

Smart Waste Disposal

Makeathon Project (2/2-2/4)

I participated in a 36-hour design build competition where we were tasked with building a smart waste disposal system that would be able to distinguish between waste and recyclable materials.

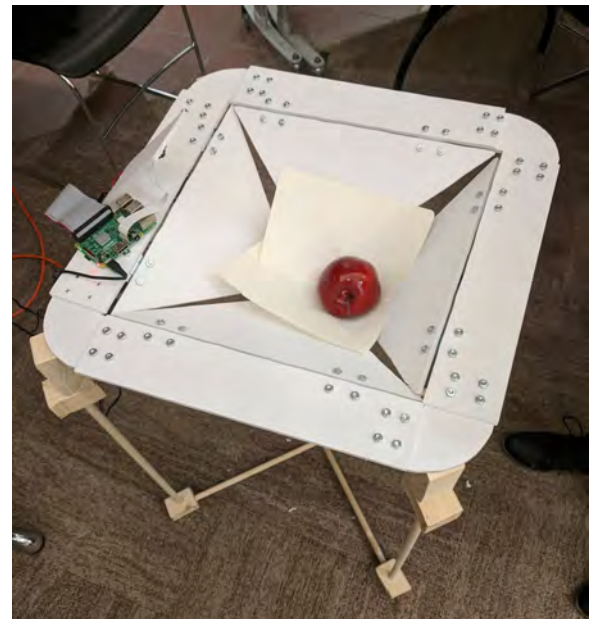
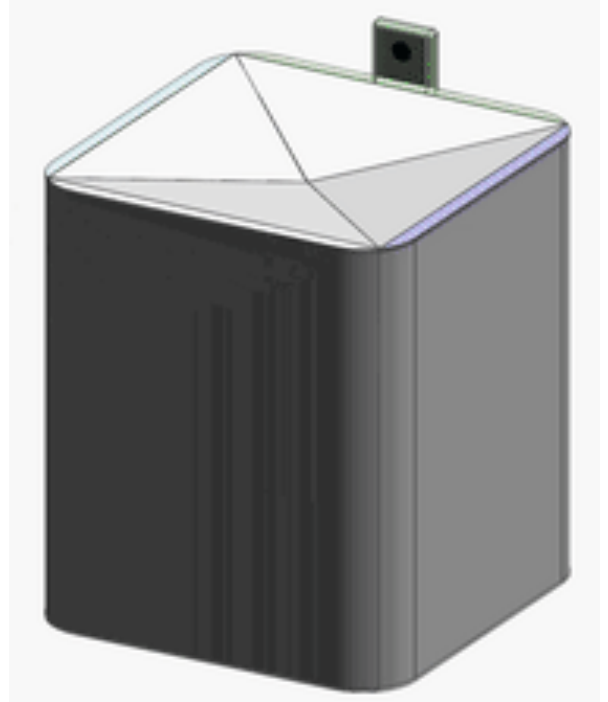
The project team was formed on the day of the competition. The group of three was split between creating the mechanical structure to house all the components and the electrical/coding needed to interface with all the sensors and servos.

The main components we decided on using for the project:

- | | |
|-----------------------------------|-----|
| - Fleetech 6V 6kg.cm Analog Servo | x 4 |
| - Raspberry Pi | x 1 |
| - Raspberry Pi Camera Module v2 | x 1 |

I worked on the electronics/coding segment where I used OpenCV library to evaluate the pixels captured by a picture. It calculated the majority pixel color and the amount of pixels to determine the size and color of the object.

Each lid was driven by a separate servo interfacing with GPIO. This ended up leading to a large current draw and we planned on switching to SPI with a dedicated hardware component to generate the PWM signal for each servo.



Demonstration of the prototype video:

<https://drive.google.com/file/d/1Zb3gILpLPso-Wy73aj5jFwpsXF4vvPq4/view?usp=sharing>

Electronic Skateboard

Esk8 Freelance work

I designed and built an electronic skateboard while maintaining close contact with the client during the build to ensure transparency and a product with the envisioned idea. **Client reference:** karl@vmware.com

[Build 1]: *OG-LY*

Name with respect to the original Landyachtz, this build was a throwback to a retro form with modern electronic components. A detailed build log, including problems that came up is listed here:

<https://www.electric-skateboard.builders/t/ogly-landyachtz-urban-assault/66777>

Using an open source speed controller (VESC), I programmed the appropriate parameters according to the battery setup and motor configuration. Machined a weatherproof enclosure out of a guitar pedal enclosure provided by the client. Safety was a high priority for the build as evidenced through the usage of an anti-spark switch circuit, vibration dampening Sorbothane and water-proofing cable glands.

