TEC-V

MILESTONE 2

By: Michael Dowling & Zealand Brennan

CLIENT

- DR. Wood
  - **Professor** | Ocean Engineering and Marine Sciences
  - **Program Chair for Ocean Engineering**

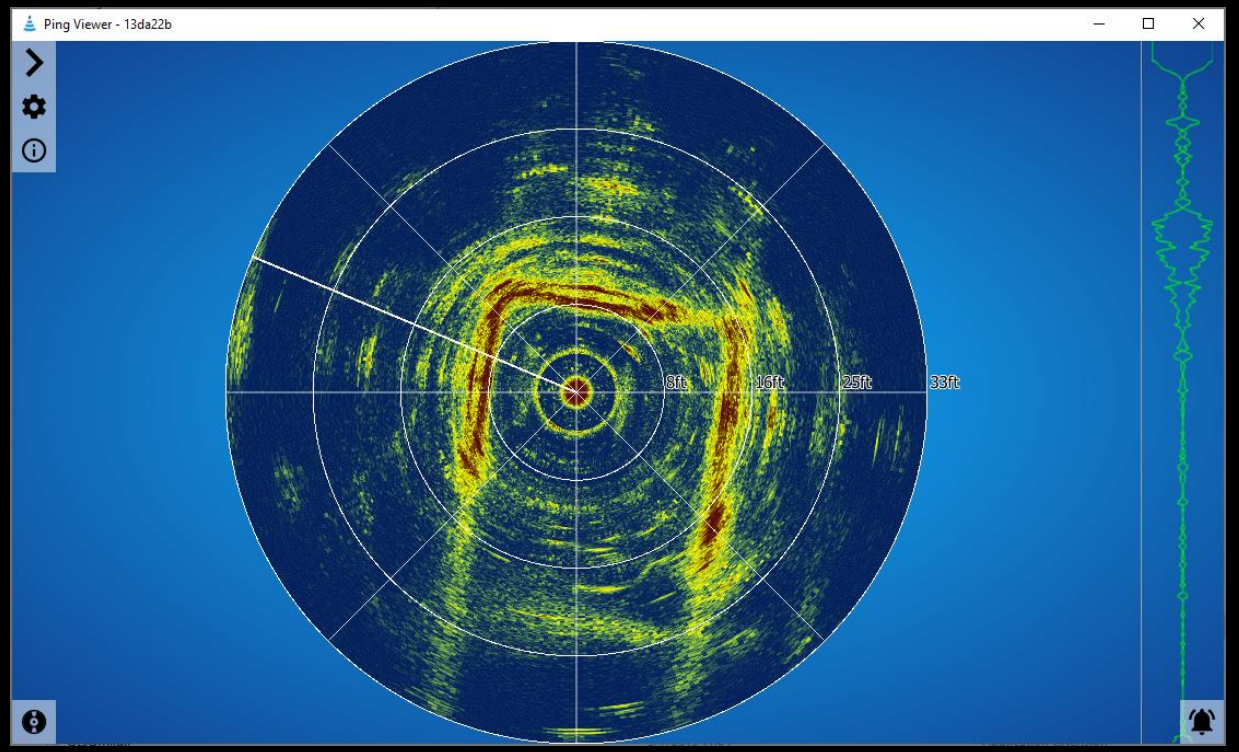
MILESTONE 1 OVERVIEW

- Sonar Data Retrieval
- Information Saving
- Testing
- Data Interpretation
- Point Cloud Plotting

