



Department of Electronics & Communication Engineering

Project Proposal Presentation on “GPS-Integrated Autonomous Surface Vehicle for Depth Mapping and Environmental Water Testing”

By

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Introduction

Water survey teams face challenges such as labor-intensive methods, difficult access to remote areas, and inconsistent data quality. Traditional methods often miss trends and can disturb ecosystems. Limited resources and the need for advanced technology expertise add to the difficulties. Autonomous systems can significantly improve efficiency and accuracy in water resource management.

Problem Statement

Accurate and detailed information about water bodies is crucial for various applications, including environmental monitoring, hydrographic surveys, aquaculture management, and recreational activities. Traditional methods of gathering water depth and quality data can be labour-intensive, time-consuming, and limited in scope. Autonomous systems offer a promising solution to these challenges by enabling continuous, high-resolution data collection with minimal human intervention.



Current method

- Traditional method is used where a team of researchers go to targeted spot and collect water sample for testing
- Uses high end boats for under water survey in oceans but it is not applicable for small water bodies like river , lake etc.
- Professional team of divers has been used for bathymetric survey.
- Time consuming and investment.

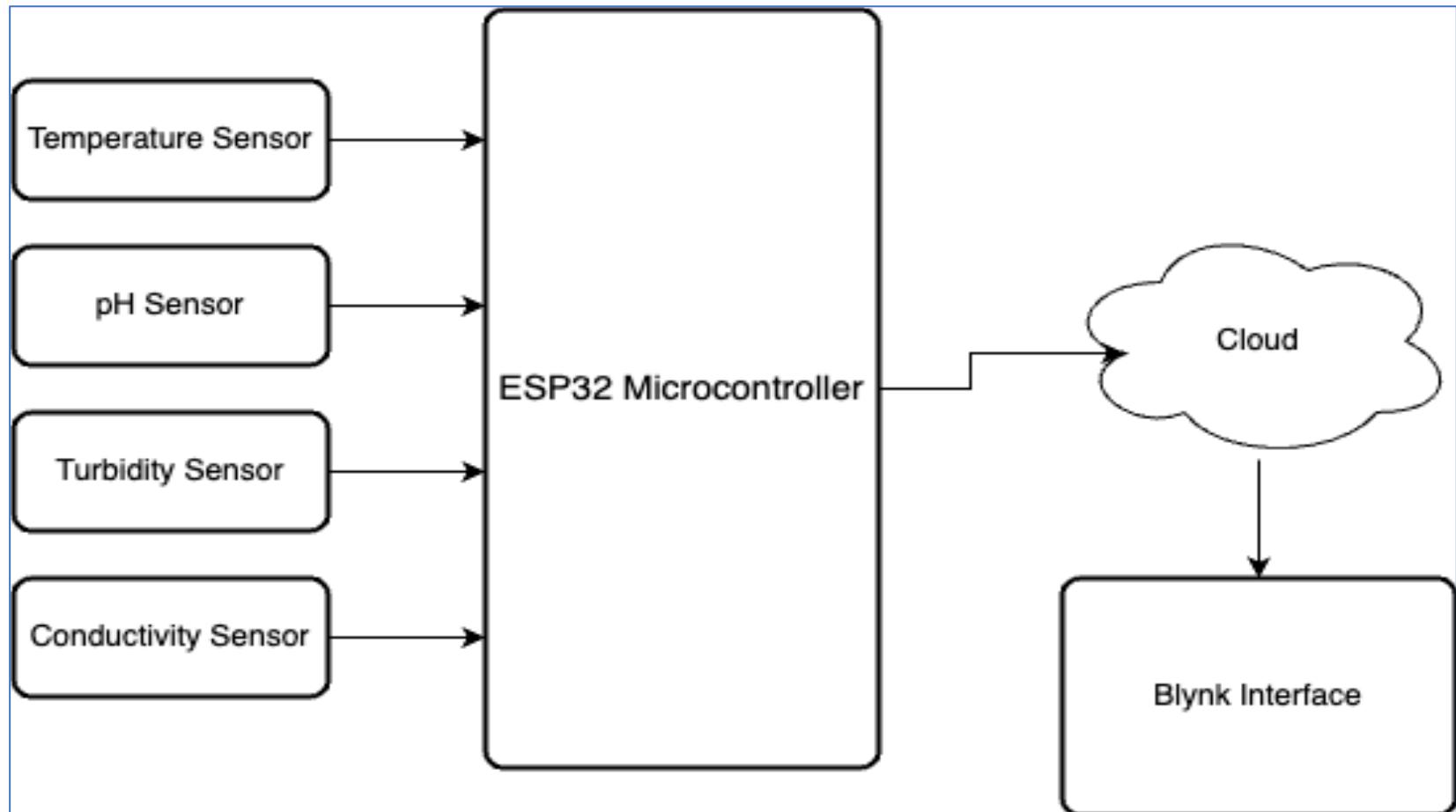


Project Objectives

- Autonomous navigation system.
- Accurate under water bathymetry, Provide accurate 3d mapping of underwater structures.
- The system should be able to sustain the high currents.
- Accurate data analysis of water quality
- No manual interference and multipurpose usability.



