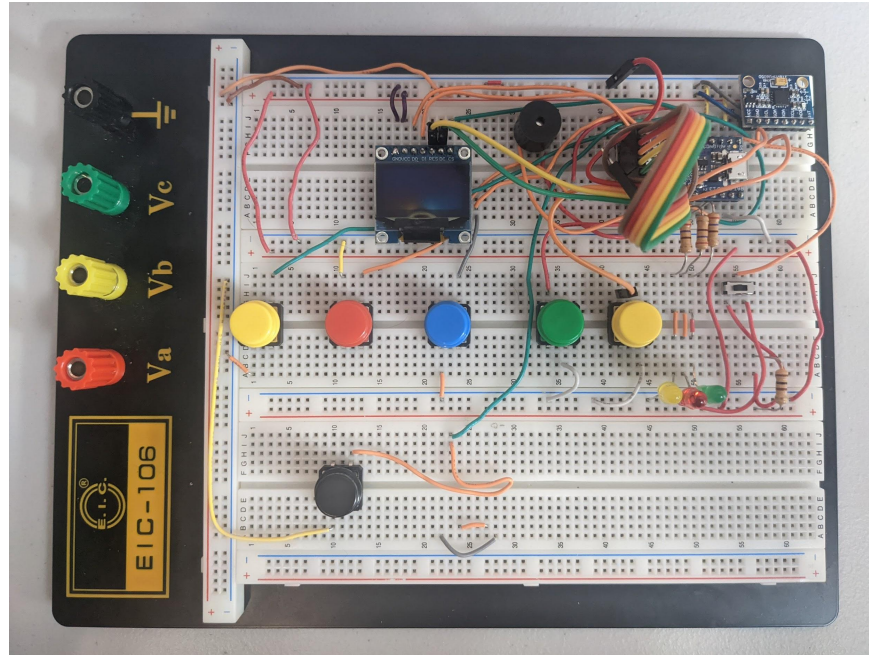


Design 3 Project Reflection: Joseph Schurer

For my final design I chose to do the MPU6050 modification to the arduboy. My original plan was to then add motion control to the arduboy game EVADE (<https://community.arduboy.com/t/evade-side-scrolling-space-shooter/2712>).

Below is an image of the final circuit used in my design.



Testing

When I first tried to upload the game to the circuit for initial testing I ran into an issue where my LCD was constantly completely white and was unresponsive to inputs. My first thought was that it was wired incorrectly so I first checked over the wiring to the LCD. Eventually I came to the conclusion that the wiring was correct and began to look for other issues. One time by chance, I left the circuit on for longer than it had been previously and happened to brush my hand over the LCD and noticed that it was very hot. I began to check the input voltages from the ItsyBitsy and, after verifying they were normal, was able to isolate the issue to the LCD. When I looked very closely at the back of the LCD I noticed that there appeared to be a small solder bridge on the connections on the small traces connecting the LCD panel to the back of the board. Upon fixing this the game immediately worked and I was able to move onto adding the motion controls.

This step proved to be the next challenge that I came across. EVADE uses nearly 100% of the available memory on the device. After the addition of the required libraries and the code for

motion detection I was significantly over the memory limits of the device. I tried to strip out the music in the game and was able to come closer but could not reduce it enough. I decided to switch games at this point to a game called Flight Sim <https://community.arduboy.com/t/flight-simulator/8097>. This game had the available memory to add the motion controls, and I thought that motion controls would also fit well with a flight simulator game.

Software Design

The code for the modification itself was relatively simple. I did some experimentation to find a threshold for detection that felt right and if that threshold was reached emitted the same signal as if a button were pressed.

```
mpu.Execute();  
double X = mpu.GetAngX();  
double Y = mpu.GetAngY();  
if (arduboy.pressed(A_BUTTON))  
{  
    result |= INPUT_A;  
}  
if (arduboy.pressed(B_BUTTON))  
{  
    result |= INPUT_B;  
}  
if (arduboy.pressed(UP_BUTTON) || Y > 10)  
{  
    result |= INPUT_UP;  
}  
if (arduboy.pressed(DOWN_BUTTON) || Y < -10)  
{  
    result |= INPUT_DOWN;  
}  
if (arduboy.pressed(LEFT_BUTTON) || X < -10)  
{  
    result |= INPUT_LEFT;  
}  
if (arduboy.pressed(RIGHT_BUTTON) || X > 10)  
{  
    result |= INPUT_RIGHT;  
}
```

Possible Future Improvements

I think obvious future improvements would be to move this design onto a pcb and a dedicated enclosure. Currently holding an entire breadboard with the exposed wires is a bit unwieldy.

Video Link

https://pitt-my.sharepoint.com/:v:/g/personal/jws110_pitt_edu/EYHpJXTMYBVIgssuuOqr_gBHl5aphKG-RV6sl9uu0dPOQ?e=yjjtHP