SONAR DEVICE

Ping 360

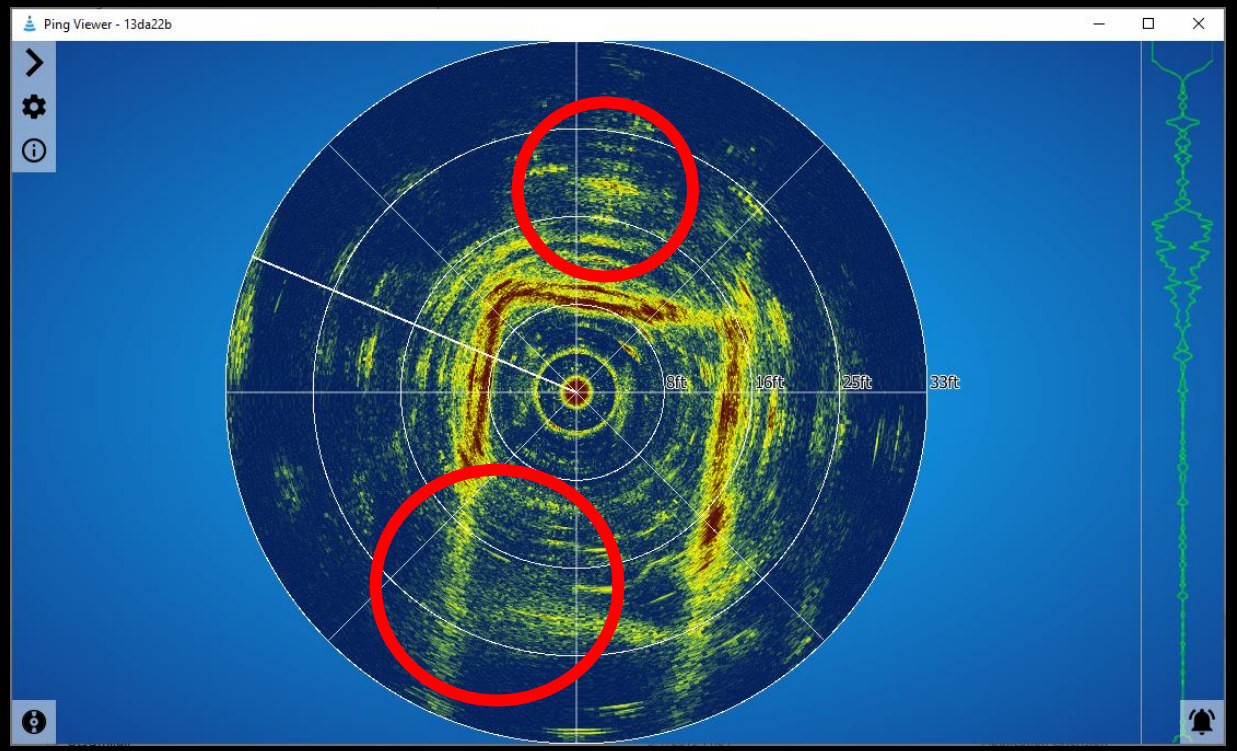
- Data is read by degrees and intensity values.
- Main view of what data you may come across



DETAILS

Main Problems

- Data can be missed by the sonar
- Reflections can cause higher intensity values than actual readings
- .8 meters from center is not viable



DATA RETRIEVED

Message

- Loop that asks for the intensity values at x degree to be sent back
- Intensity values 0-255
- Range 1200 in array

EXAMPLE: Intensity array

[0, 4, 134, 55, 20, 100, 160, 255, 240…….]

```
78
79  for currentAngle in range(400):
80      # Read a single iteration of intensity data
81      ping_data = ping360.transmitAngle(currentAngle)
82
83      # Extracting intensity as integer values
84      intensity_data = [(struct.unpack('!H', int(data).to_bytes(2, byteorder='big'))[0], i)
85                        for i, data in enumerate(ping_data.msg_data)]
86
87      # Store the raw data for the current angle
88      raw_data[currentAngle] = intensity_data
```

DATA SAVING

Data.csv

- Three categories
  - Depth (in progress)
  - Angle
  - Most likely distance to object

