Space Invaders Bop-It

ECE 1895 - Aragya Goyal, Joshua Krymgold, PJ Granieri

The Main Idea

Our Bop-It project is inspired from a familiar game, known as Space Invaders. However, it differs greatly from the original game, as instead of only shooting down invaders, the player is also responsible for maneuvering the space shuttle as well as applying the throttle to accelerate out of troublesome situations.

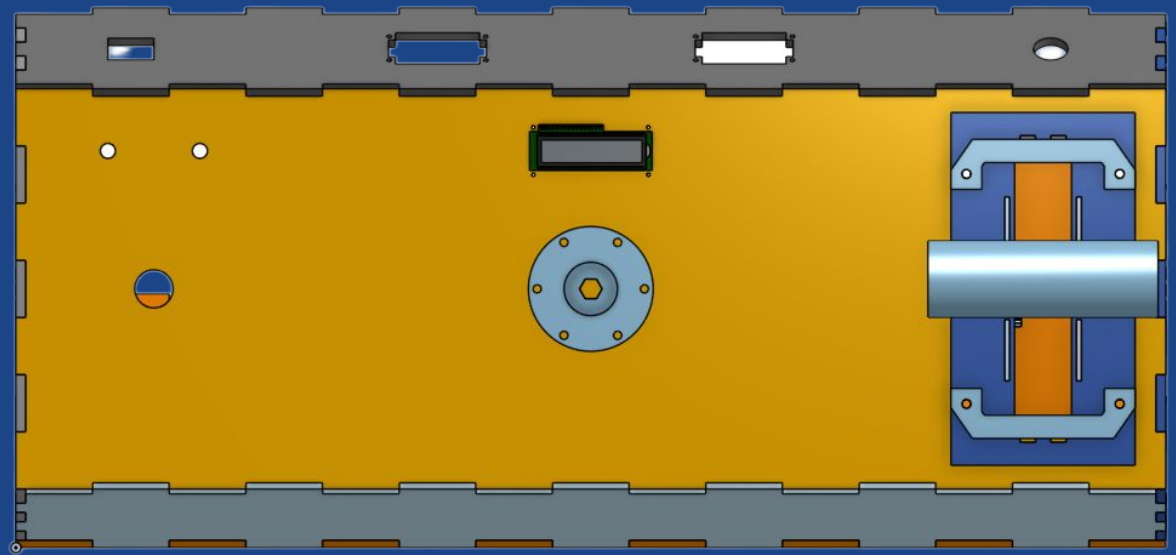
Three Main Goals

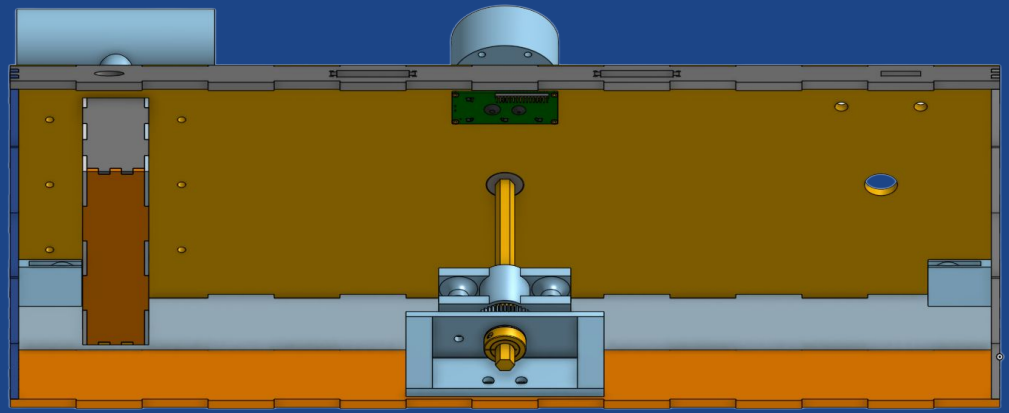
1. Shoot down the Invaders
2. Navigate through the domain of space
3. Accelerate out of any trouble that arises

01

Enclosure

Designing the housing





CAD Design (Onshape)

- Laser Cut Acrylic
  - Main Body
  - Throttle Holder
- 3D Printed Parts
  - Steering Column
  - Throttle Handle
- COTS Parts
  - Steering Wheel
  - Bungee Cords

