Final Project – ECE 1895

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Final project proposal

For my final project, I decided to modify the code for Breakout game on Arduboy. I chose a code that was given to us in the assignment sheet. As the player starts the game, a screen containing blocks, a paddle, and a ball appears. The player has to press button A to start the game. The main goal is to move the paddle to keep the ball in the field and hit the blocks constructed at the top of the screen. If the ball falls out of the screen (below the paddle), the game stops and the player has to restart.

Hardware setup (breadboard)

First, I set up my breadboard and all the necessary connections that would allow me to upload the code to the ATmega32U chip. I followed the circuit shown below.

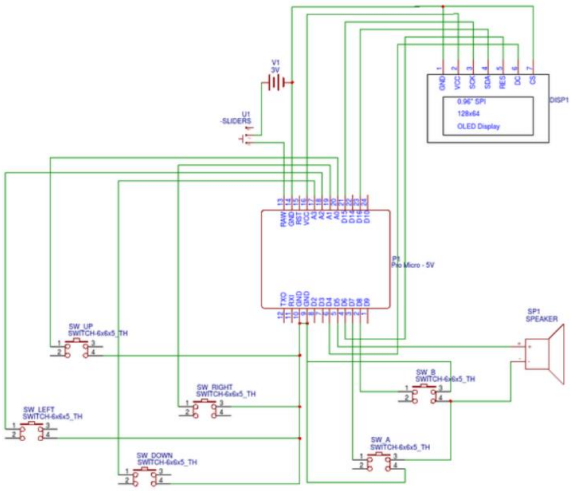

Figure 1. Schematics used to build the breadboard Connections

However, I did make a few changes. In fact, since I didn't use the speaker as it wasn't necessary for my project. Therefore, I disconnected pins of switches A and B, and connected pin 4 of switch B to ground. Also, I added a reset button connected to pin RST of the ATmega32U chip and ground. Here is a picture of my final breadboard.

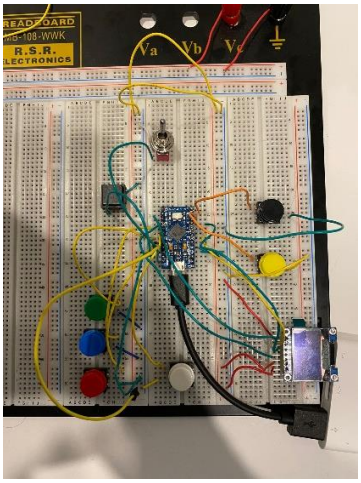

Figure 2. Picture of the breadboard

Original code

The code was simple. It was divided into different functions that deal with each component of the game (the paddle, the ball, the blocks…). However, I figured that it didn't provide the user enough information. In fact, it directly shows a screen containing the different components, and the player would start the game directly. If they lose, the components simply reset themselves without notifying the user. Here is a picture that shows the screen before the game starts.

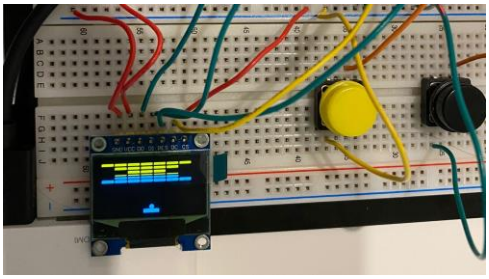

Figure 3. Start screen of the Breakout game

Modification (software level)

I figured that it would be nice to tell the user when the game should start, by displaying "Let's play!" on the screen, until they press button A. Therefore, I created a function called startGame(), which checks if the variable idleBall is True. When this variable is set to True, it means that the player is starting a new game, either because the just turned it on, or because they lost. The function is shown below.

```
void startGame(){

   if (idleBall== true){ // if the ball falls off the bottom --> start again (game over)
      arduboy.clear();
      arduboy.print("Let's Play!");
      arduboy.display();
      return;
        }
    else {
      return;
    }
}
```

Figure 4. My modification: Code for function startGame()

After that, I called the function in the main loop after all the other function calls.

Modification (hardware level)

I uploaded the code to the ATmega32U chip and was able to play the game normally, with the only difference that the screen would display a title before the start of every round. Here is a picture of what this latter looks like.

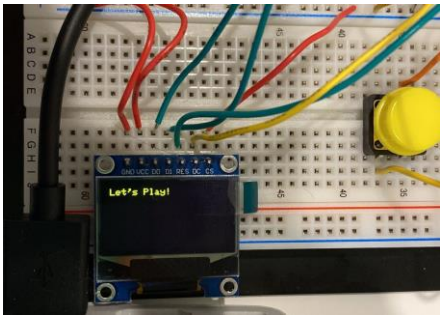

Figure 5. Starting screen after modification

Future improvements

My modification was very simple, however, it would have been much better if I completed the design by adding the score after each round, and displaying a 'GAME OVER' message after every failure. Due to time constraints and finals, I wasn't able to achieve that. Although those modifications would have also been easy to implement. For the score I would have initialized a variable that would keep count of every successful 'hit'. Points would add up and the score would be displayed after the game is over as well as a message that says "GAME OVER", and take the user back to the starting screen ("Let's Play").

Reference

The original code I used and modified can be accessed via the following link

https://github.com/mattiasjahnke/arduino-projects/blob/master/BreakoutClone/BreakoutClone.ino