Aqua Gazer

What are the challenges and complexities associated with underwater mapping using mobile robots?

Suggested Equipment Skill Level

Intermediate User

Equipment Skills

Block Coding

Underwater Robot Autonomy Designer

Career & Skillset Connections
- Programming Languages
- Problem Solving
- Collaboration

Project Guiding Themes
- Engineering design process
- Designing coral reef maps
- Coding the RVR+ to meet constraints

Suggested Software & Materials
- Sphero App
- Various materials to create the coral reef map

Aligned VDOE CTE Course(s) and Competencies

Programming

36-Weeks

Technology Foundations

36-Weeks

VMASC
OLD DOMINION UNIVERSITY

Aqua Gazer

Mobile Robots-Intermediate Skill Level

What are the challenges and complexities associated with underwater mapping using mobile robots?

Project Problem & Career Prompt

Welcome to the world of coral reef exploration! As a dedicated underwater robot autonomy designer, you have been entrusted with a crucial mission: to design and deploy a mobile robot capable of mapping coral reefs with exceptional precision and detail. Your goal is to gather crucial data that will aid in conservation efforts, monitor reef health, and contribute to scientific research. Your task is to develop an autonomous program that can navigate the complex underwater terrain of coral reefs, capturing high-resolution imagery and collecting relevant environmental data.

Project Background & Resources

-Understanding of block coding used to program the RVR+
-Understanding of sensor capabilities of the RVR+

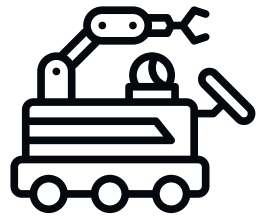Mapping the Seafloor

https://www.youtube.com/watch?v=0Da40wvViY8

Investigative Questions

What is important to know about the environment of the seafloor when preparing to do mapping?
What size and requirements do the mobile robots need to have for seafloor maping?

Project Criteria

-4 different colored coral reefs must be used in the map designed

-Final physical prototype and program must be completed prior to project deadline

Project Constraints

-Program used to operate RVR+ must be coded by you
-Underwater coral reef map cannot exceed 3'x3'
-Underwater coral reef map must be designed by you with representation of 4 different colored coral reefs

Suggested Pacing

1-2 Days of research and ideation

1-2 Days of underwater coral reef map construction

2-3 Days of coding and testing

Aqua Gazer
Mobile Robots

Career & Skill Set Connections

Underwater Robot Autonomy Designer

An underwater robot autonomy designer is responsible for developing the autonomy capabilities of underwater robotic systems. They design and implement algorithms, behaviors, and control systems that allow the robot to operate autonomously.
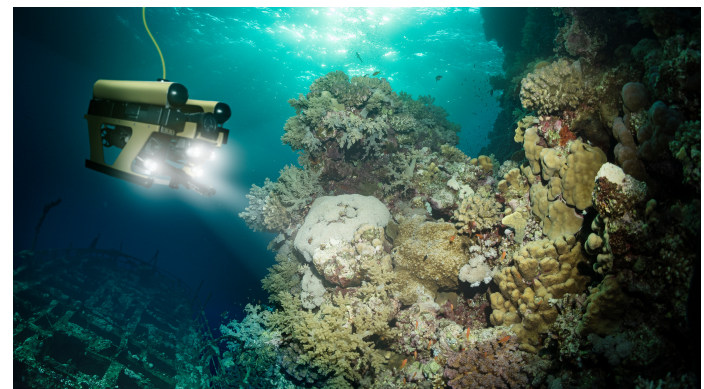
Essential Skills

*Adaptability
*Mechanically-inclined
*Maintenance of technical documentation

Academic Pathway

High School Diploma
and
Community College/Certification
or
Bachelor's Degree
and/or
Master's Degree

Aligned VDOE CTE Course(s) and Competencies

Workplace Readiness Skills & Work-Based Learning Opportunities & Examine All Aspects of an Industry

