

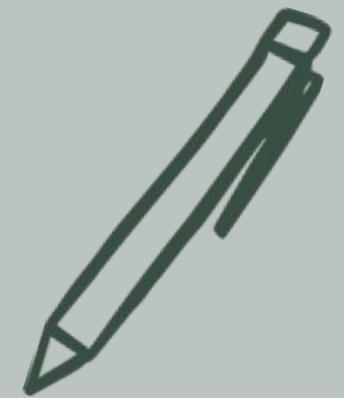


Can of Things



Goal

Our goal was to utilize servos, cameras, and computers to sustainability reduce landfill waste and encourage recycling classification through a smart trash can that can sort 6 different types of waste.





What we do?

Scan item

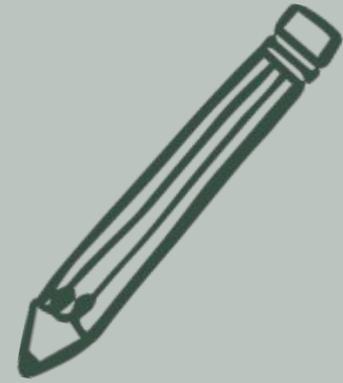


Rotate



Throw item

6 categories



01 Cardboard

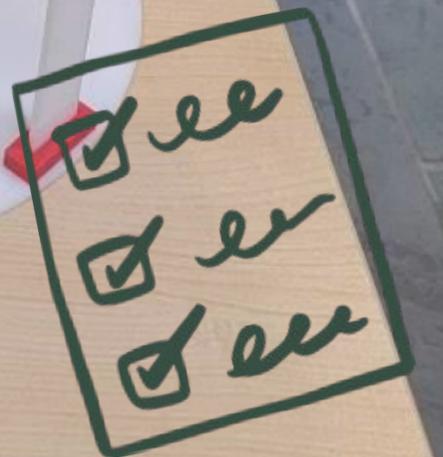
02 Glass

03 Metal

04 Paper

05 Plastic

06 Trash



Software Implementation



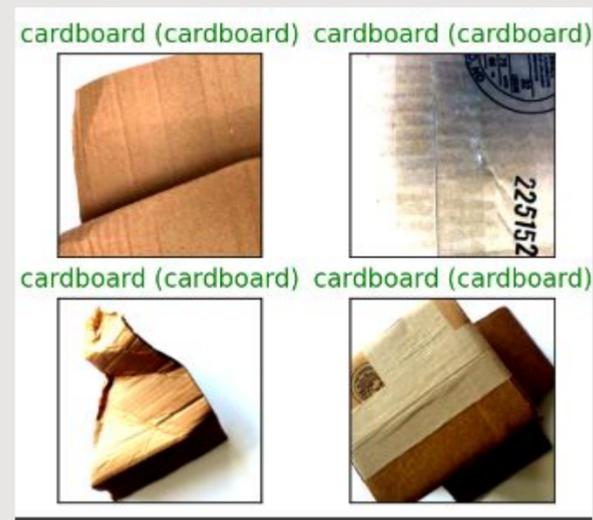
01

We researched datasets for the recyclable image classification and decided to use a combination of TrashNet (from Github) and Waste Classification Data (from Kaggle)



02

We used a pretrained VGG-16 deep convolutional neural network, with our own custom classification head.