METHODOLOGY





WATER QUALITY TESTING

Parameter	Sensor Type	Measurement Range	Sample Value	Units	Comments
pH	pH Electrode	0 - 14	7.2	pH units	Indicates water acidity or alkalinity
Temperature	Digital Thermistor	-55°C to +125°C	23.5	°C	Common sensor: DS18B20
Turbidity	Turbidity Sensor	0 - 4000 NTU	67	NTU (Nephelometric Turbidity Units)	Measures clarity; affected by particles
Conductivity	Conductivity Probe	0 - 200,000 µS/cm	350	µS/cm	Measures ion concentration in water

pH	Temperature (°C)	Conductivity (µS/cm)	Turbidity (NTU)
7.2	23.5	350	60
7.3	23.6	355	66
7.1	23.4	350	81
7.2	23.5	355	88
7.3	23.6	350	80
7.2	23.5	355	83
7.1	23.4	350	85
7.2	23.5	355	91
7.3	23.6	350	88
7.2	23.5	355	89



WATER QUALITY TESTING

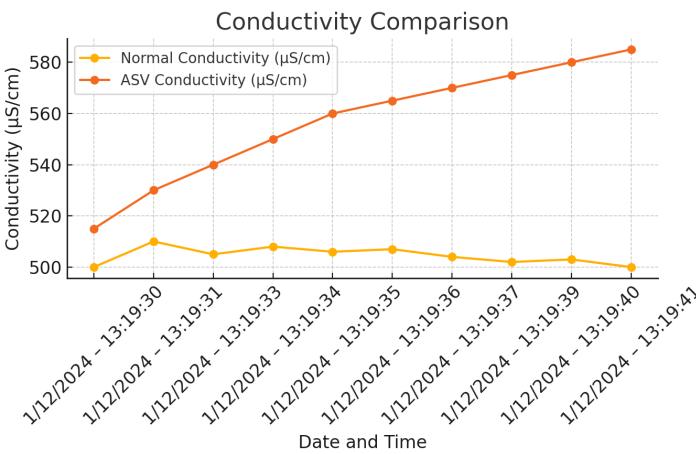
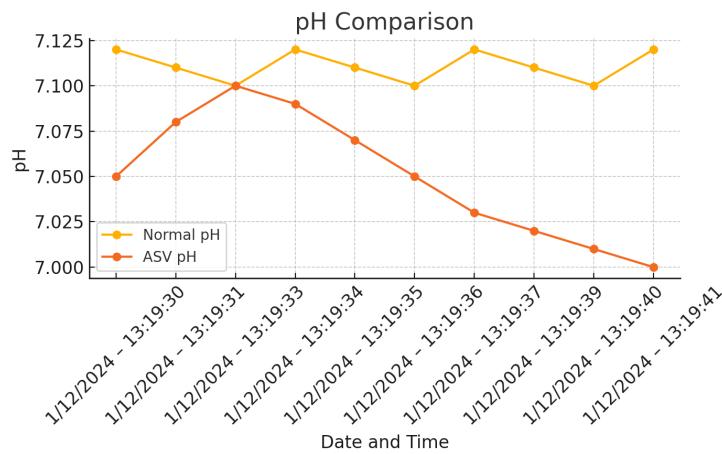
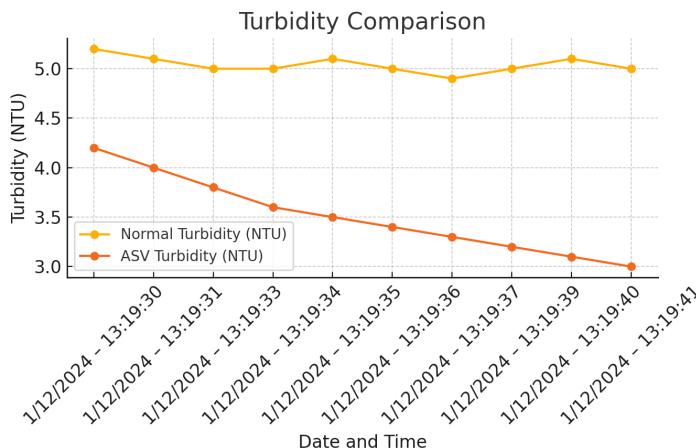
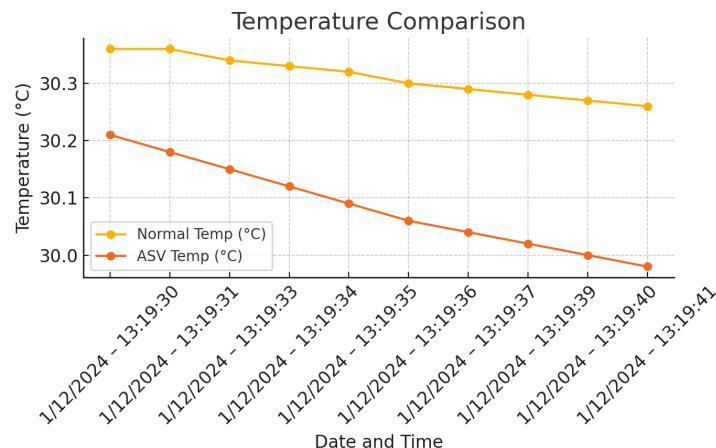
COMAPARISION TABLE

