Final project – Catch and Dodge Game

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Introduction

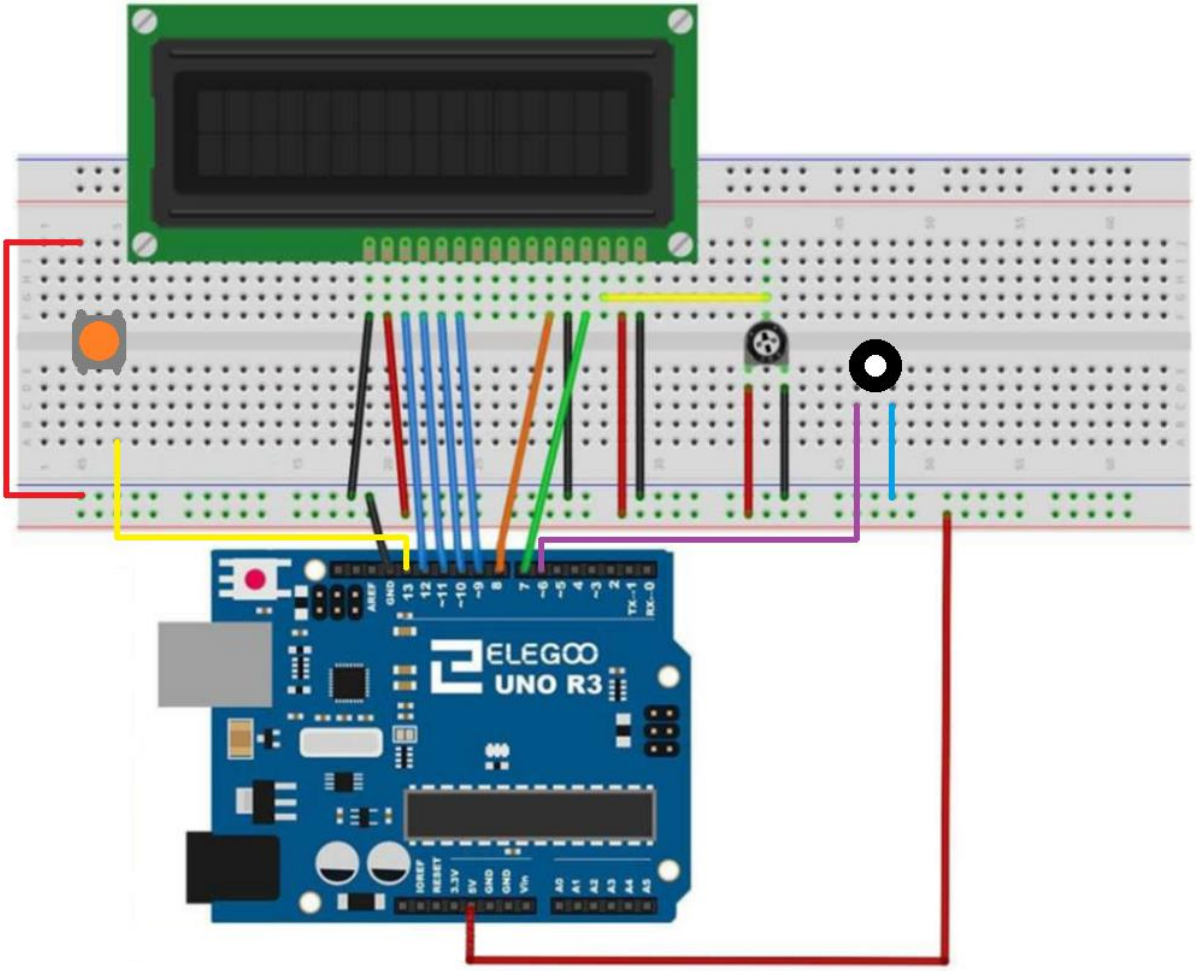
The original inspiration for this game, which I will call it the Catch and Dodge game, is from the game 2 Cars by Ketchapp. The main objective of the game 2 Cars is to collect all the circles and avoid all the squares that comes in a random direction either from left or right. The user has to simply tap the screen to move left or right and if the user accidentally either miss a circle or get hit by a square, the game is over. It is a simple game that, with some modifications, can be a perfect game to be displayed in the Arduino with its basic controls and minimal graphics.

The main objective I had with this final project is to make full use of the LCD screen. The 7 segment display was my favorite component until we learned about the LCD display which is a superior version of the display. While the 7 segment display had a lot of limitation in terms of displaying, the LCD screen has endless potential. I also liked the idea of using a button to interact with the display. For finish it off, I also used the buzzer to add some extra sound to the game for a more immersive experience.

