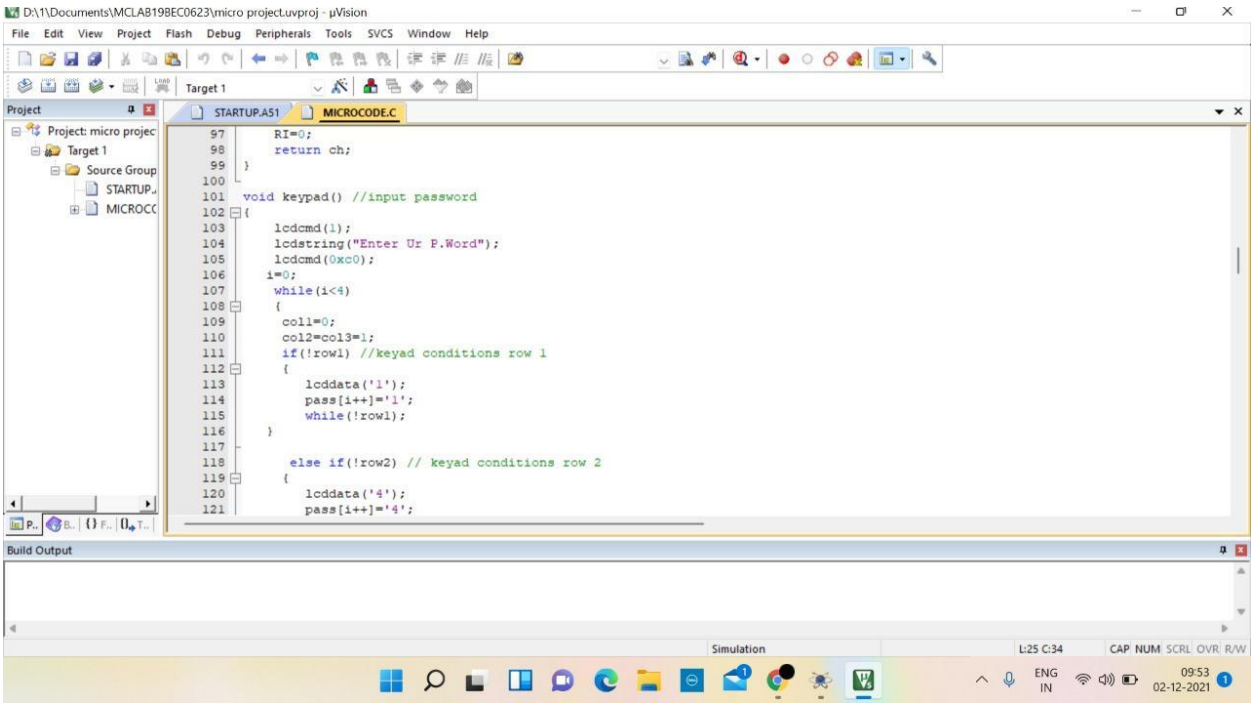
CAP NUM SCRL OVR R/W
ENG
IN
09:53
02-12-2021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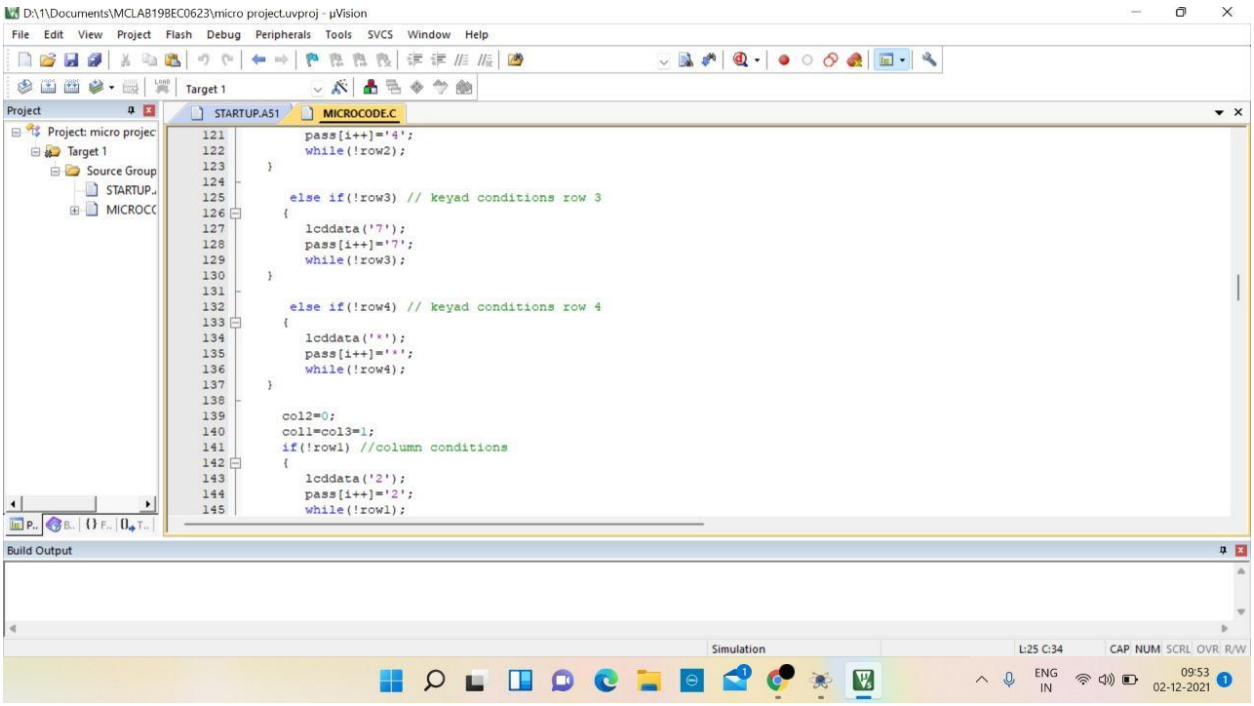
Project: micro projec
Target 1
Source Group
STARTUP.
MICROCC
STARTUP.A51
MICROCODE.C
97 RI=0;
98 return ch;
99 }
100
101 void keypad() //input password
102 {
103 lcdcmd(1);
104 lcdstring("Enter Ur P.Word");
105 lcdcmd(0xc0);
106 i=0;
107 while(i<4)
108 {
109 col1=0;
110 col2=col3=1;
111 if(!row1) //keyad conditions row 1
112 {
113 lcddata('1');
114 pass[i++]='1';
115 while(!row1);
116 }
117
118 else if(!row2) // keyad conditions row 2
119 {
120 lcddata('4');