A	B	C	D	E	F	G	H	I
Date and Time	Normal Testing				ASV Testing			
	Temp (°C)	Turbidity (NTU)	pH	Conductivity (µS/cm)	Temp (°C)	Turbidity (NTU)	pH	Conductivity (µS/cm)
1/12/2024 – 13:19:30	30.36	5.2	7.12	500	30.21	4.2	7.05	515
1/12/2024 – 13:19:31	30.36	5.1	7.11	510	30.18	4	7.08	530
1/12/2024 – 13:19:33	30.34	5	7.1	505	30.15	3.8	7.1	540
1/12/2024 – 13:19:34	30.33	5	7.12	508	30.12	3.6	7.09	550
1/12/2024 – 13:19:35	30.32	5.1	7.11	506	30.09	3.5	7.07	560
1/12/2024 – 13:19:36	30.3	5	7.1	507	30.06	3.4	7.05	565
1/12/2024 – 13:19:37	30.29	4.9	7.12	504	30.04	3.3	7.03	570
1/12/2024 – 13:19:39	30.28	5	7.11	502	30.02	3.2	7.02	575
1/12/2024 – 13:19:40	30.27	5.1	7.1	503	30	3.1	7.01	580
1/12/2024 – 13:19:41	30.26	5	7.12	500	29.98	3	7	585



