Rapid Response Robotics

How are mobile robots used in communication and coordination of search and rescue missions?

Suggested Equipment Skill Level

Advanced User

Equipment Skills

Block Coding

Maritime Search and Rescue (SAR) Coordinator

Career & Skillset Connections

-Strong Communication
-Maritime operations and navigation
-Collaboration

Project Guiding Themes

-Engineering design process
-Coding the RVR+ to meet constraints
-Integration of technologies

Suggested Software & Materials

-Sphero App
-3D modeling software
-3D printer/CNC Machine

Aligned VDOE CTE Course(s) and Competencies

Engineering Drawing and Design

36-Weeks

Industrial Robotics Technology

36-Weeks

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Rapid Response Robotics

Mobile Robots-Advanced Skill Level

How are mobile robots used in communication and coordination in search and rescue missions?

Project Problem & Career Prompt

In the vast expanse of the ocean, a critical mission unfolds to save a rare and endangered species of marine animals. These magnificent creatures find themselves entangled in fishing nets, their freedom and survival at stake. As the search and rescue coordinator, you and your team are called upon to design a specialized attachment for an autonomous mobile robot, a crucial tool in this race against time. Your mission begins with a sense of urgency as you gather your team of skilled engineers and robotic experts and collaborate closely with marine conservationists. You and your team need to deploy the robot, navigate the waters, locate the entangled animals, and use the attachment to free them.

Project Background & Resources

-Understanding of block coding used to program the RVR+
-Understanding of sensor capabilities of the RVR+
-3D modeling and 3D printing/Milling (CNC machine)
-Attaching externals parts to the RVR+

Diving Robot for search and rescue missions

https://www.youtube.com/watch?v=lDeKxriZAjc

Investigative Questions

-What functionalities should the attachment possess to effective free the animals?
-Why is collaboration between different groups of people important in search and rescue missions?

Project Criteria

-RVR+ must have one autonomous program that runs in the mission
-Marine animal must be completely rescued to have completed the mission
-Final physical prototype and program must be completed prior to project deadline

Project Constraints

-Program used to operate RVR+ must be coded by you
-Attachment for the RVR+ must be designed by you
-Team must design the “course” for the RVR+ to navigate
-Team must design how the animal is tangled

Suggested Pacing

1-2 Days of research and ideation	2-3 Days of attachment design and building, coding, course design, and animal entanglement	2-3 Days of testing and reiteration

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Rapid Response Robotics

Mobile Robots

Career & Skill Set Connections

Maritime Search and Rescue Coordinator

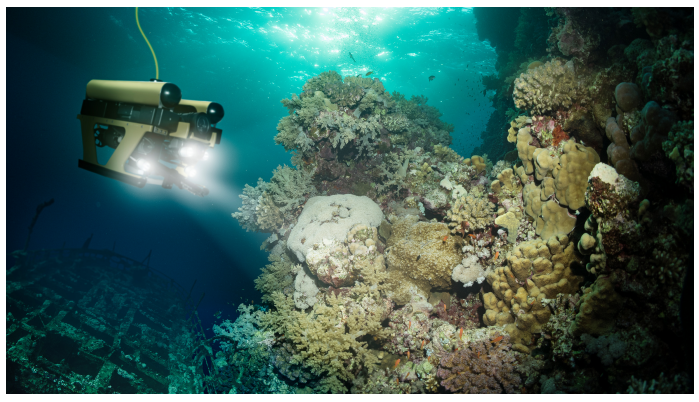
A maritime search and rescue coordinator is responsible for overseeing and coordinating search and rescue operations in maritime environments.

