İstanbul Aydın University
Department of Computer Engineering

COM448 - EMBEDDED SYSTEM

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MAN JUMPING FROM OBSTACLES

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1 INTRODUCTION

I start my project's man jumping from obstacles game by pressing the button. When the game starts, we see the obstacles coming towards the man by moving from right to left. By the way, I created three characters for the man. This is how I created the running effect. When we press the button after the game starts, our man jumps over the obstacles with his jumping character. As long as we don't touch the obstacles, the speed of the obstacles increases. Each time we jump over obstacles, the score increases by one. In case of hitting an obstacle, the game is over and the screen includes score points and characters.

1.1 PROJECT LAYOUT

I used arduino as the development language in my project, arduino is a c and c++ based language. Libraries are available in it. I used the " LiquidCrystal_I2C " library by typing " #include <LiquidCrystal_I2C.h> " in the code I wrote for my project. Thanks to this library, I connected my lcd component with the I2C component and connected it to the arduino uno in a much more comfortable way. I wrote and implemented the codes for my project in the " Arduino IDE " platform. The most basic feature for me to choose the platform was that it was easy to use and the interface was simple, apart from the fact that I could use and update the libraries very easily.

2 PROJECT DESIGN.

- *To bring my project to life, I first ordered my components online.*
- *Then I connected the plus and minus sides of the arduino uno to the mini breadboard, so I transferred the electricity to the breadboard.*
- *I connected my lcd component to the arduino uno connectors from the side parts with m-f cables.*
- *In the same way, I connected my button to my mini breadboard using a resistor, and then connected it to the arduino uno.*
- *Finally, I connected the arduino uno to the computer with the help of the USB Cable from A to B, so I provided the electricity.*

2.1 PROGRAMMING AND CODE MODULES

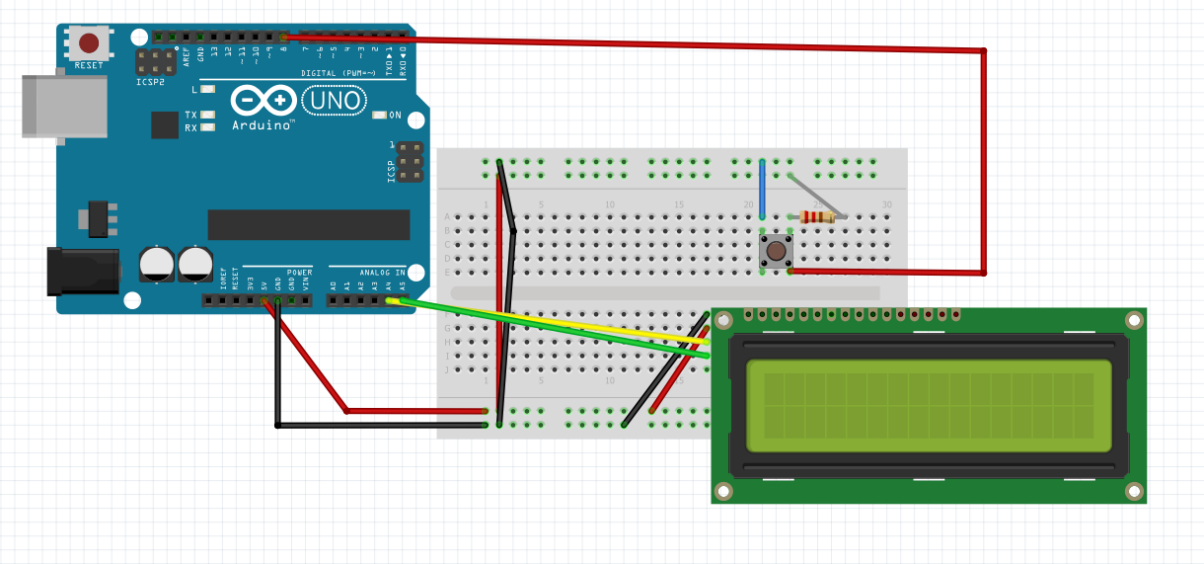


Figure 1 - Fritzing Arduino Design

Arduino is an open source microcontroller platform developed. Many electronic applications can be made using Arduino. The reason why I was coding in the arduino IDE as a platform was that I could access the libraries more easily, and when I connected the arduino uno, I could see the connection status, mistakes and deficiencies in the code more easily. Accessing and linking their libraries on other platforms was a bit more difficult and troublesome.