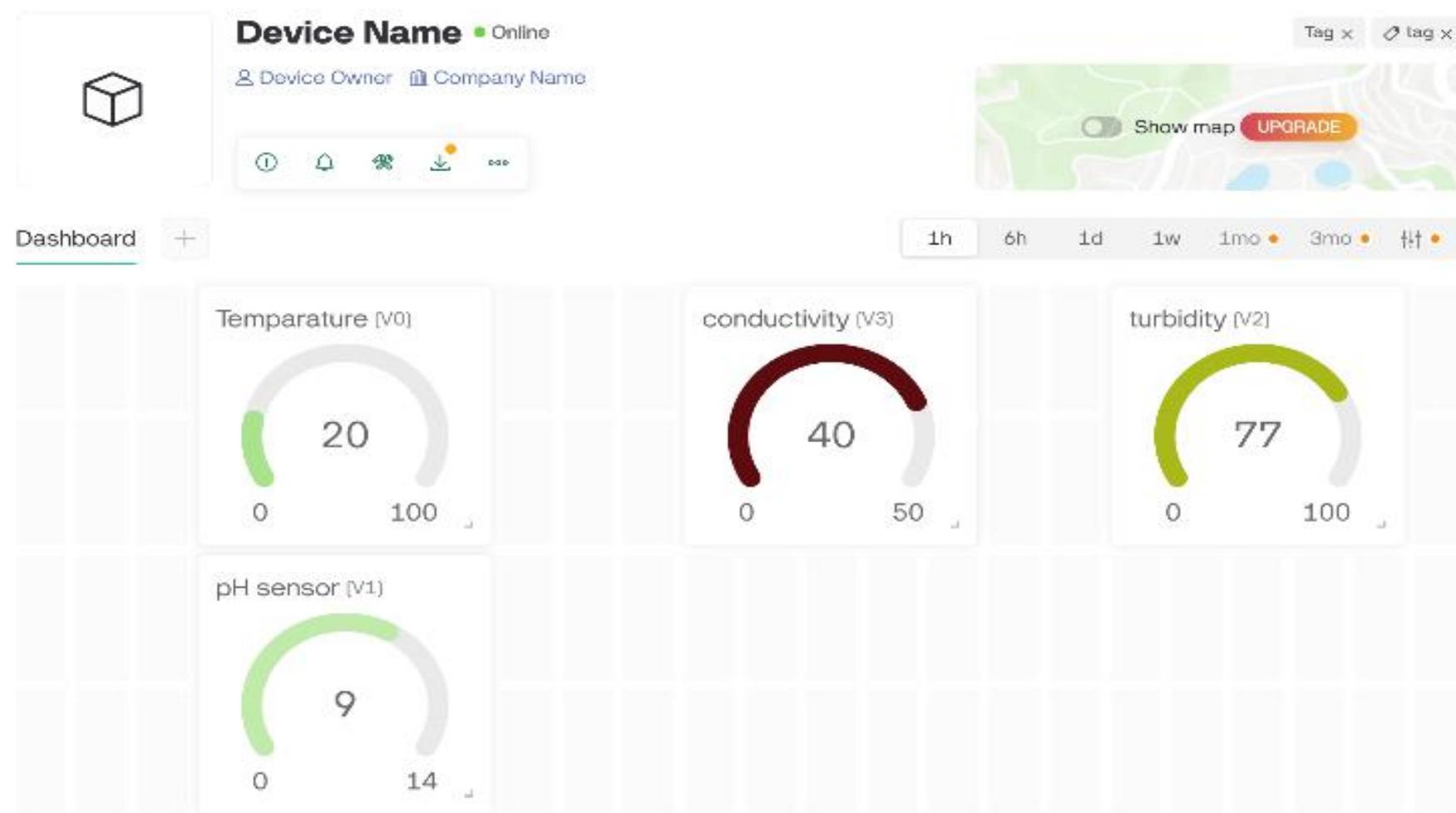
WATER QUALITY TESTING

Comparison of Normal Testing and ASV Testing Parameters