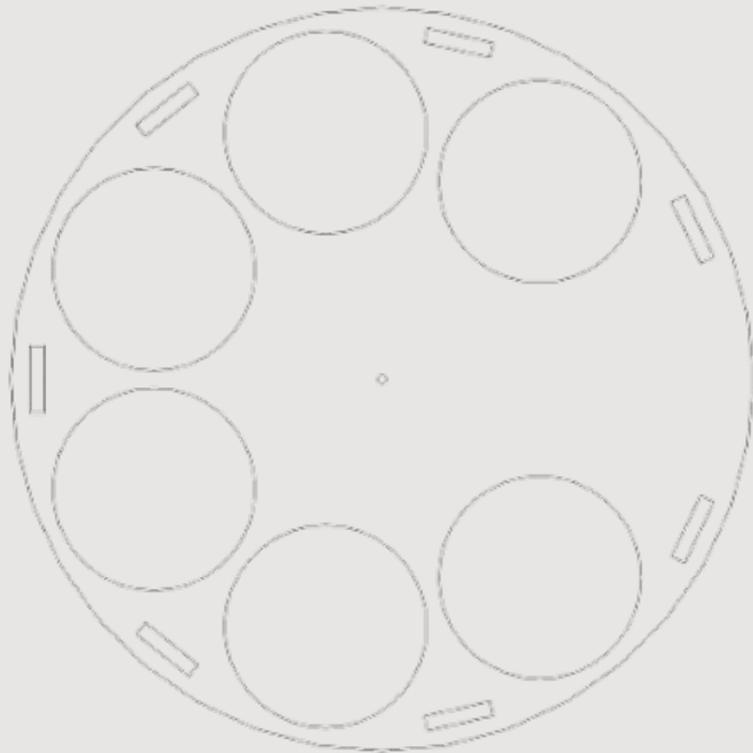
03

We send the resulting prediction through serial ports to the arduino in order to control the servo.

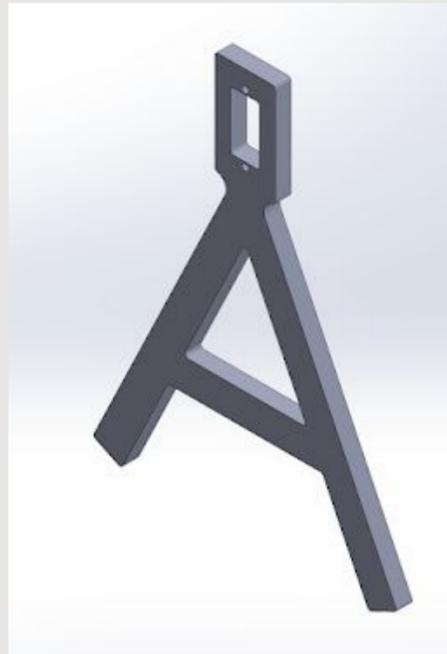
```
void loop() {  
  // Check if there is data available on  
  if (Serial.available() > 0) {  
    // Read the incoming data  
    String data = Serial.readString();  
  }  
}
```

➤ Hardware Implementation

- 01 Laser Cutting:
We designed our parts in Solidworks and exported them to .DXF files in order to laser cut them



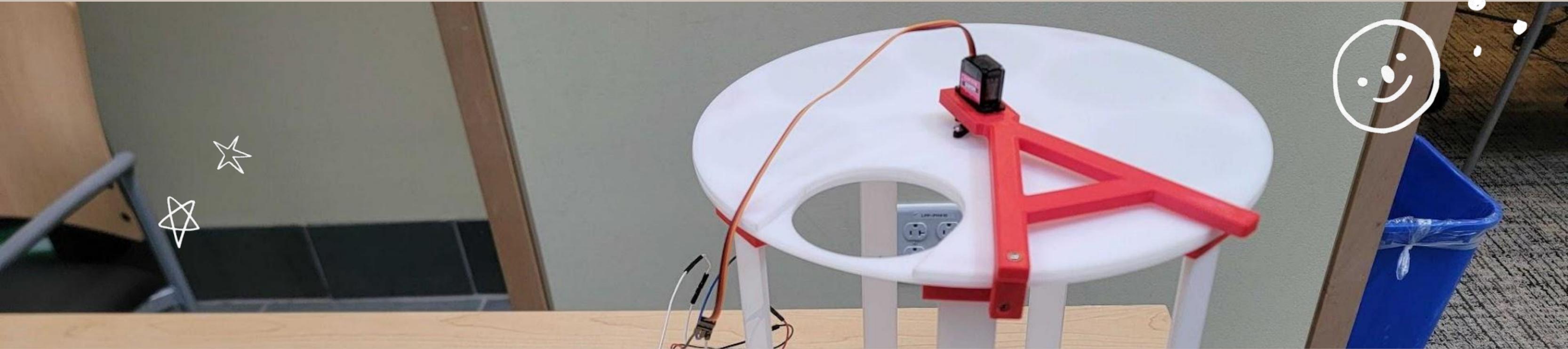
- 02 3D Printing:
For parts that couldn't be laser cut or for parts that needed to be made after the RPL closed, we designed them in Solidworks and 3D printed them