[Build 2]: *MEEVO*

Deck swapped a Verreal F1 commercial board onto a Landyachtz Evo Falcon 2018. Swapped out the battery for a larger 18650 flatpack, 10 cells in series and 3 in parallel, with a fiberglass enclosure.

Used stainless steel threaded inserts, countersunk washers, and anodized bolts in the aim of accomplishing an aesthetics low profiled build.

Skills gained or topics reinforced through builds:

- VESC software and hardware familiarity
- Battery and General electronics concepts
- Brushless Motor composition
- Soldering + Hand tools



OG-LY: Top to down

- 1) Initial parts
- 2) Top view
- 3) Zoomed side view of the enclosure & drive train

MEEVO: Left to Right

- 1) Initial parts
- 2) Top view
- 3) Belly view

Robotics Team

Gunn Robotics team 192

I was a member of the Gunn Robotics team from 2013 to 2016 and the team captain on the last year. The Gunn Robotics team was a participant in the annual FIRST robotics Competition. I was a part of the welding, structures, and drive train team.

Leadership

As my role as Captain, I planned and led two classes period of 50+ students by designing out projects prompts and class curriculum. I helped support the creation of the new strategic team that was integral to deciding the design of our robot from an early stage.

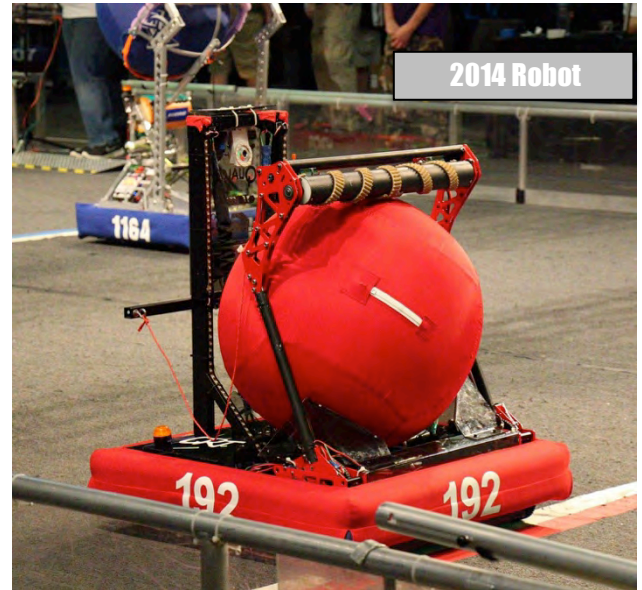
I organized corporate sponsorships, machine shop training, and communications with students and their parents.

Welding and Designing

I welded the 2015 and 2016 robot using a TIG welder setup. I was involved with communicating with other students about their design's ability to be welded. In addition to being responsible for procuring the supplies necessary to maintain the welder, I taught other students how to weld.

Drivetrain

I developed my skills on the lathe and the mill as I was tasked with creating an assortment of parts made from aluminum, steel and plastics.



Card Scanner

Makeathon Event check in card reader

As a part of the logistical team, I was tasked with figuring out the best method to expedite the process for checking into our event. While the C++ code is simple, the card reader function hit all the requirements we needed.