121 pass[i++]='4';
Build Output
Simulation
L:25 C:34
CAP NUM SCRL OVR R/W
ENG
IN
09:53
02-12-2021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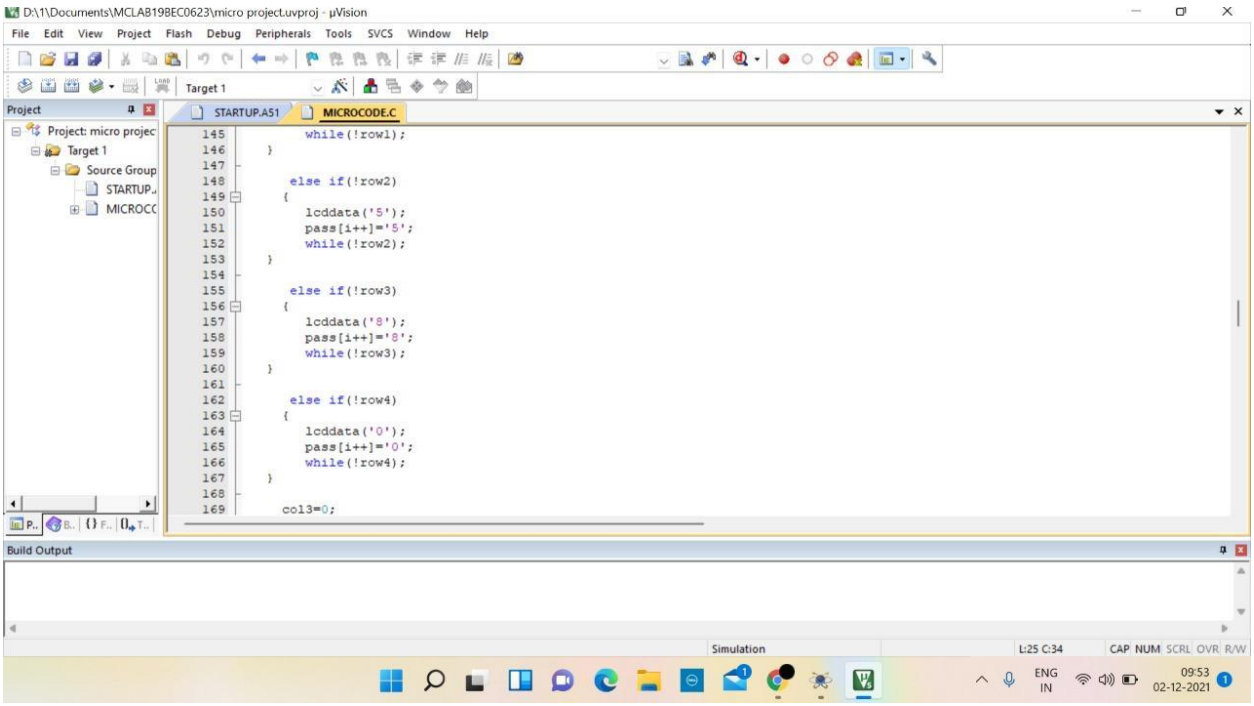
Target 1
Project
Project: micro projec
Target 1
Source Group
STARTUP.
MICROCC
STARTUP.A51
MICROCODE.C
121 pass[i++]='4';
122 while(!row2);
123 }
124
125 else if(!row3) // keyad conditions row 3
126 {
127 lcddata('7');
128 pass[i++]='7';
129 while(!row3);
130 }
131
132 else if(!row4) // keyad conditions row 4
133 {
134 lcddata('*');
135 pass[i++]='*';
136 while(!row4);
137 }
138
139 col2=0;
140 col1=col3=1;
141 if(!row1) //column conditions
142 {
143 lcddata('2');