Programming

Implementing Programming Procedures

Design a program, using an algorithm, pseudocode, a flowchart, and/or decision table

Code the program, using a programming language

Test the program with sample data

Debug the program

Using Algorithmic Procedures

Analyze the problem statement

Create possible solutions to the problem

Determine the best solution to the problem

Technology Foundations

Exploring Technology Foundations

Describe the basic systems model

Explain how systems may have varying outputs

Explain what process does in a system

Controlling an Electronic System

Analyze a problem whose solution uses electronic controls

Describe the different methods for using electronically controlled devices

Use engineering design to solve an identified problem using an electronically controlled device
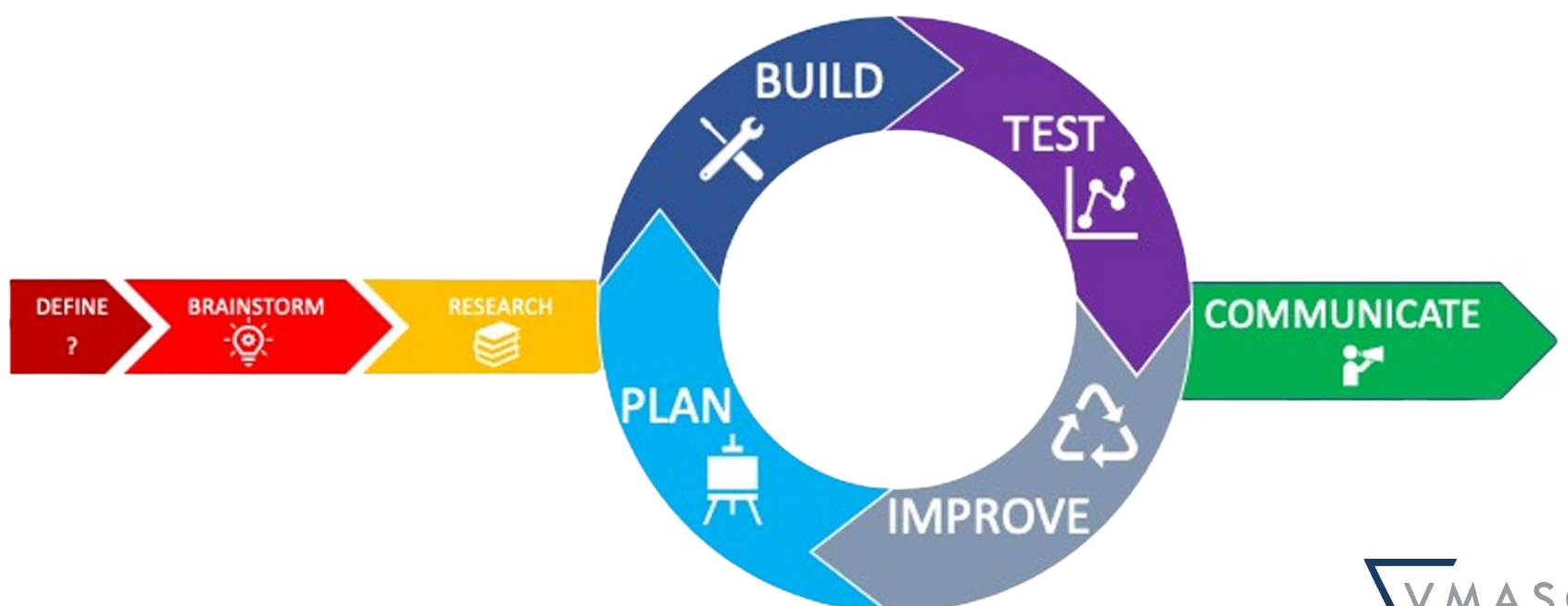
Project Management Plan

Team
Member
Roles

Team
Goals &
Timelines

Team
Member
Tasking

VMASC
OLD DOMINION UNIVERSITY

Sketches & Design Planning

Notes

Notes