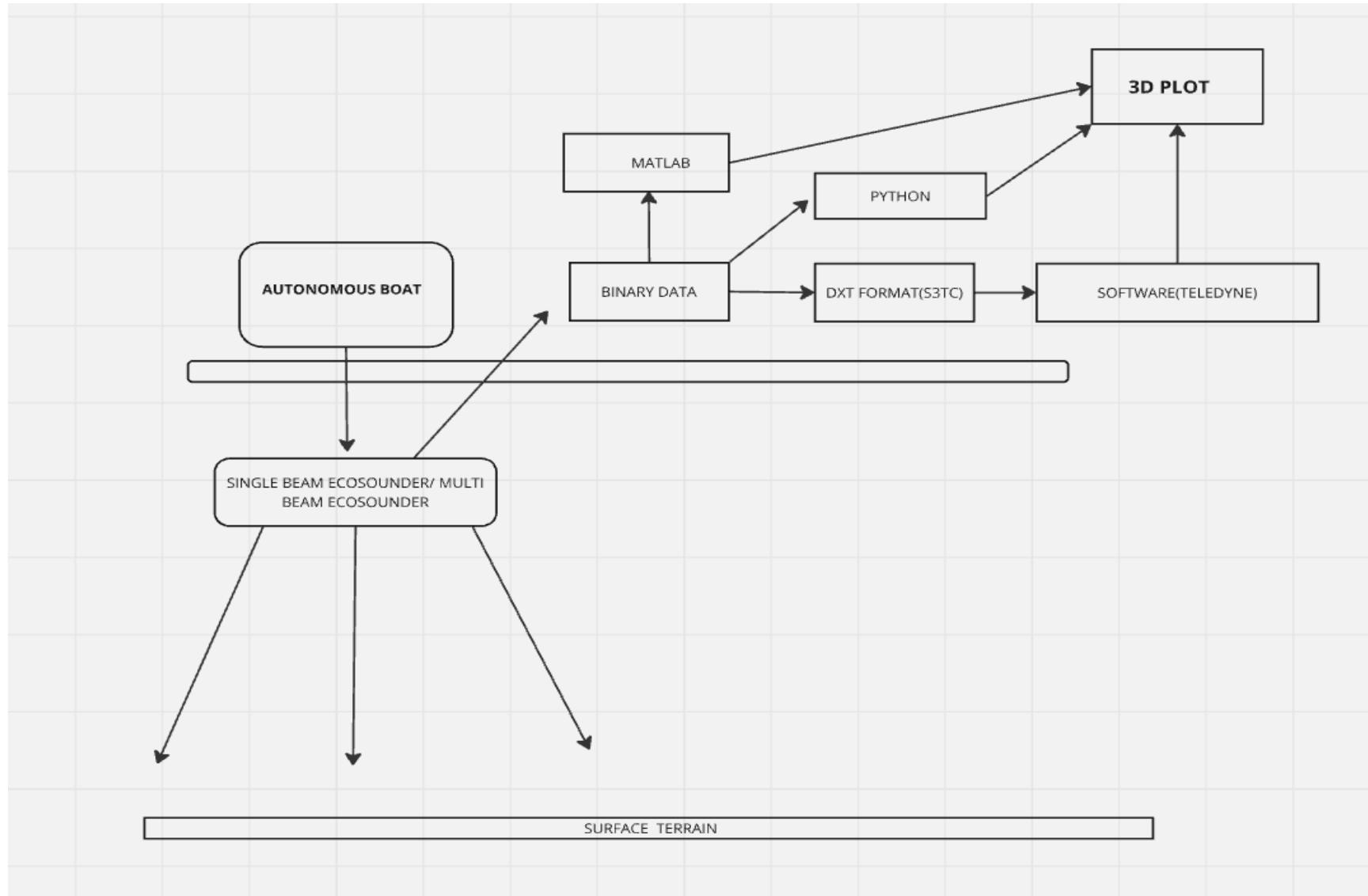




WEB INTERFACE



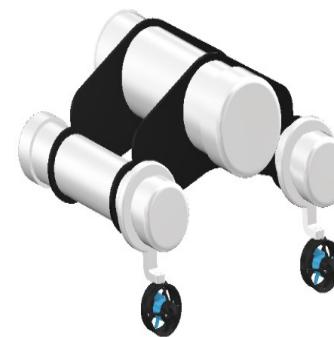
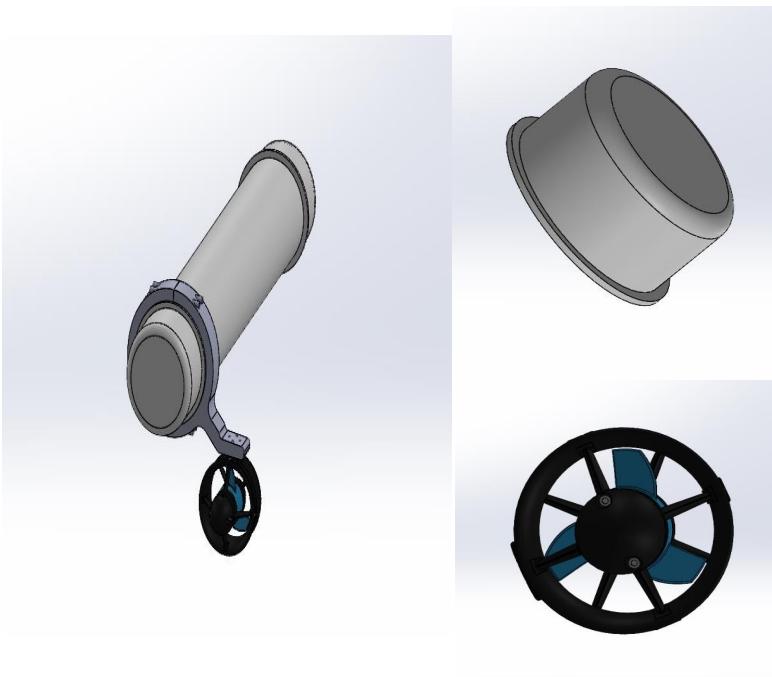
METHODOLOGY