3 REQUIRED COMPONENTS

- *16X2 LCD ---------- 18,95 TL*
- *BUSH BUTTON ---------- 0,61 TL*
- *MINI BREADBOARD ------- 4,04 TL*
- *220 OHM RESISTANCE -- 0,51 TL*
- *ARDUNIO UNO ---------- 58,62 TL*
- *M-F JUMPER CABLES ---- 5,76 TL*
- *M-M JUMPER CABLES --- 6,06 TL*
- *A TO B USB CABLE ------- 5,05 TL*

I used the components above to bring my project to life.

3.1 SOFTWARE PART AND FUNCTIONS

```
#include <LiquidCrystal_I2C.h>
LiquidCrystal_I2C lcd(0x27,16,2);
const int btn = 8;
int game=0;
int buttonPress = 0;
int buttonState = 0;
int Posizyon;   //Character's Position
int obsSpeed;   //Duration and Distance
int score=0;
unsigned long lastDebounceTime = 0;
int lastButtonState=LOW;
byte PlayerRun1[8] = {
  B01110,
  B10001,
  B10001,
  B01110,
  B00101,
  B00110,
  B00100,
  B00010
};
byte PlayerRun2[8] = {
  B01110,
  B10001,
  B10001,
  B01110,
  B10100,
  B01100,
  B00100,
  B01000
};
byte Playerjump[8]={
  B01110,
  B10001,
  B10001,
  B01110,
  B10101,
  B01110,
  B00100,
  B01010
```

```
 };
byte Yuvarlak1[8] = {
  B01110,
  B11011,
  B11111,
  B00111,
  B00111,
  B11111,
  B11111,
  B01110
};
byte Yuvarlak2[8]={
  B01110,
  B11011,
  B11111,
  B11111,
  B11111,
  B11111,
  B11111,
  B01110
};
void setup() {
  Serial.begin(9600);
  lcd.init();
  lcd.backlight();
  lcd.createChar(0,PlayerRun1);
  lcd.createChar(1,PlayerRun2);
  lcd.createChar(2,Playerjump);
  lcd.createChar(3,Yuvarlak1);
  lcd.createChar(4,Yuvarlak2);
  pinMode(btn,INPUT);
  buttonState=digitalRead(btn);
}
void loop()
{
    score=0;
    lcd.clear();
    delay(2000);
    lcd.clear();
   while(button()!=1)    //When starting
    {
     lcd.setCursor(0,0);
      lcd.print("Welcome The Game");
      lcd.setCursor(0,1);
      lcd.print(" Press To Start ");
      delay(100);
}
   if(button()==1)
       game=1;
    while(game==1)   //If you push button game is starting
         OyunHareketleri();
    lcd.clear();
    lcd.setCursor(0,0);
    lcd.print("Your Score:");
    lcd.print(score);
    lcd.setCursor(7,1);
    lcd.write(2);
    lcd.setCursor(9,1);
    lcd.write(3);
```

```
   delay(3000);
}
void reset()
 {
    if(Posizyon%2==0)   //Create Running Effect
    {
       lcd.clear();
       lcd.setCursor(0,1);
       lcd.write(0);
    }
    else
    {
       lcd.clear();
       lcd.setCursor(0,1);
       lcd.write(1);
    }
 }
 void OyunHareketleri()
 {
  obsSpeed=250;   //Speed and Distance for Obtacles
  Posizyon=15;   //Starting Position
  while(game==1)
  {
      reset();
      if(button()==1)      //If Button is Pressed.
       {
         lcd.clear();
         lcd.setCursor(0,0);
         lcd.write(2);           //When Jumping, Show Playerjump Charachter
         YuvarlakHareketi(Posizyon);   //Shows Obstacles on The Screen
         delay(400);
         lcd.clear();
         lcd.setCursor(0,1);
         lcd.write(1);
         YuvarlakHareketi(Posizyon);
}
       else
       {
         if(Posizyon!=0)        //If It's not worth anaything
         {
            reset();
            YuvarlakHareketi(Posizyon); // See Obstacles in Screen Again
         }
else if(Posizyon==0)   //If Something İs Worth It, The Game is Over
         {
           game=0;
           break;
         }
       }
       Posizyon--;
       if(Posizyon<0)      //Game Renewal Again
       {
         obsSpeed=obsSpeed-15;    //Speed and Location of The Obstancle to The Man
         Posizyon=15;             //Starting Place of The Obtacles
         score++;
       }
      delay(obsSpeed);
   }
  }
```

```
int button()
{
int reading = digitalRead(btn);
    if (reading != lastButtonState)
{
      lastDebounceTime = millis();  //Time to Repeat on Screen
    }
    lastButtonState = reading;
}
void YuvarlakHareketi(int i)
{
if(Posizyon%2==0 && Posizyon>-1)
        {
           lcd.setCursor(i,1);
           lcd.write(3);
        }
        else if(Posizyon%2!=0 && Posizyon>-1)
        {
           lcd.setCursor(i,1);
           lcd.write(4);
        }
}
```

