

2019 Hoverbear Spring Semester

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<https://classes.engineering.wustl.edu/ese205/core/index.php?title=Hoverbear>

Introduction

We are going to be constructing a hoverboard that would be able to hover a few centimeters off the ground.

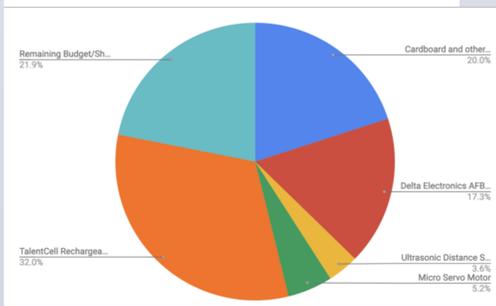
Setting 1: The Hoverbear is able to avoid obstacles

Setting 2: The Hoverbear is able to follow a line of tape

Setting 3: The Hoverbear is able to follow commands.

Budget

Item	Quantity	Cost
Cardboard	1	\$10.00
Delta Fan	2	\$25.99
Ultrasonic Distance Sensor	3	\$5.42
Micro Servo Motor	1	\$7.79
Talentcell Battery	1	\$23.99
Remaining Budget		\$39.98
Total Budget		\$150.00

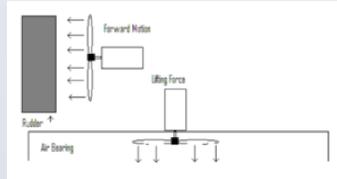


Challenges

The hoverbear will be a careful balance between power and weight: The heavier the craft is, the more power is required to keep it afloat. The heaviest machine part will either be the fans or the battery.

It could be a challenge to learn how to utilize the ultrasonic distance sensor so we can be self dependent and navigate through obstacles. In addition, we will be trying to use more than one ultrasonic distance sensor. It may be hard to calibrate all distance sensors.

Not everyone in the group is familiar with Arduino programming. Learning how to use an Arduino is likely to take time out of the building process of the project.



Solutions

- For obstacle avoidance, we decided to use ultrasonic distance sensors and a servo motor
 - The ultrasonic distance sensors are able to notice any obstacles in the way of the hovercraft and tell the arduino how far away they are
 - The servo motor can then receive the signal from the Arduino and turn accordingly
- For help stay airborne, we used a lightweight foam frame and a skirt
 - The lightweight foam frame is both firm enough to support the fans and circuitry while light enough to fly
 - The skirt is able to trap the air underneath it, so it can better maintain static air pressure.

Coding

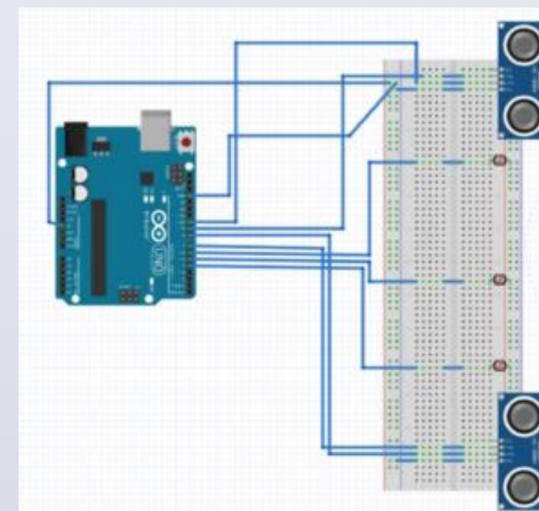
-This code simply checks to see if there is an obstacle in front of the hoverboard

```
boolean obstacle() //checks for obstacles. Returns true if an obstacle is within
//false otherwise.
{
  if (cm < range)
  {
    Serial.println("There is an obstacle");
    Serial.println(cm);
    return true;
  }
  else
  {
    Serial.println("There is no obstacle");
    return false;
  }
}
```

-This code turns the servo motor in the back which is attached to rudders. This allows the hovercraft to turn once the obstacles have been detected.

```
void turnLeft() // tells the servo to turn left
{
  servoWrite(0);
  Serial.println("Turning left!");
  turning();
}

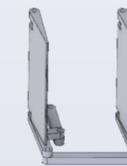
void turnRight() // tells the servo to turn right
{
  servoWrite(180);
  Serial.println("Turning right!");
  turning();
}
```



Components



Delta Fan
12V
3.24A
210 CFM



Talentcell Battery
3000mAh
12V
4Hr Duration



EK-Furious
Vardar EVO
107 CFM
Power Draw: 5.64W
Voltage: 12V