Progress Achieved

● CAD Design



Progress Achieved





Progress Achieved

● Thruster Specification

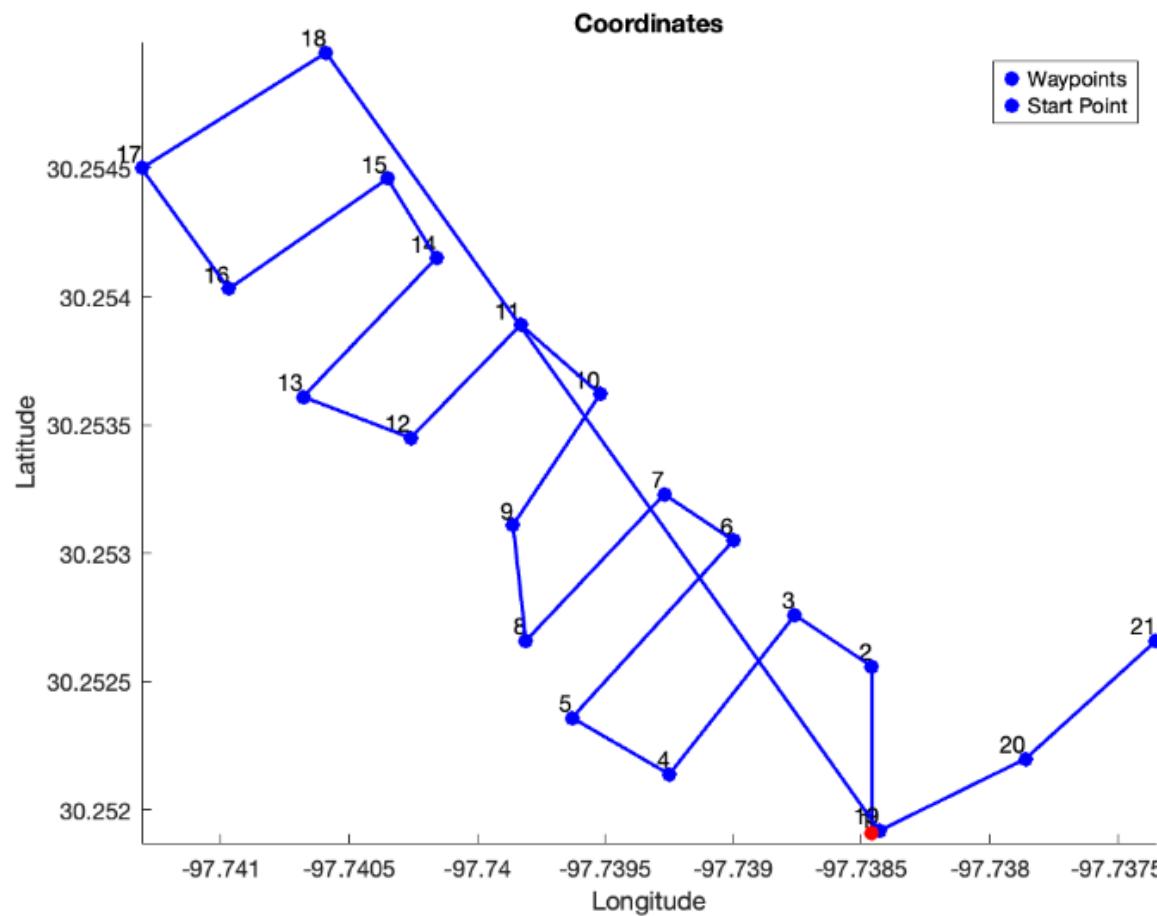
Parameter	Details
Thrust Output	2-10 kgf (kilogram-force) or 20-100 N
Power Consumption	10-50 W (for small ASVs) or 100-500 W (for medium ASVs)
Voltage Requirement	12V or 24V depending on thruster
Current Draw	Specify max current draw at full thrust (e.g., 5-20 A)
Control Protocol	PWM or I2C, based on ESC model
Propeller Size	Diameter: 3-6 inches, Pitch: based on speed requirement
Operating Temperature Range	Minimum and maximum temperatures suitable for operation