DataRead.cs | data.csv

Assets > data.csv

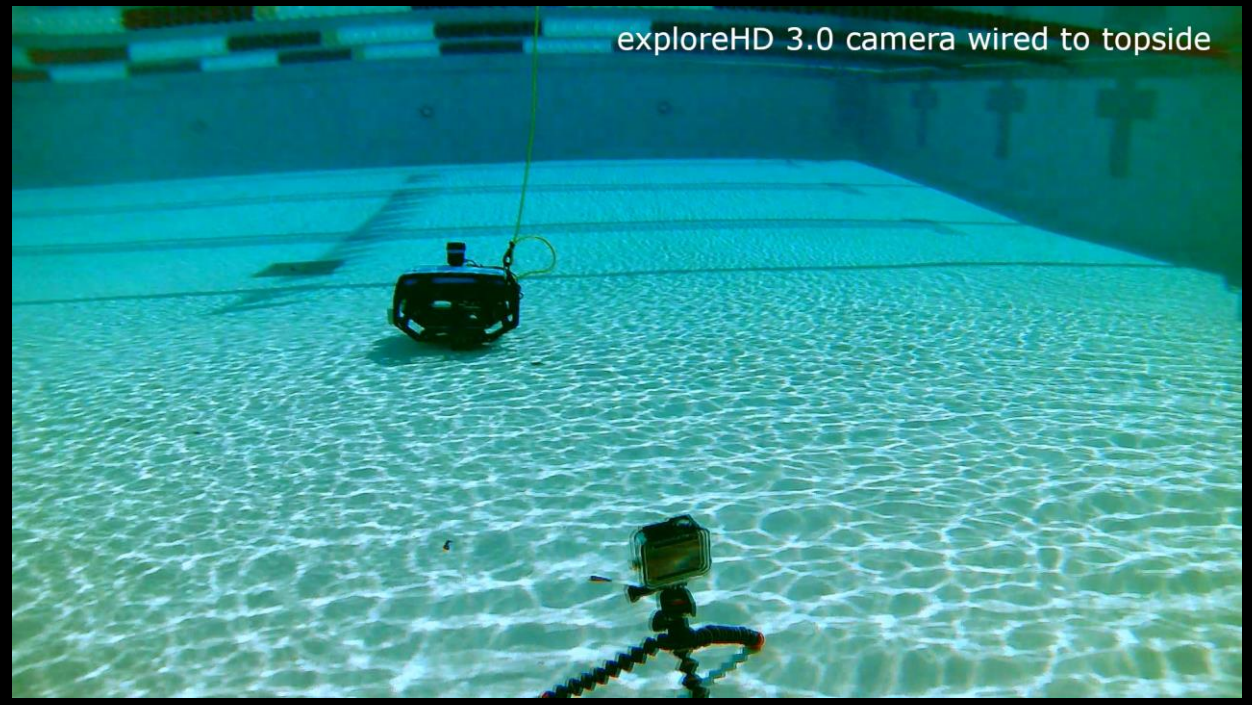
```
1   0,0,5.16552375
2   0,1,5.116406249999999
3   0,2,4.993612499999999
4   0,3,4.9526812499999995
5   0,4,4.846259999999999
6   0,5,4.739838749999999
7   0,6,4.690721249999999
8   0,7,4.657976249999999
9   0,8,4.592486249999999
10  0,9,4.543368749999999
11  0,10,4.4778787499999995
12  0,11,4.396016249999999
13  0,12,4.3632712499999995
14  0,13,4.314153749999999
15  0,14,4.29778125
```

TESTING

10-21-23

- Clemente Pool 10 a.m. to 1 p.m.

