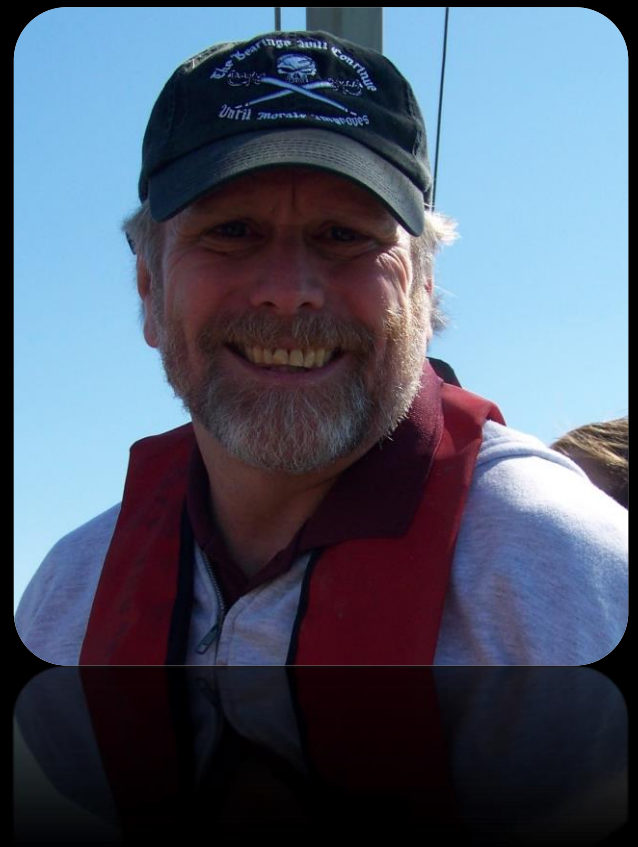
TEC-V

PROJECT PROPOSAL

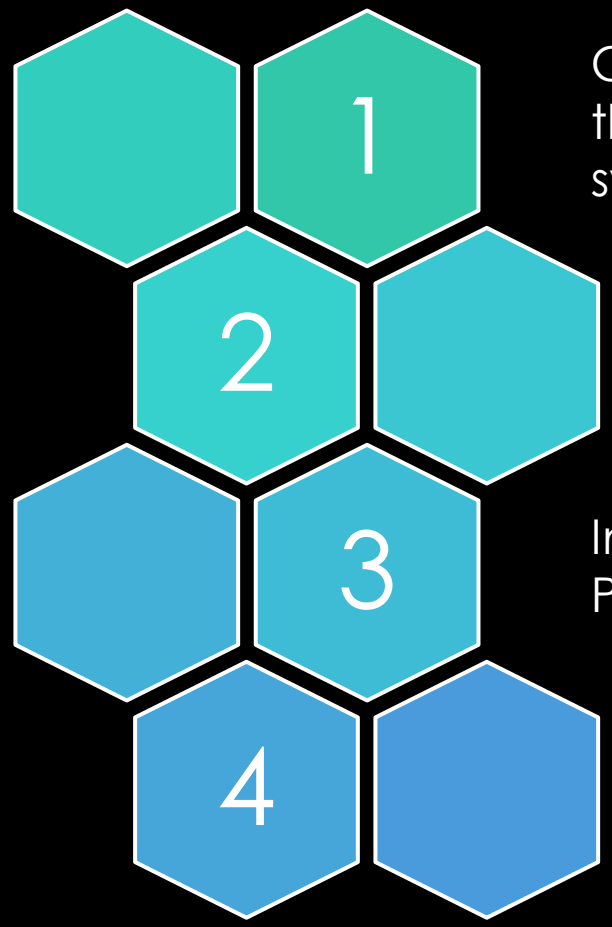
By: Michael Dowling, Zealand Brennan

CLIENT

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



GOALS



Complete Rebuild of the current control system

Open Architecture Design

Integrate Sensor Packages

Basic Autonomous Navigation

KEY FEATURES

Modularity and Extensibility:

Objective: Design the software with a modular architecture to enable easy integration of new sensors, algorithms, and control strategies.

Machine Learning Integration

Objective: Incorporate machine learning techniques for improved underwater navigation and decision-making.

Safety and Collision Avoidance

Objective: Develop safety features and collision avoidance mechanisms.

Simulation and Testing Environments

Objective: Provide a comprehensive simulation environment for testing navigation algorithms and strategies.

NOVEL FEATURES

1

❑**Hybrid Navigation Strategies**

❑**Objective:** Combine traditional navigation methods with advanced techniques like SLAM for enhanced accuracy and reliability.

❑**Novelty:** This hybrid approach is novel and addresses the challenge of navigating complex underwater environments effectively.

2

❑**Real-time 3D Mapping**

❑**Objective:** Develop capabilities for real-time creation and updating of high-resolution 3D maps of the underwater environment.

❑**Novelty:** This feature aids in obstacle avoidance and path planning, marking a significant advancement in autonomous underwater navigation.