Description

The main character < is controlled a single button which will either move the character up or down. The objective of this game is to collect all the O and dodge all the X. The O and X will come in random order at a random direction. In short, there will be four instances of the object: O coming from top, O coming from bottom, X coming from top, or X coming from bottom. The object will come from the right side of the screen and move leftward where the character is located. The character needs to perform a quick reaction to either stay in the position or move to the opposite position. If the character successfully collect the O or dodge the X, the score on the right will increase by 1. Every time the character gains a point, the object will start coming at a gradually increasing speed. If the character fails to collect a O or gets hit by a X, the game will end and move over to the game over screen which displays the score. After a few seconds, the game will automatically reset.

Schematic


AREF
GND
13
12
~11
~10
~9
8
7
~6
~5
4
~3
2
TX→1
RX←0
ELEGOO
UNO R3
IOREF
RESET
3.3V
5V
GND
GND
Vin
A0
A1
A2
A3
A4
A5

Code with explanation

```
#include <LiquidCrystal.h>
#include "pitches.h"

const int rs = 7, en = 8, d4 = 9, d5 = 10, d6 = 11, d7 = 12;
LiquidCrystal lcd(rs, en, d4, d5, d6, d7);

int button = 13; //input for the button
int y = 1; //position where the character starts
int down = 0; //prevent button multiclick
int enemy, yspawn, alive = 0; //enemy information
float xspawn = 12; //enemy spawn position and movement
int score = 0; //score display
float fast = 0.3; //enemy speed
void(* resetFunc) (void) = 0;

void setup()
{
  pinMode(button, INPUT_PULLUP);
  lcd.begin(16, 2);
  randomSeed(analogRead(0));
}

void loop()
{
  lcd.setCursor(13,0);
  lcd.print(score); //these two lines will display the score on the right
  if(digitalRead(button) == LOW && down == 0)
  {//button press to change the position of the character
    if(y == 1)
    {
      y = 0;
    }
    else
    {
      y = 1;
    }
    down = 1;
  }

  if(digitalRead(button) == HIGH && down == 1)
  {//prevent holding button multiclick
    down = 0;
  }

  if(y == 0)
  {//moves the character to 1st line
    lcd.setCursor(0,1);
    lcd.print(" ");
    lcd.setCursor(0,0);
    lcd.print("<");
  }

  if(y == 1)
  {//moves the character to 2nd line
    lcd.setCursor(0,0);
    lcd.print(" ");
    lcd.setCursor(0,1);
    lcd.print("<");
  }

  if(alive == 0)
  {//randomly creates the enemy
    enemy = random(2); //X or Y
    yspawn = random(2); //line 1 or 2
    alive = 1;
  }

  if(alive == 1)
  {
    lcd.setCursor(xspawn,yspawn);
    if(enemy == 0)
    {
      lcd.print("X");
      if(y != yspawn && xspawn < 1)
```

```
 {//when character successfully dodges the X
  tone(6,NOTE_C5,100);
  score += 1;
  alive = 0;
  xspawn = 12;
 }
 else if(y == yspawn && xspawn < 1)
 {//when character fails to dodge the X
  lcd.clear(); //empty the screen
  lcd.setCursor(3,0);
  lcd.print("Game Over");
  lcd.setCursor(7,1);
  lcd.print(score); //game over screen with score
  tone(6,NOTE_E4,300);
  delay(300);
  tone(6,NOTE_C3,600);
  delay(3000);
  resetFunc(); //automatically restart the game
 }
}
if(enemy == 1)
{
 lcd.print("O");
 if(y == yspawn && xspawn < 1)
 {//when character successfully collects the O
  tone(6,NOTE_C5,100);
  score += 1;
  alive = 0;
  xspawn = 12;
 }
 else if(y != yspawn && xspawn < 1)
 {//when character fails to dodge the O
  lcd.clear();
  lcd.setCursor(3,0);
  lcd.print("Game Over");
  lcd.setCursor(7,1);
  lcd.print(score);
  tone(6,NOTE_E4,300);
```

```
    delay(300);
    tone(6,NOTE_C3,600);
    delay(3000);
    resetFunc();
   }

  }
  xspawn -= fast;
  if(fast < 1)
  {
   //subsequently increase the speed of enemy
   fast *= 1.005;
  }
  lcd.print(" ");
 }

 delay(50);
}
```

Video

https://www.youtube.com/watch?v=-3dxO3BUC04

Introduction

My final lab was the combination of all the components from the past labs that I enjoyed playing around with. The LCD display, button, and buzzer are all very interactive components with endless potential. The circuit wiring itself was also simple since most of the wiring comes from the lab 10. The main adjustment was replacing the thermistor with the button and adding a buzzer to the circuit. The most difficult part about this project was the object movement. Although it looks very simple since all it does it move up or down, there were multiple issues while programming. Leaving a trail behind or not disappearing when gaining a point were some of the difficulties I had to face. Overall, I am very satisfied with my result. Unlike my midterm project where I had to create a different project due to unsuccessful programming, this final project was down very fast and did not require too much modification. To conclude, I believe that my final project was a success and I was able to utilize some of my favorite components of the Arduino.