- Goal:
  - Test sonar data retrieval
  - Collect Data for Cloud Plotting
  - Have a real-world test to see accuracy



POOL TEST

Transcription

- Idea 1: Using Java
- Original Formula was incorrect

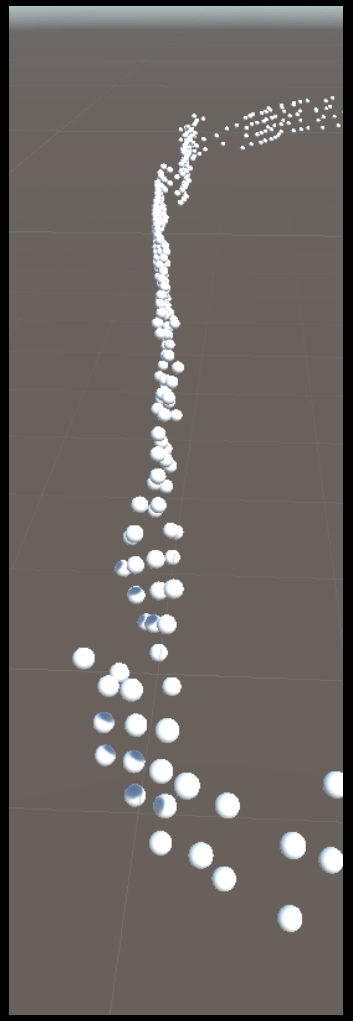
```java
// Normalize the angle
double angleDegreesNormalized = angleDegrees % 360;
double angleRadians = Math.toRadians(angleDegreesNormalized);

double x = distance * Math.cos(angleRadians);
double y = distance * Math.sin(angleRadians);
```