- 03 Integration:
We put together the laser cut parts, the 3d printed parts, and electronics with screws, bushings, and tape



Image classification



Initial Data Exploration



Realized trash category was lacking data so we bolstered it with images from another dataset

Model Research



Read papers to find the best-performing pre-trained architecture for the TrashNet dataset

Model Training



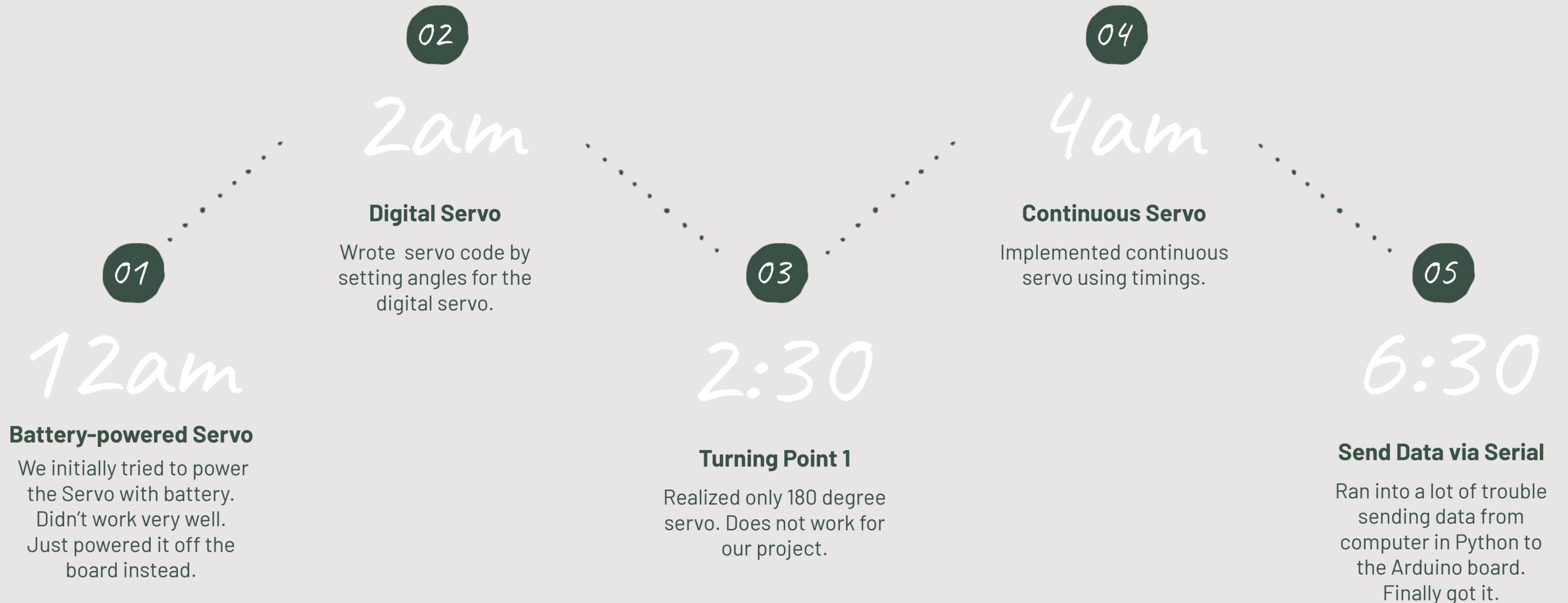
Trained classification layer of VGG-16 model. Achieved accuracy of 85% overall.

Model Refinement



Biased predictions towards 'trash' to achieve 95% accuracy on the trash category.

Servo Silliness



Thank You