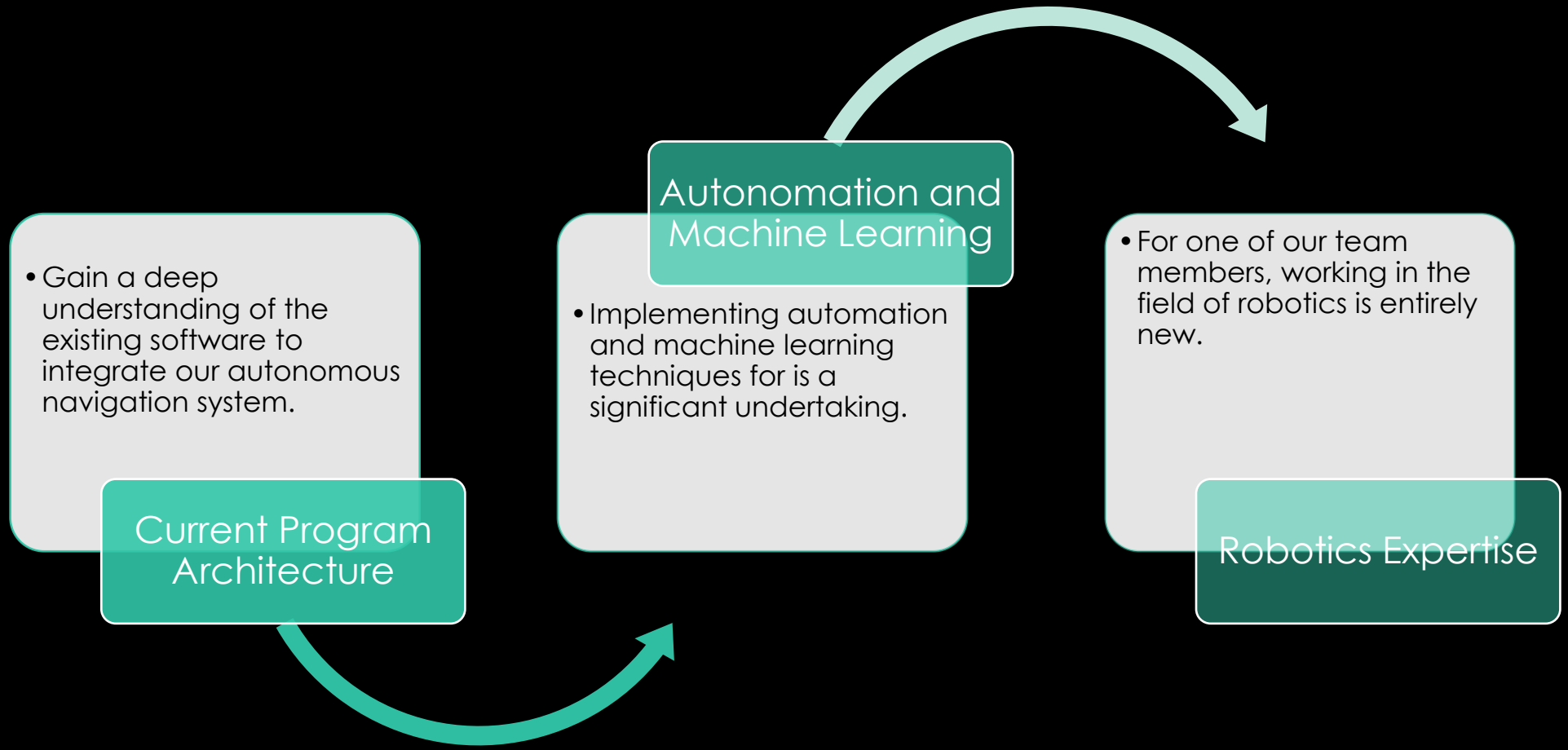
3

❑**Energy-efficient Navigation**

❑**Objective:** Optimize energy consumption during underwater navigation.

❑**Novelty**: The development of unique algorithms to conserve energy is a novel contribution, especially for extended missions.

TECHNICAL CHALLENGES



MILESTONE 1 (OCT 2)

- Gain a comprehensive understanding of the current software architecture, assess its compatibility with the project goals, and evaluate the feasibility of implementing autonomous navigation within the existing framework.

- **Tasks:**
  - Conduct a detailed analysis of the current software architecture.
  - Identify potential integration challenges and areas requiring modification.
  - Assess the feasibility of incorporating automation and machine learning components.
  - Produce a feasibility report outlining the findings and proposed modifications if necessary.

MILESTONE 2 (OCT 30)

- Successfully integrate the open architecture software with the underwater robot's hardware components, ensuring seamless communication and manual controls.

- **Tasks:**
  - Develop and implement communication protocols between the software and hardware components.
  - Test the integration in controlled environments to ensure stability and reliability.
  - Address any issues or discrepancies in hardware-software interaction.
  - Ensure that the robot can be controlled and monitored through the software interface.

MILESTONE 3 (NOV 30)

- Develop and demonstrate a functional prototype of the autonomous navigation system.

- **Tasks:**
  - Implement automation and machine learning algorithms for autonomous navigation.
  - Develop and integrate sensor data processing and mapping capabilities.
  - Conduct extensive testing in real or simulated underwater environments.
  - Demonstrate the robot's ability to autonomously navigate, and avoid obstacles.

WEBPAGE LINK

TEC-V

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

QUESTIONS?