144 pass[i++]='2';
145 while(!row1);
Build Output
Simulation
L:25 C:34
CAP NUM SCRL OVR R/W
ENG
IN
09:53
02-12-2021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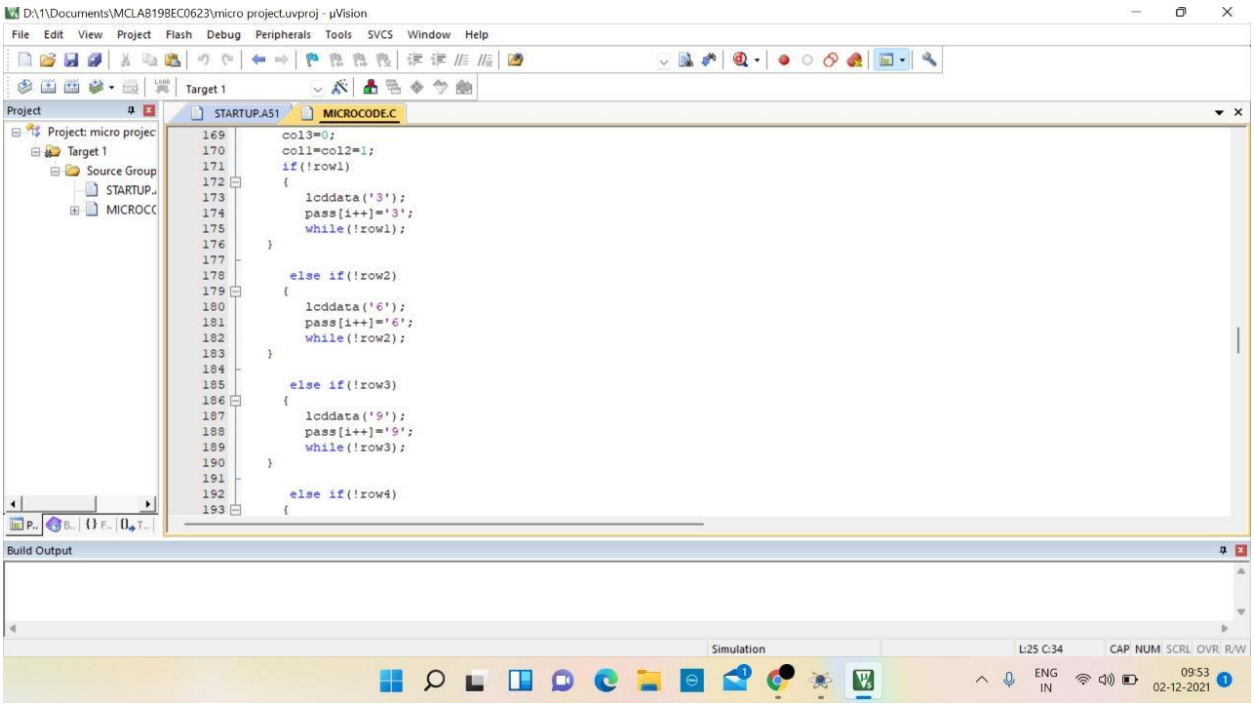
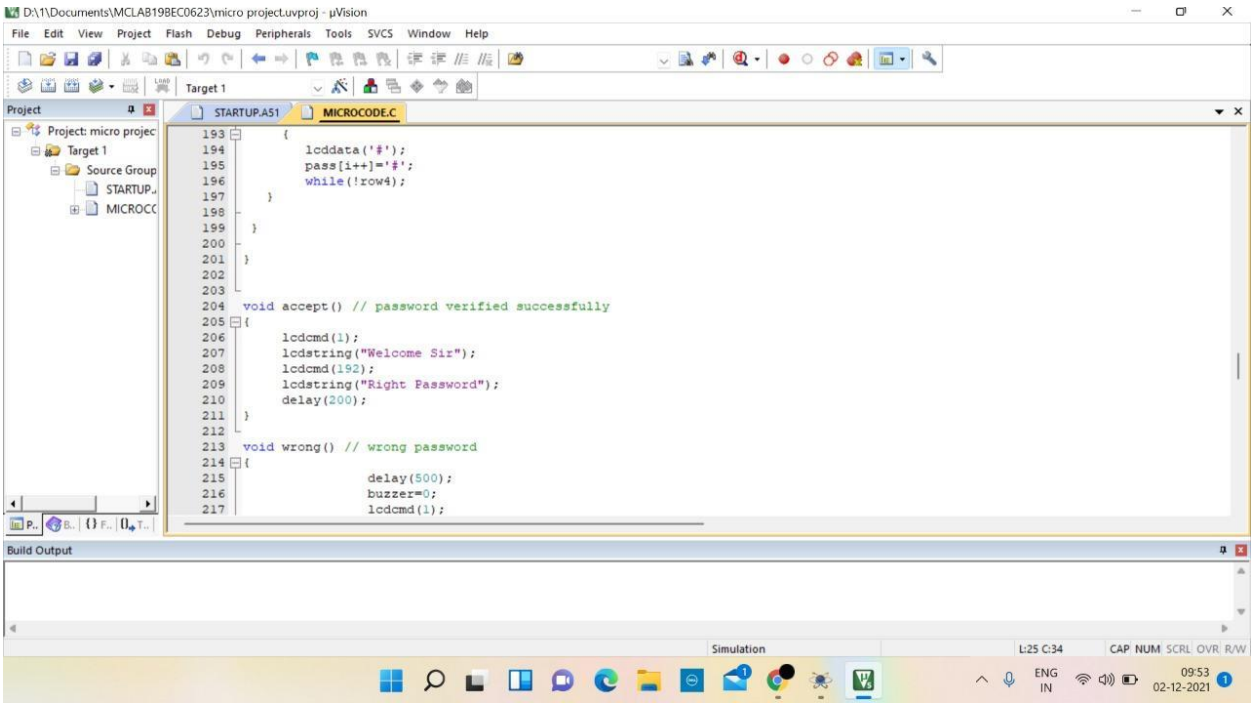
Target 1
Project
Project: micro projec
Target 1
Source Group
STARTUP.
MICROCC
STARTUP.A51
MICROCODE.C
while(!row1);
}
else if(!row2)
{
lcddata('5');
pass[i++]='5';
while(!row2);
}
else if(!row3)
{
lcddata('8');
pass[i++]='8';
while(!row3);
}
else if(!row4)
{
lcddata('0');
pass[i++]='0';
while(!row4);
}
col3=0;
Build Output
Simulation
L:25 C:34
CAP NUM SCRL OVR R/W
ENG
IN
09:53
02-12-2021