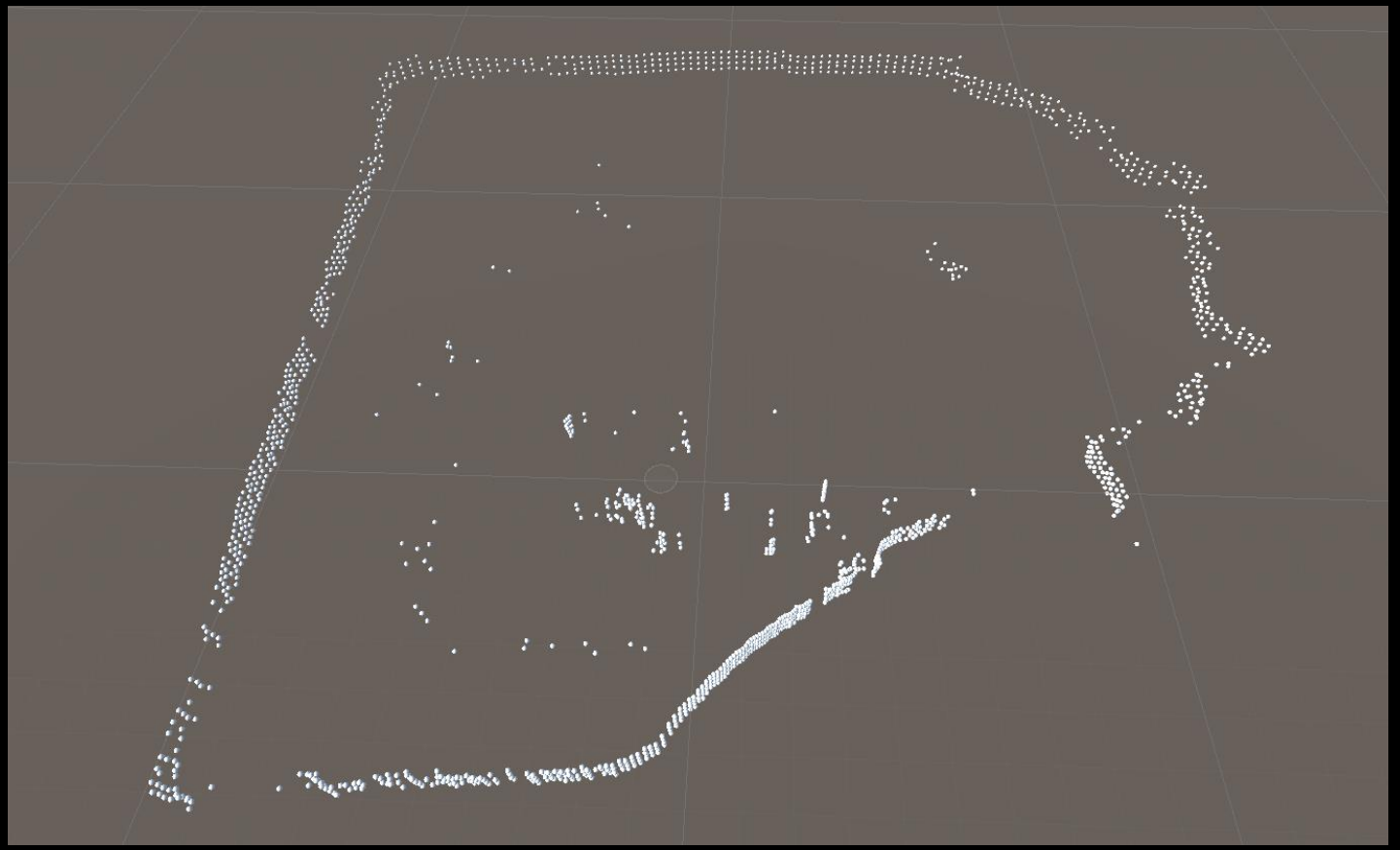
UNITY

- Idea 2: Unity
  - Secondary formula corrected
  - Better data manipulation

```
while (!endoffile)
{
    string Data_String = stReader.ReadLine();
    if (Data_String == null)
    {
        endoffile = true;
        break;
    }
    var datavalues= Data_String.Split(',');
    Debug.Log(datavalues[0].ToString() +','+ datavalues[1].ToString() + ','+datavalues[2].ToString());
    Instantiate(sphere, new Vector3(Mathf.Cos(float.Parse(datavalues[1])*
                (Mathf.PI/200))*scale*-1* float.Parse(datavalues[2]),
                float.Parse(datavalues[0])*scale/5, Mathf.Sin(float.Parse(datavalues[1])
                * (Mathf.PI / 200)) * scale *float.Parse(datavalues[2])),
                new Quaternion(1, 1, 1,1));
}
```