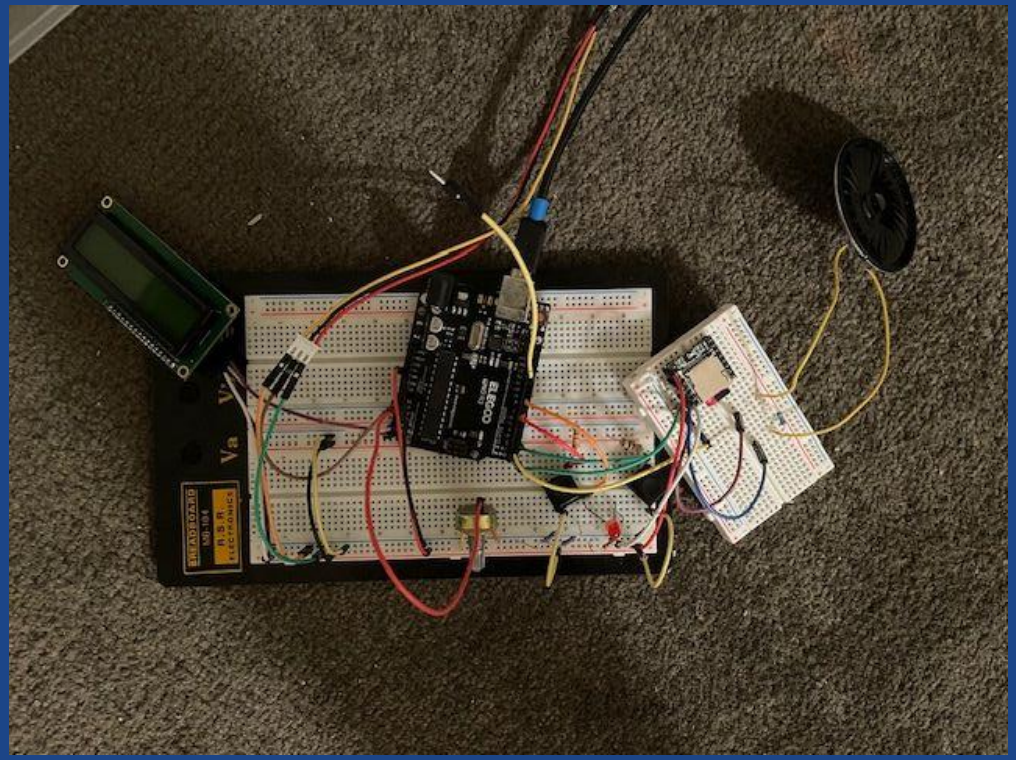
Aesthetics

- Spray painted for aesthetic
- Removable Steering Wheel

02

Electronics/Software

Building the brains



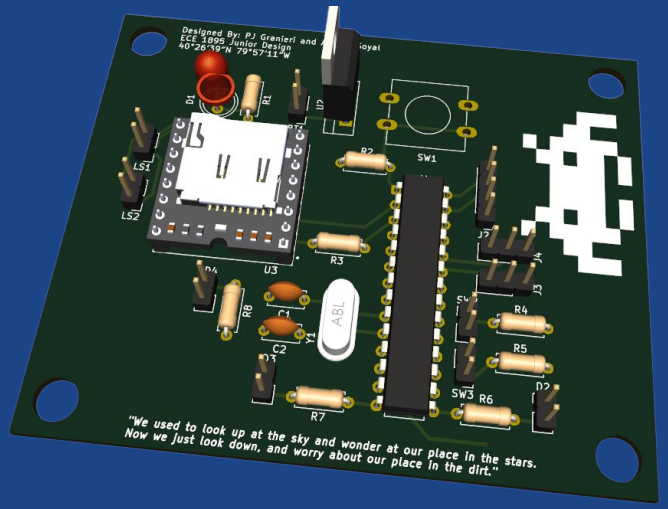
Breadboard

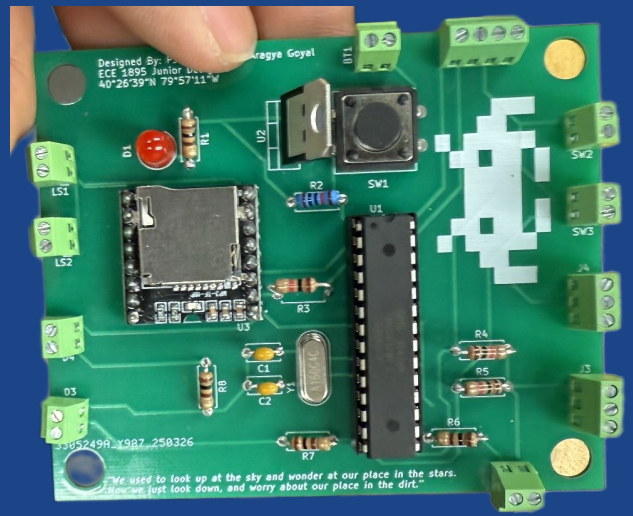
- Designed in components
- Slowly assembled after testing each individual component
- Only major issue was Software Serial

```
if(curTime-commandEntered>2000 && !dingPlayed){
  dingPlayed = true;
  myDFPlayer.play(2);
  dingTime = millis();
  commandPlayed = false;
  lightGreen(ledHigh);
}
if(curTime-dingTime>2000 && !commandPlayed){
  if(score>=99){
    running = false;
    inputValid = false;
    myDFPlayer.play(7);
  }
  else {
    inputValid = true;