D:\1\Documents\MCLAB19BEC0623\micro project.uvproj - µVision
File Edit View Project Flash Debug Peripherals Tools SVCS Window Help
Target 1
Project
Project: micro projec
Target 1
Source Group
STARTUP.
MICROCC
STARTUP.A51
MICROCODE.C
col3=0;
col1=col2=1;
if(!row1)
{
lcddata('3');
pass[i++]='3';
while(!row1);
}
else if(!row2)
{
lcddata('6');
pass[i++]='6';
while(!row2);
}
else if(!row3)
{
lcddata('9');
pass[i++]='9';
while(!row3);
}
else if(!row4)
{
Build Output
Simulation
L:25 C:34
CAP NUM SCRL OVR R/W
ENG
IN
09:53
02-12-2021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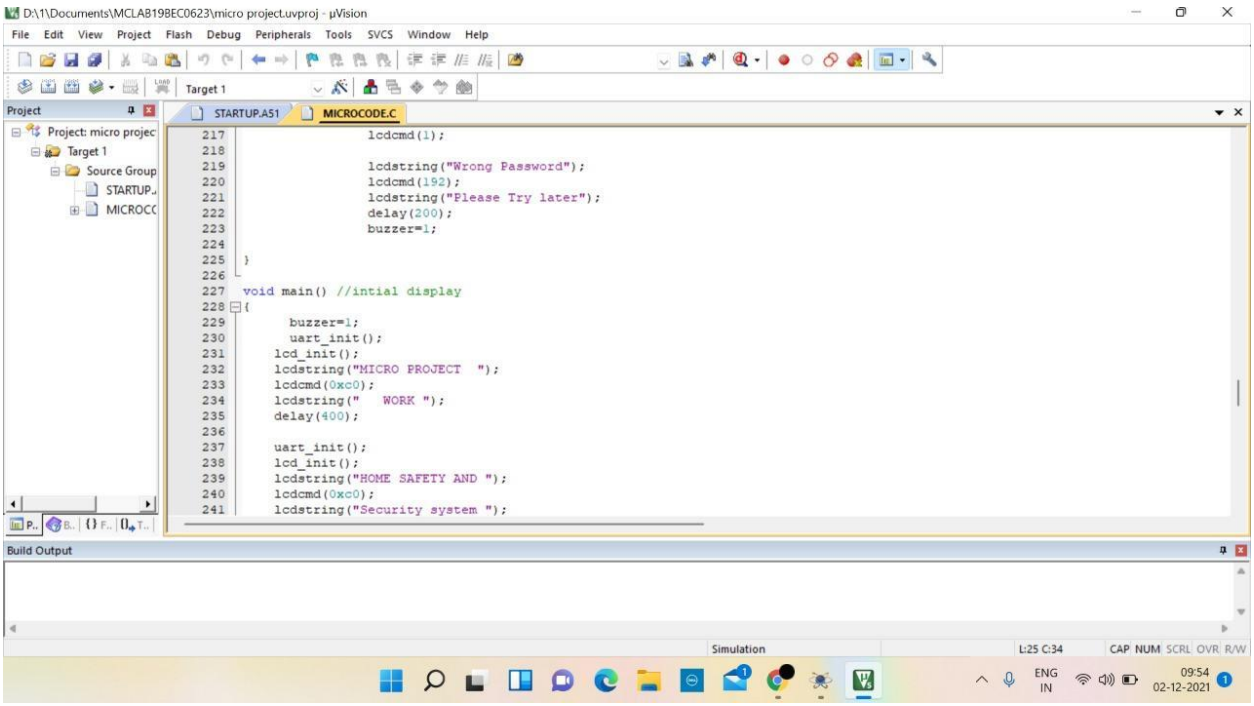
Target 1
Project
Project: micro projec
Target 1
Source Group
STARTUP.
MICROC
STARTUP.A51
MICROCODE.C
193 {
194 lcddata('#');
195 pass[i++]='#';
196 while(!row4);
197 }
198
199 }
200
201 }
202
203
204 void accept() // password verified successfully