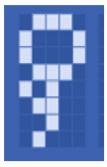
3.2 FIGURES

```
byte PlayerRun1[8] = {
 B01110,
 B10001,
 B10001,
 B01110,
 B00101,
 B00110,
 B00100,
 B00010 };
```

PlayerRun1

```
byte PlayerRun2[8] = {
 B01110,
 B10001,
 B10001,
 B01110,
 B10100,
 B01100,
 B00100,
 B01000
};
```

PlayerRun2



```
byte Playerjump[8]={
 B01110,
 B10001,
 B10001,
 B01110,
 B10101,
 B01110,
 B00100,
 B01010
 };
```

Playerjump

```
byte Yuvarlak1[8] = {
  B01110,
  B11011,
  B11111,
  B00111,
  B00111,
  B11111,
  B11111,
  B01110
 };
```

Yuvarlak1

```
byte Yuvarlak2[8]={
  B01110,
  B11011,
  B11111,
  B11111,
  B11111,
  B11111,
  B11111,
  B01110
};
```

Yuvarlak2

4 IMAGE CAPTURE AND DISPLAY

Figure 2 - Start Screen

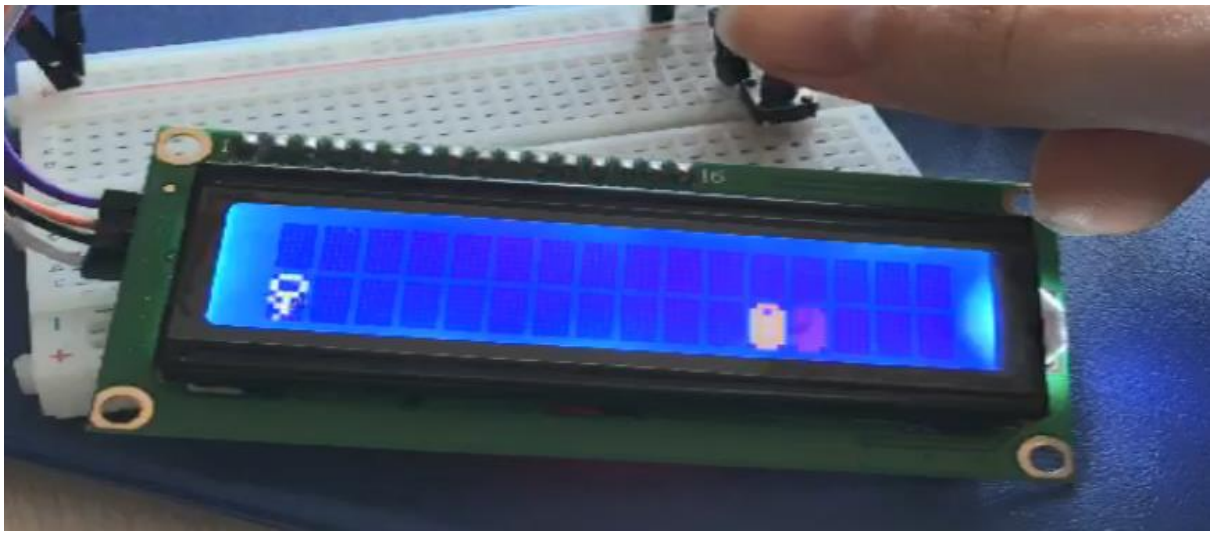


Figure 3 - Left View As Man Moves

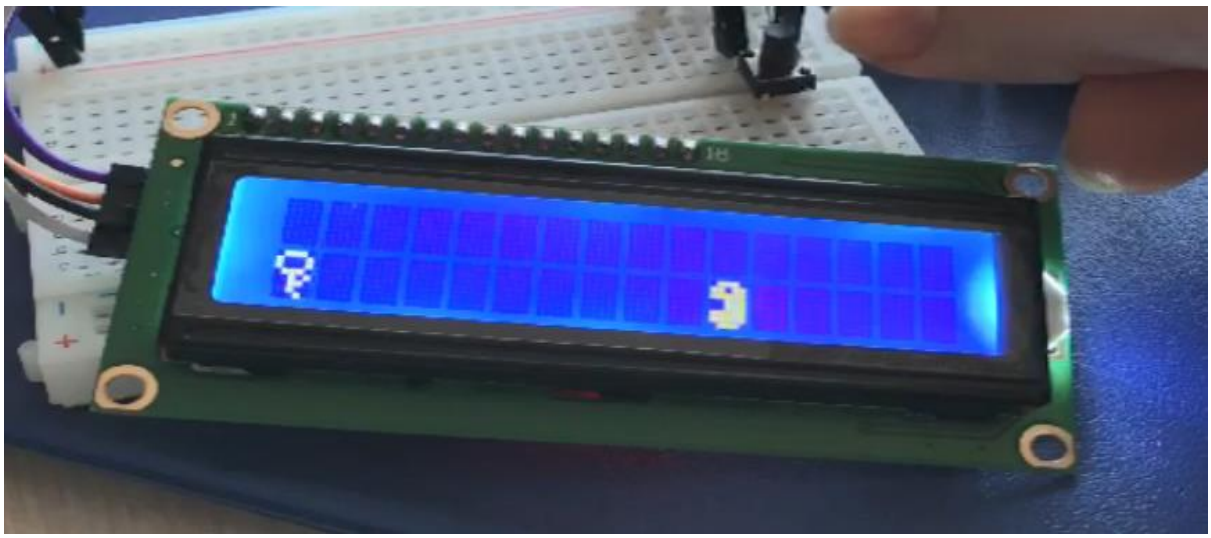


Figure 4 - Right View As Man Moves

Figure 5 - As the Man Jumping Through Obstacles

Figure 6 - Game End Screen

5 CONCLUSION

I developed my project using arduino uno, lcd and button. I created a game by injecting the code I wrote into components. The game I created features a man jumping over obstacles. The features of this simple and fun game are listed in the above items.

5.1 IMPLIMENTATION PROCESS

- *I set the start text and when I pressed the button, I enabled the game to open.*
- *I would make up the running man and the obstacle characters that open and close his mouth that I wanted to use.*
- *Later, I determined the location of the obstacles characters on the LCD screen and wrote codes to move them.*
- *After doing the steps I mentioned above, I created the running effect of the man character and the opening and closing effect of the obstacle character.*
- *I wrote my codes for the man character I created to jump over obstacles when pressing the button.*
- *I wrote my codes to gain points and speed up the obstacles when jumping over each obstacle.*
- *I also wrote the code for the man to light up when he touched the obstacle and ended the game.*
- *When the game was over, I showed the score and characters to the screen.*

6 REFERENCES

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