    digitalWrite(8, LOW);
    commandPlayed = true;
    switch(command) {
      case TURNLEFT:
        myDFPlayer.play(6);
        break;
```

Software

- Timing was a common problem
- Best solution was FSM
- Ended up making sudo FSM using booleans





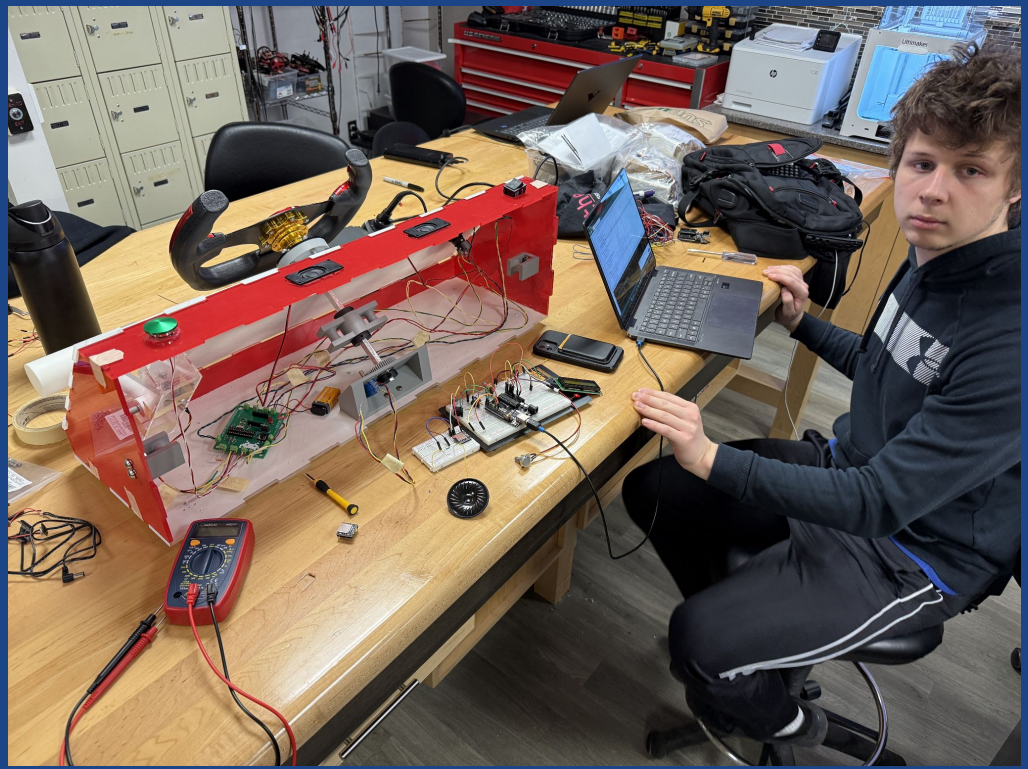
PCB Design (KiCAD)

- DF Player w/ SD Card
- Two Speakers
- LCD Display
- Voltage Regulator
- Two Encoders
- Two Press Buttons
- Crystal Oscillator
- Green LED
- Red LED

03

Assembly/Integration

Putting it all together



The AVCC Problem

Problem:

- Potentiometers were giving random inputs
- Worked Correctly at 5V and 0V

Solution:

- AVCC must also be tied to high in order for ADC to have a reference voltage