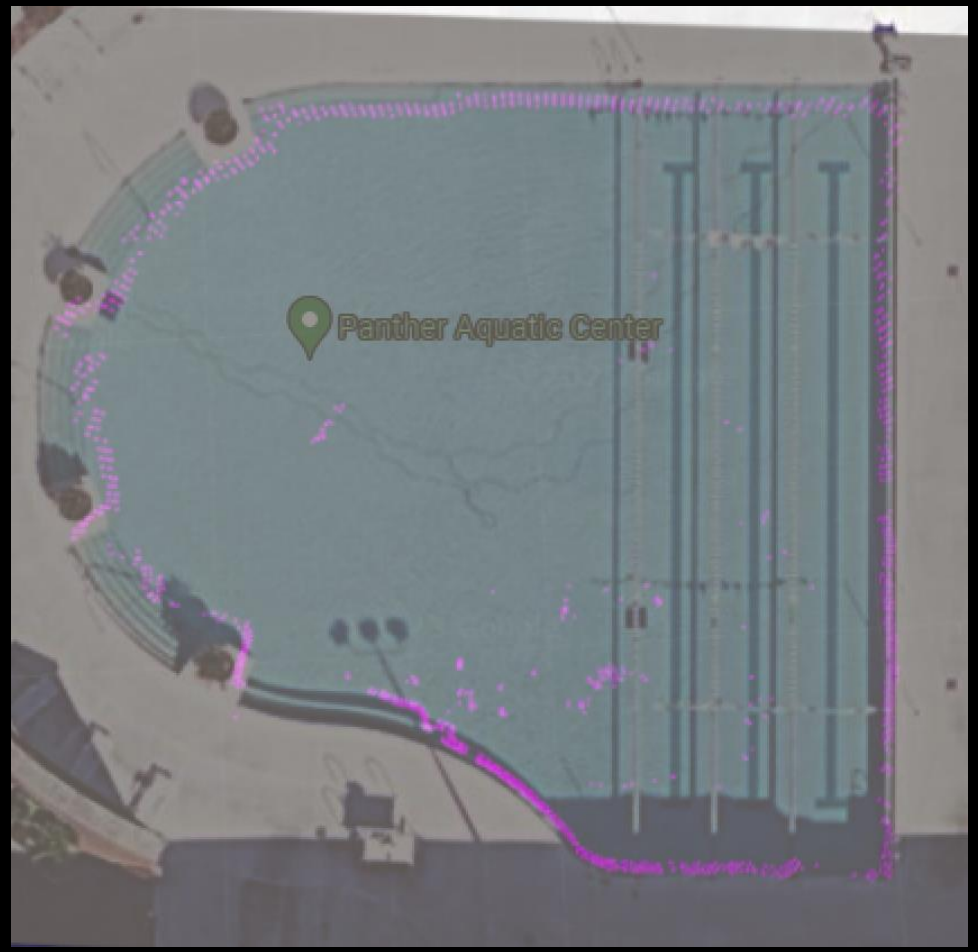
UNITY





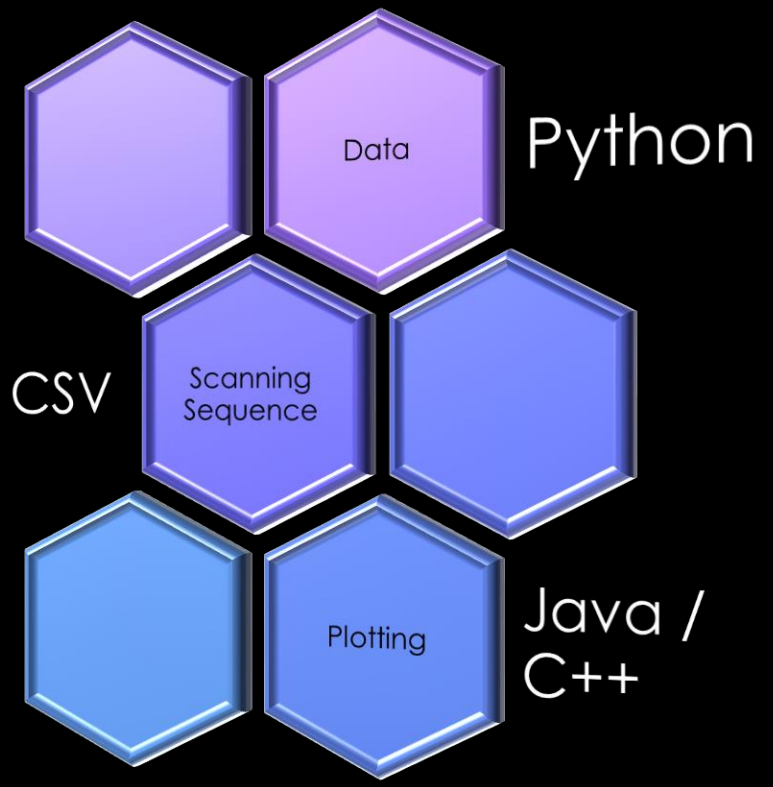
TRANSPOSE

- Data shows accuracy along flat edges
- Slight difficulty along the shallow end
- Shadows from where the sonar was unable to see



TOOLS

- Data: Python
  - Git Hub package that allows for simple commands
- Plotting: Unity / C++
  - Allows for better data manipulation in 3D environment



MILESTONE 3: TASKS

1. ❑ **Improve False Data:**
   - ❑ Create a sorting algorithm to remove false data
2. ❑ **Telemetry Data:**
   - ❑ **Gain access to accurate depth and positioning instruments**
3. ❑ **Cloud Plotting / Testing**
   - ❑ **Use Gazebo to plot and test AI pathing**

Live Demo

WEBPAGE LINK

TEC-V

https://bluecodehydra.github.io/FIT_Project-TEC_V/data.html

QUESTIONS?