Progress Achieved

● ASV Testing

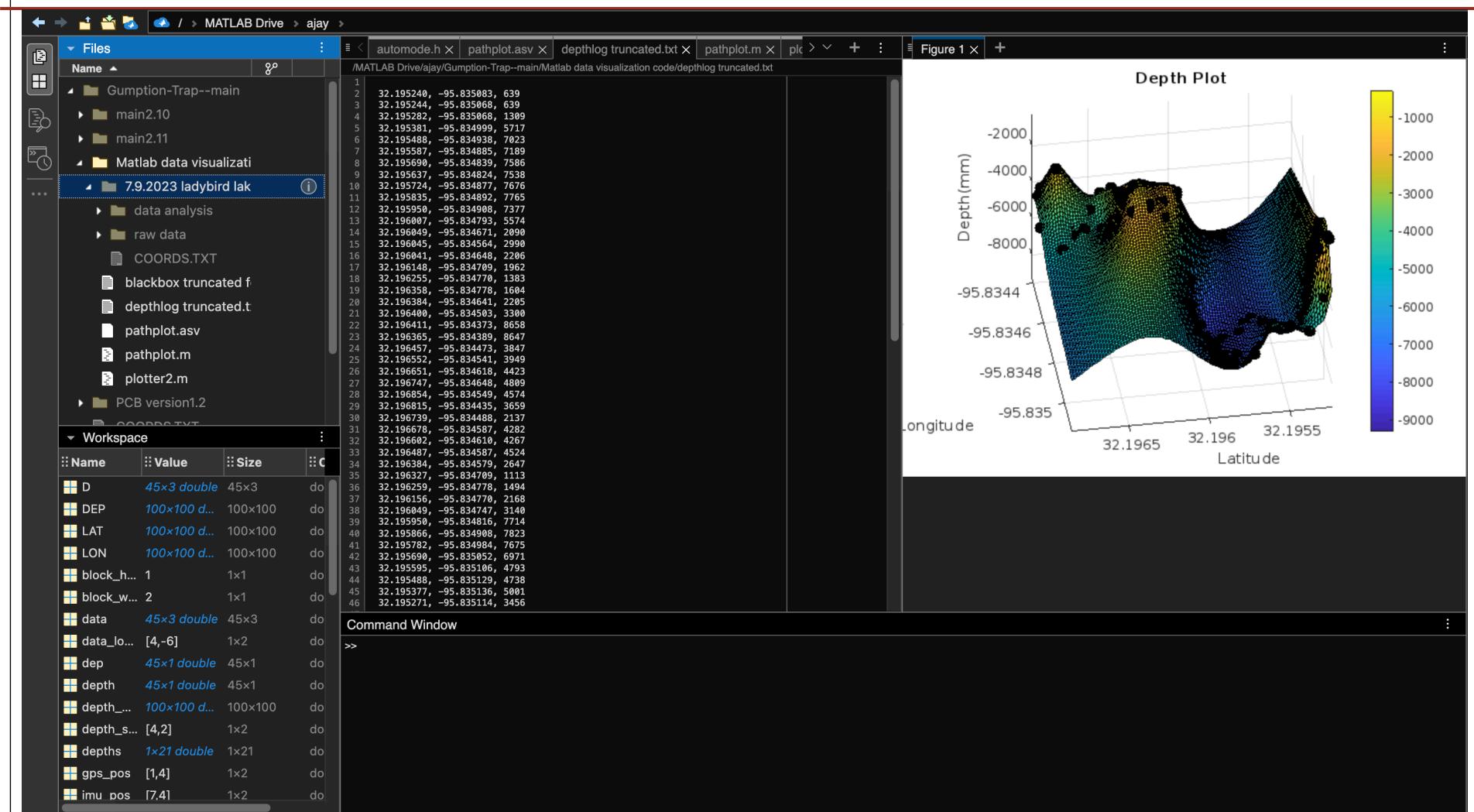


MAPPING



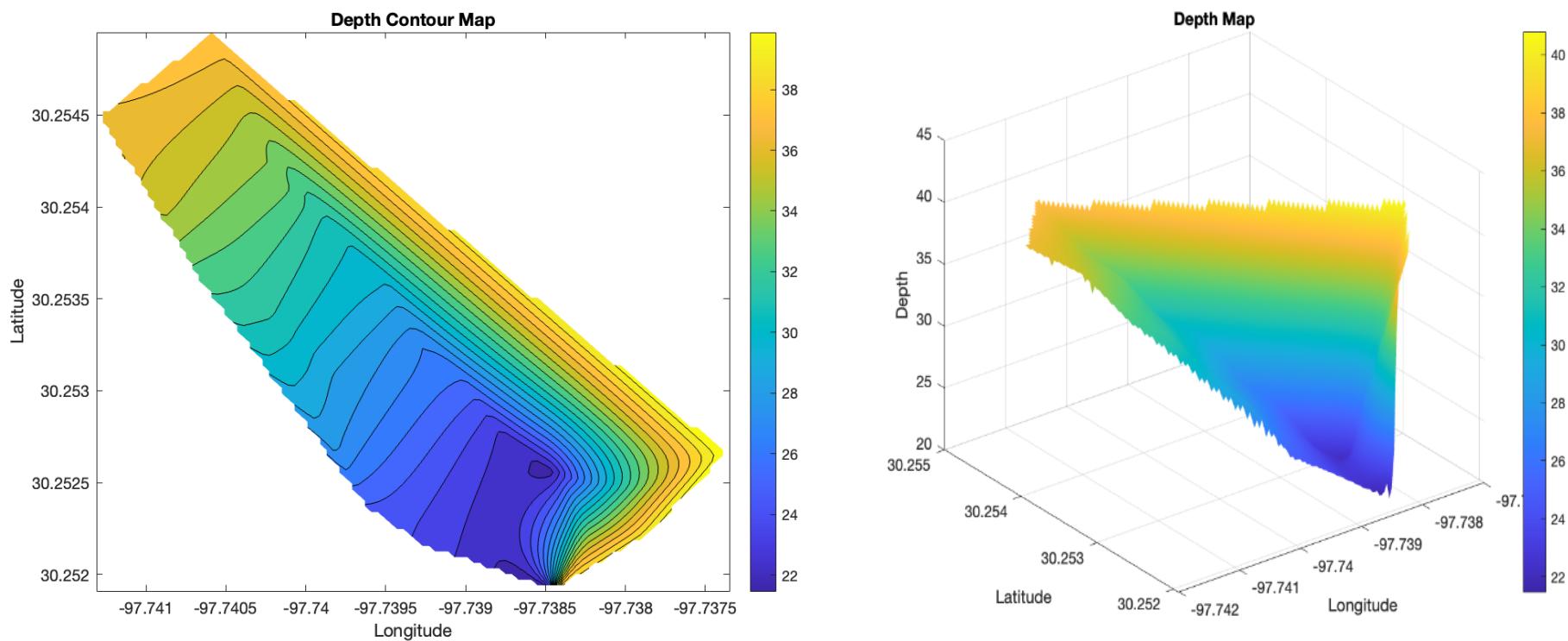


BATHYMATRIC MAPPING PLOT



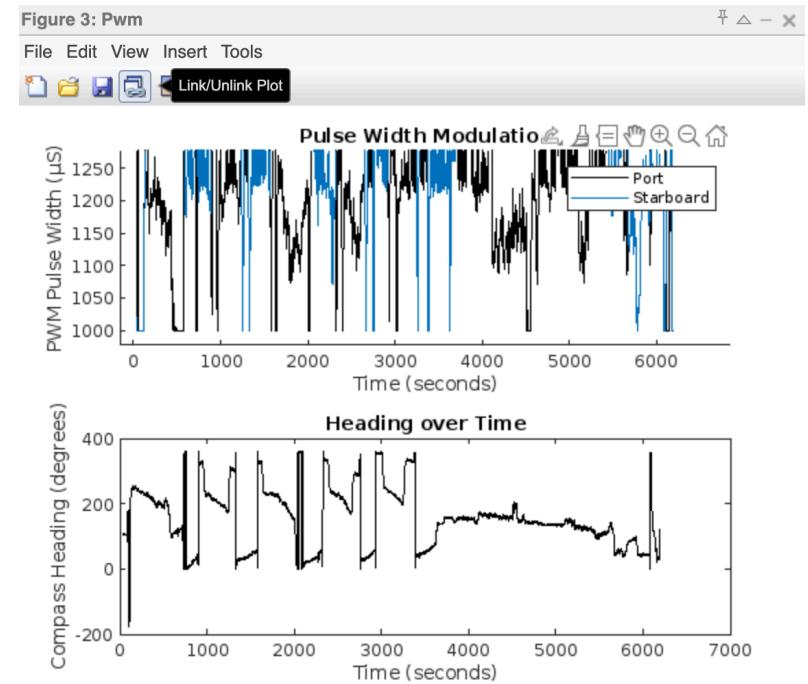
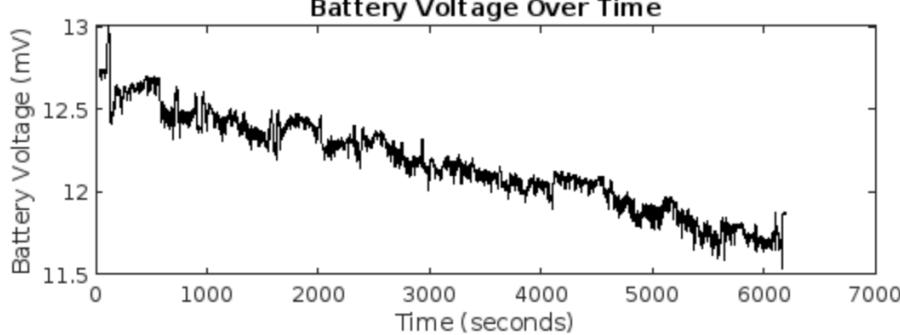


BATHYMATRIC MAPPING PLOT





BATHYMATRIC MAPPING PLOT



References

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Thank You