205 {
206 lcdcmd(1);
207 lcdstring("Welcome Sir");
208 lcdcmd(192);
209 lcdstring("Right Password");
210 delay(200);
211 }
212
213 void wrong() // wrong password
214 {
215 delay(500);
216 buzzer=0;
217 lcdcmd(1);
Build Output
Simulation
L:25 C:34
CAP NUM SCRL OVR R/W
ENG
IN
09:53
02-12-2021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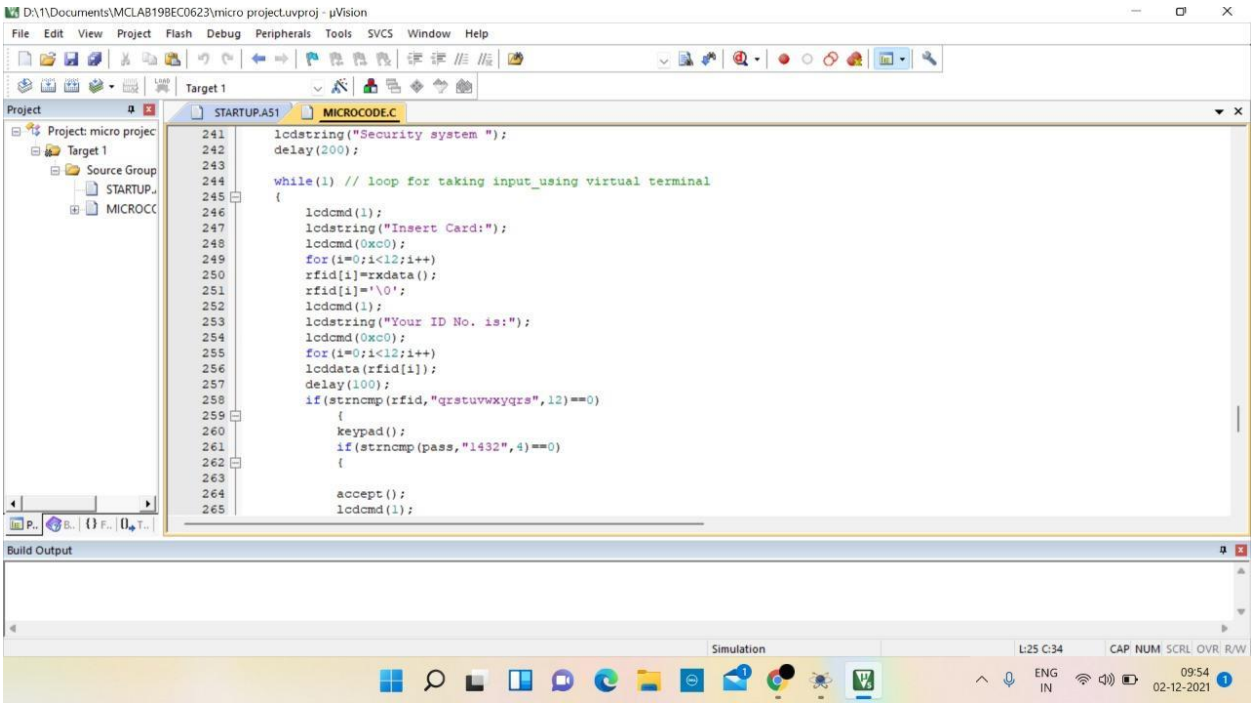
Target 1
Project
Project: micro projec
Target 1
Source Group
STARTUP.
MICROC
STARTUP.A51
MICROCODE.C
217 lcdcmd(1);
218
219 lcdstring("Wrong Password");
220 lcdcmd(192);
221 lcdstring("Please Try later");
222 delay(200);
223 buzzer=1;
224
225 }
226
227 void main() //intial display
228 {
229 buzzer=1;
230 uart_init();
231 lcd_init();
232 lcdstring("MICRO PROJECT ");
233 lcdcmd(0xc0);
234 lcdstring(" WORK ");
235 delay(400);
236
237 uart_init();
238 lcd_init();
239 lcdstring("HOME SAFETY AND ");