Essential Skills

*Decision-making
*Maritime knowledge
*Leadership
*Technical Competence

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

Engineering Drawing and Design

Introducing the Design Process

Describe the engineering design process

Apply the engineering design process

Producing Illustrations

Prepare drawings of parts that transfer energy or motion in mechanical systems

Create examples of mechanical, fluid, and/or electrical/electronic schematic drawings

Design an assembly and prepare working drawings as part of a design team

Create parts of the assembly using a 3D Printer

Present a design solution to explain an engineered system

Industrial Robotics Technology

Understanding Graphic Communications in Robotics

Interpret schematics, technical drawings, and flowcharts

Create schematics, technical drawings, and flowcharts

Using and Programming Robotic Equipment

Write programs to control robots

Manipulate a robot, using a PC host computer

Understanding PLC/Industrial Controls

Describe the use of essential machines and basic measuring tools found in a machining lab

Produce a finished machine part

Produce a part using a 3D printer

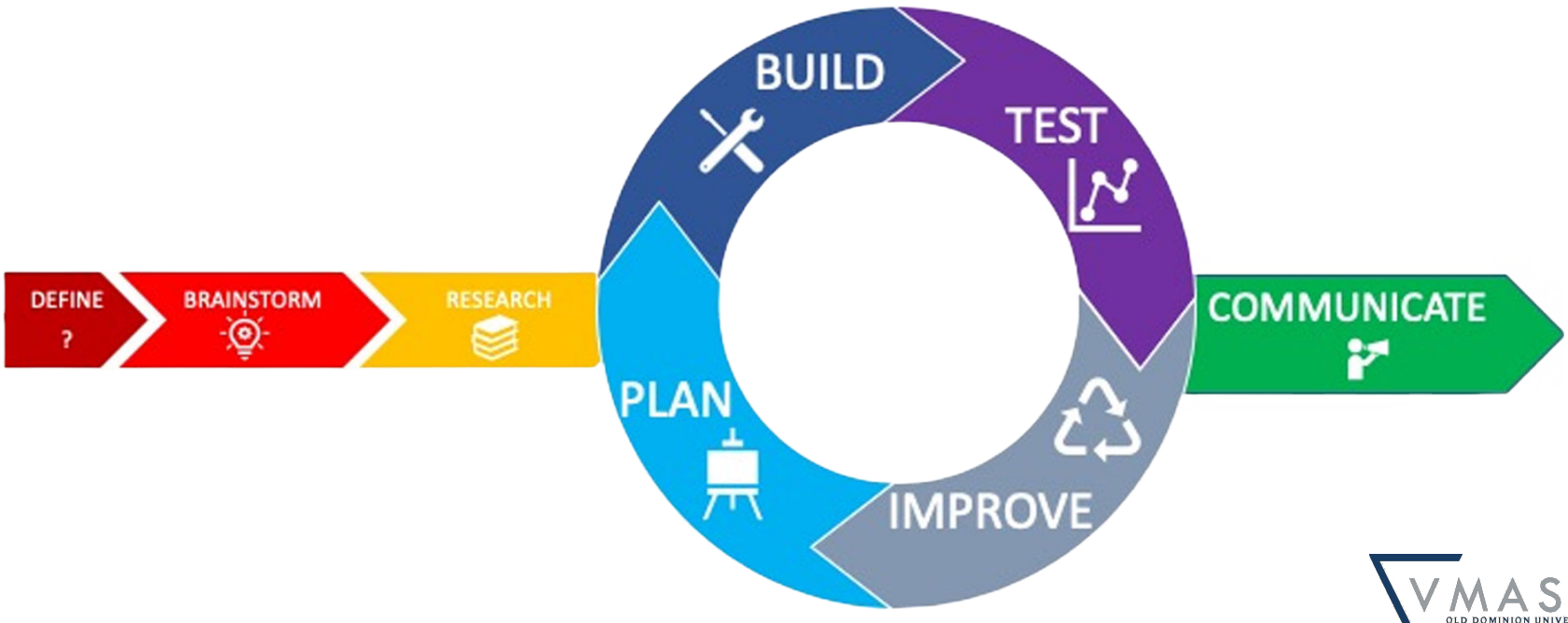
Project Management Plan

Team Member Roles

Team Goals & Timelines

Team Member Tasking

Sketches & Design Planning



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