	A	B	
1	Last_name/F	UMID#	
2	SHEN/M	12345678	
3	LI/C	45678910	
4	JIN/R	23456789	
5			
6			
7			



```

4 #include <iostream>
5 #include <string>
6 #include <fstream>
7 #include <cassert>
8 using namespace std;
9
10 string umid_parser(string swiper_info);
11 string name_parser(string swiper_info);
12
13 int main(){
14     ofstream out;
15     string info;
16
17     out.open("mccard_output.csv", ios::app);
18     out << "Last_name/First_initial/UMid" << endl;
19     out.close();
20
21     cout << endl << "Swipe MCard or press '\n' to quit" << endl << endl;
22
23     while(cin >> info){
24         if(info == "q"){
25             return 1;
26         }
27
28         cout << name_parser(info) << ", " << umid_parser(info) << endl;
29         //RUNNING INTO PROBLEM OF DELETING LEADING 0 for UMID
30         out.open("mccard_output.csv", ios::app);
31         out << name_parser(info) << ", " << umid_parser(info) << endl;
32         out.close();
33
34         out.open("mccard_output.txt", ios::app);
35         out << name_parser(info) << " " << umid_parser(info) << endl;
36         out.close();
37     }
38 }
39
40 string umid_parser(string swiper_info)
41 {
42     return swiper_info.substr(7,8);
43 }
44
45 string name_parser(string swiper_info)
46 {
47     swiper_info.erase(swiper_info.end()-8,swiper_info.end());
48     return swiper_info.substr(18,100);
49 }

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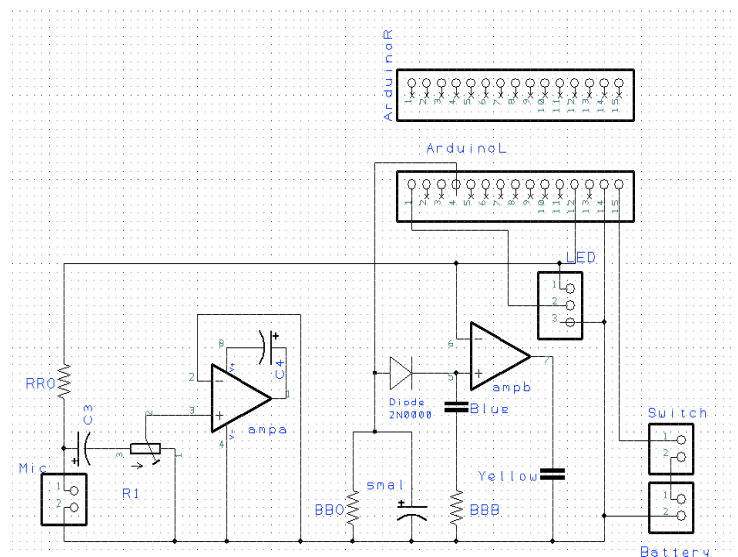
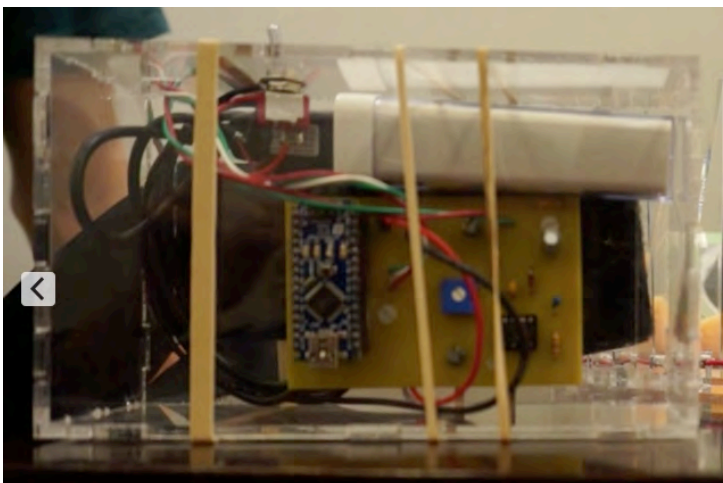
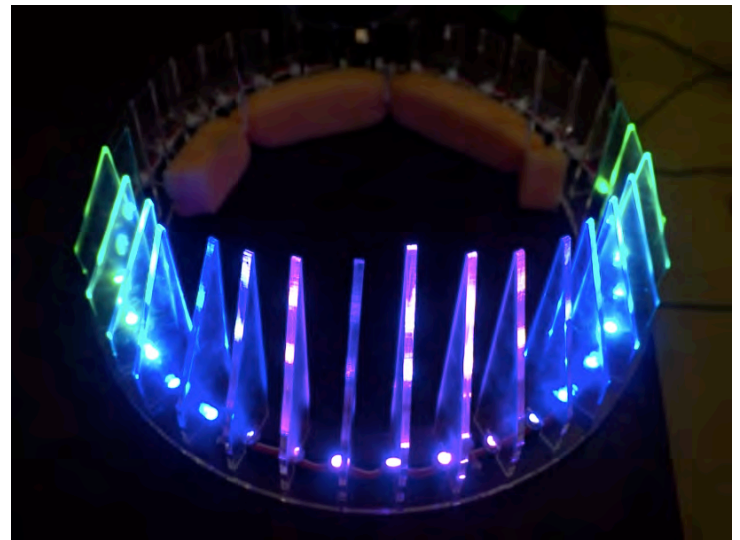
LED Crown

Rose-Hulman Summer Program

The project was to create an LED Crown that would light up LEDs according to how loud the ambient noise was. My role was designing the circuit and writing the C code to light up the crown.

I used Design Spark and tested circuit design on a breadboard in parallel to determine the best version iteration of the circuit.

The general circuit was an op amp circuit with a diode used to filter/smooth the circuit to erase more sporadic noise signals picked up from the microphone. The program was run off of an Arduino NANO powered by a portable battery.



Demonstration of Crown video:https://drive.google.com/file/d/16n79OwRFtP4ux-BIdVrtCL6voD_kJssN/view?usp=sharing