240 lcdcmd(0xc0);
241 lcdstring("Security system ");
Build Output
Simulation
L:25 C:34
CAP NUM SCRL OVR R/W
ENG
IN
09:54
02-12-2021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Target 1
Project
Project: micro projec
Target 1
Source Group
STARTUP.
MICROCC
STARTUP.A51
MICROCODE.C
241 lcdstring("Security system ");
242 delay(200);
243
244 while(1) // loop for taking input_using virtual terminal
245 {
246 lcdcmd(1);
247 lcdstring("Insert Card:");
248 lcdcmd(0xc0);
249 for(i=0;i<12;i++)
250 rfid[i]=rxdata();
251 rfid[i]='\0';
252 lcdcmd(1);
253 lcdstring("Your ID No. is:");
254 lcdcmd(0xc0);
255 for(i=0;i<12;i++)
256 lcddata(rfid[i]);
257 delay(100);
258 if(strncmp(rfid,"qrstuvwxyqrs",12)==0)
259 {
260 keypad();
261 if(strncmp(pass,"1432",4)==0)
262 {
263
264 accept();
265 lcdcmd(1);
Build Output
Simulation
L:25 C:34
CAP NUM SCRL OVR R/W
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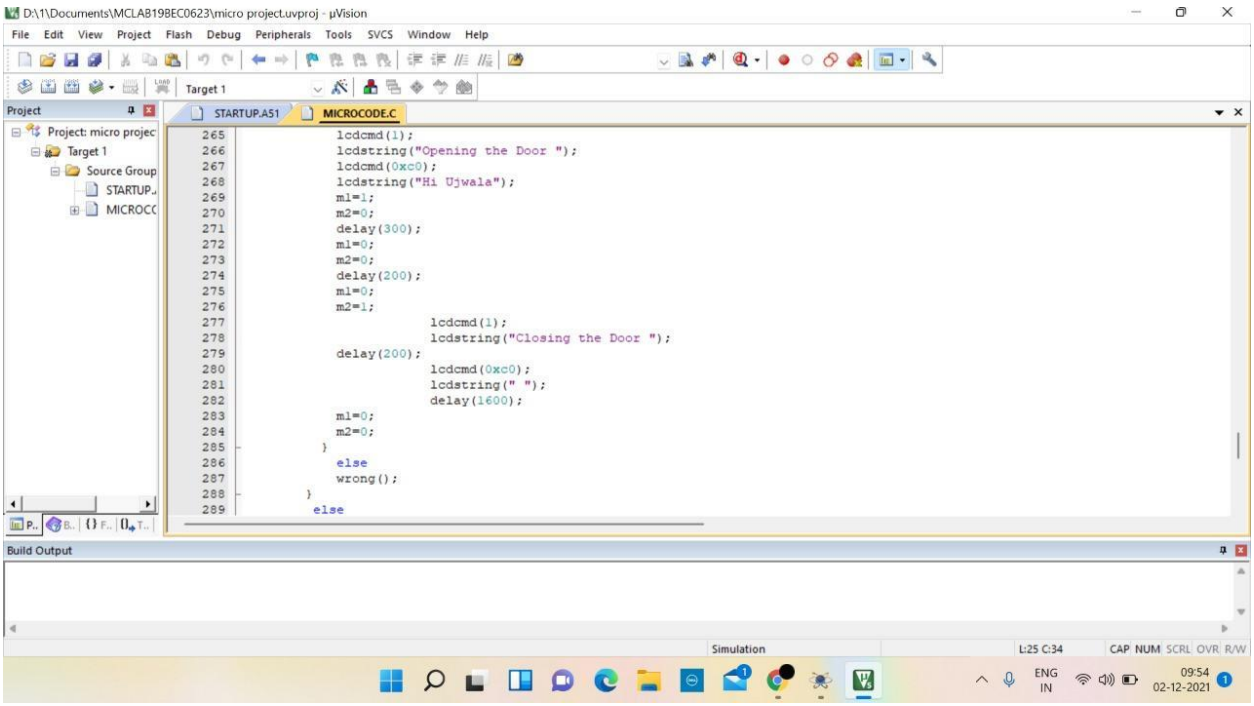
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Target 1
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Project: micro projec
Target 1
Source Group
STARTUP.
MICROCC
STARTUP.A51
MICROCODE.C
265 lcdcmd(1);
266 lcdstring("Opening the Door ");
267 lcdcmd(0xc0);
268 lcdstring("Hi Ujwala");
269 m1=1;
270 m2=0;
271 delay(300);
272 m1=0;
273 m2=0;
274 delay(200);
275 m1=0;
276 m2=1;
277 lcdcmd(1);
278 lcdstring("Closing the Door ");
279 delay(200);
280 lcdcmd(0xc0);
281 lcdstring(" ");
282 delay(1600);
283 m1=0;
284 m2=0;
285 }
286 else
287 wrong();
288 }
289 else
Build Output
Simulation
L:25 C:34
CAP NUM SCRL OVR R/W
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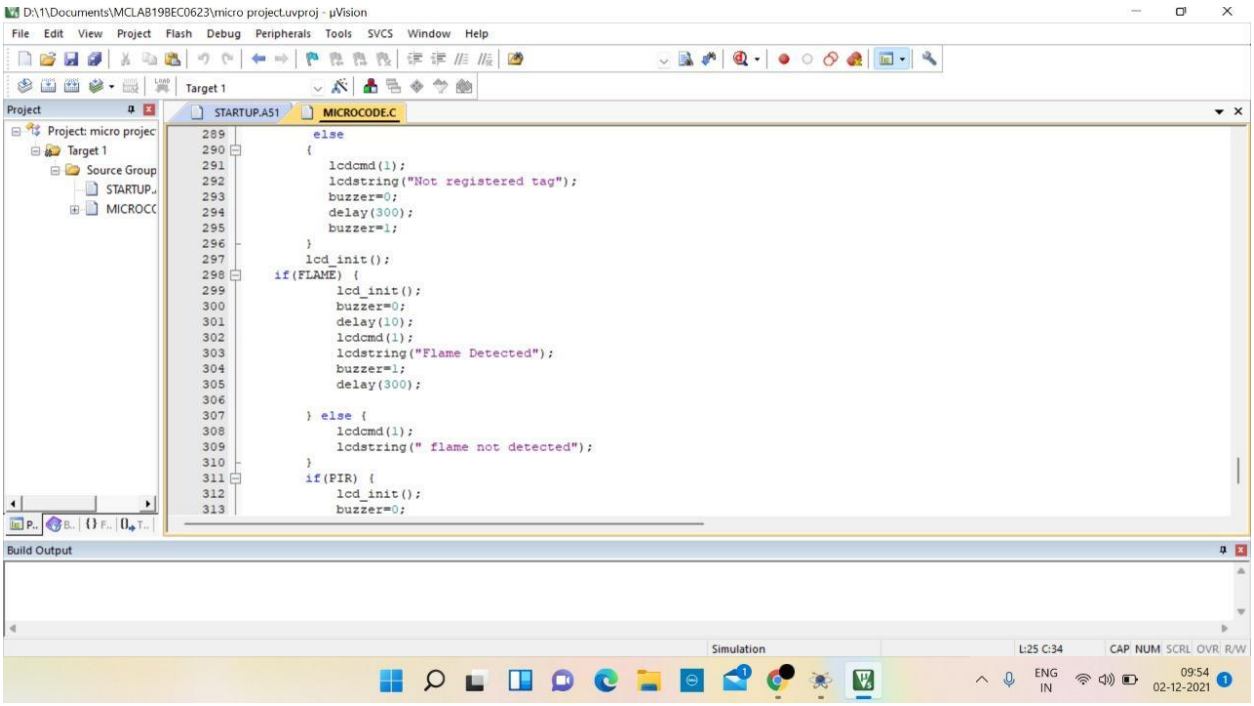
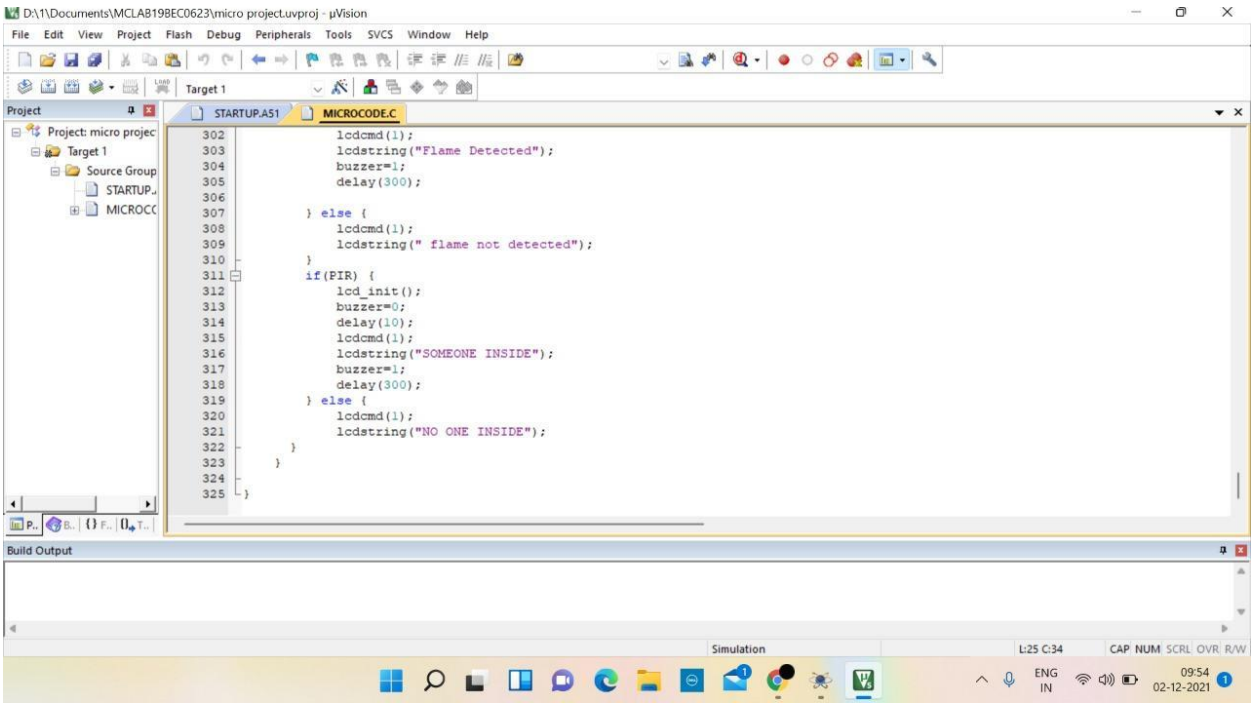
IN
09:54
02-12-2021





ADVANTAGES AND DISADVANTAGES:

ADVANTAGES:

1) Allows remote access to the home
2) Notifies of fire or gas problems
3) Alert us of any intruder sneaking around
4) Cost effective device
5) Easy to handle & reset the device
6) Lower Homeowners Insurance Premiums

DISADVANTAGES:

1) Need continuous power supply.
2) Need to protect the circuit from rain.
3) Need multiple modules to protect the whole surroundings of the house.
4) No camera surveillance is there.

LAB S.NO	REG.NO	NAME	Mobile number	Role in Project
1	19BEC0008	U V N TRISAI	9347389696	THEORY,FUTURE SCOPE,LITERATURE SURVEY AND REFERENCES
15	19BEC0478	VENKATA UJWALA	9704221682	CODING IN KEIL
17	19BEC0530	P V S SREE LALITHA	7812069998	DOCUMENTATION,IEEE PAPER AND REFERENCES AND CODING IN KEIL SIMULATION

22	19BEC0623	Y VENKATA DURGA SAI	8978895595	PROTEUS SIMULATION
27	19BEC0740	KATAKAM SRIKAR	9491011025	PROTEUS AND KEIL SIMULATION

DATA SHEETS:

1)https://tinyurl.com/AT89C51-Datasheet
2)https://tinyurl.com/DATASHEET-PIR-SENSOR
3)https://tinyurl.com/DATASHEET-ADC
4)https://tinyurl.com/DATASHEET-LCD016M001L
5)https://tinyurl.com/DATASHEET-KEYPAD
6) https://tinyurl.com/Flame-sensor-Data-sheet

PLAGIARISM REPORT:

https://tinyurl.com/Plagiarism-report-L53L54-G1

Future Scope:

- A hex keypad can be interfaced to the microcontroller board by which the user can enter his password then only the lock can be opened. This ensures even if some one has card then also without the password he can't get access.
- Connection to PC and development of PC side software to read from microcontroller.
- Entry of workers in Industries, workplaces can be done by this venture.

CONCLUSION:

Our project successfully uses an 8051 microcontroller to implement our project.
For the purpose of simulation, we have used the Proteus software where we were able to find the components we required.
The first step is entering the RFID key. If the key is correct, then we are asked to type in the corresponding password. If these both are correct, the name of the person is displayed on the LCD and the motor rotates in both clockwise and counterclockwise direction which indicates the opening and closing of the door.
If the RFID key is wrong or the RFID key is correct but the password corresponding to this key is wrong, then the lcd will display not registered and again will ask for a registered RFID tag id.
In a case where a fire has occurred then the flame sensor will be activated and will generate an alert by displaying a message flame detected and the buzzer will produce an alerting sound. Otherwise it will display flame not detected.
When a person is present in the house the pir sensor detects and gets activated and displays if the person is there or not.
Overall the project manages to provide a cost-effective way to ensure safety and security of our household.

REFERENCES/LINKS:

- **https://www.electronicshub.org/interfacing-16x2-lcd-8051/**
- **https://embetronicx.com/tutorials/microcontrollers/8051/ir-sensor-interfacingwith-8051/**
- **https://circuitdigest.com/microcontroller-projects/rfid-interfacing-with-8051**
- **https://app.diagrams.net/**

- **https://www.safewise.com/best-home-security-system**