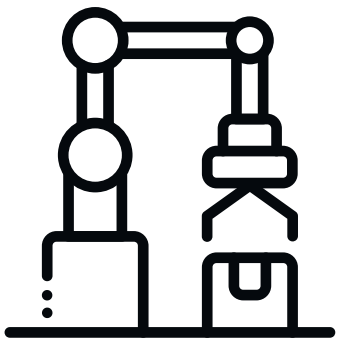
Coastal Cleanup



What role do robotic arms play in the maritime industry?

Suggested Equipment Skill Level

Novice User

Equipment Skills

Block Coding

Marine Robotics Engineer

Career & Skillset Connections

-Project Planning
-Technical Skills
-Environmental ethics

Project Guiding Themes

-Engineering design process
-Block coding
-Operating a robotic arm with multiple end effectors

Suggested Software & Materials

-DobotLab Software
-Flexible Gripper and Suction End Effectors
-variety of “trash” items

Aligned VDOE CTE Course(s) and Competencies

Technology Foundations	Electronics/Industrial Robotics Technology	Technology of Robotic Design
36-Weeks	36-Weeks	36-Weeks

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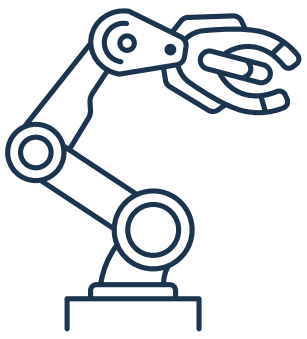

Robotic Arm-Novice Skill Level

What role does automation and the use of robotic arms play in the maritime industry?

Project Problem & Career Prompt

Imagine yourself strolling along a serene beach one morning, only to discover a significant accumulation of trash strewn across the shoreline. Despite regular cleanup efforts by volunteers, this particular secluded area seems to have been overlooked. As an advocate for the environment, you know that if this is not picked up, it will affect the coastal ecosystem. Motivated by your background as a robotic engineer, you embark on a mission to develop an efficient cleanup plan employing a robotic arm. Given the diverse range of trash you encounter, you recognize the need to utilize two different end effectors. Your objective is not only to collect the debris but also to implement a sorting mechanism that adheres to environmentally responsible practices, ensuring proper disposal of each item.

Project Background & Resources

Students should have a basic understanding of block coding used to program the Dobot Magician Lite. They should also have an understanding on how to use the suction cup and flexible gripper tools (and how to change them on the Dobot)

Soft Robotic Arms

https://www.youtube.com/watch?v=2tDsYqrbNzA

Investigative Questions

-Why is the cleanup of the coastal ecosystem important?
-Do robotic arms currently play a role in cleanup of our waterways?

Project Criteria

-Final program must be completed prior to the project deadline

-The trash must be accurately sorted based on disposal methods

Project Constraints

-Program to operate Dobot must be coded by you

-Program must include the use of the flexible gripper and suction end effectors

Suggested Pacing

-1-2 Days of Research and Ideation
-2-3 Days of Coding and Testing

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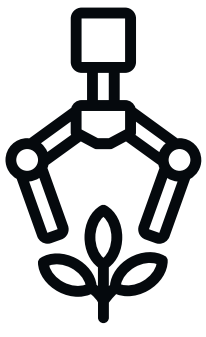
Robotic Arm



Career & Skill Set Connections

Marine Robotics Engineer

A marine robotics engineer is responsible for designing, developing, and maintaining robotic systems for underwater and coastal applications.

Essential Skills

*Innovation and Problem Solving
*IT Skills (Coding)
*Environmental Awareness
*Project Management
*Understanding of marine equipment

Academic Pathway

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

Aligned VDOE CTE Course(s) and Competencies

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

Electronics/Industrial Robotics Technology

Exploring Robotic Applications

Explain the use of robotics for industrial applications

Exploring Electronics/Robotics Technology Careers

Explore occupations related to electronics and robotics technology

Introducing Robotics

Identify types of robot geometry, manipulators, and end effectors

Identify types of robot control and drive systems

Technology Foundations

Exploring Technology Foundations

Describe the basic systems model

Explain what process does in a system

Understanding Technological Systems

Analyze the effects of technological systems on society and the environment

Controlling an Electronic System

Describe the different methods for using electronically controlled devices

Use engineering design to solve and identified problem using an electronically controlled device

Technology of Robotic Design

Exploring Microprocessor/Microcontroller (Computer) System Basics

Describe the function of interfacing robotic systems

Develop a computer-controlled model solution to a problem

Exploring Components of Robotics and Automation System

Identify components of safe robotic systems

Describe various hardware and software used in the industry

Assembling an Automated System

Assemble an automated system

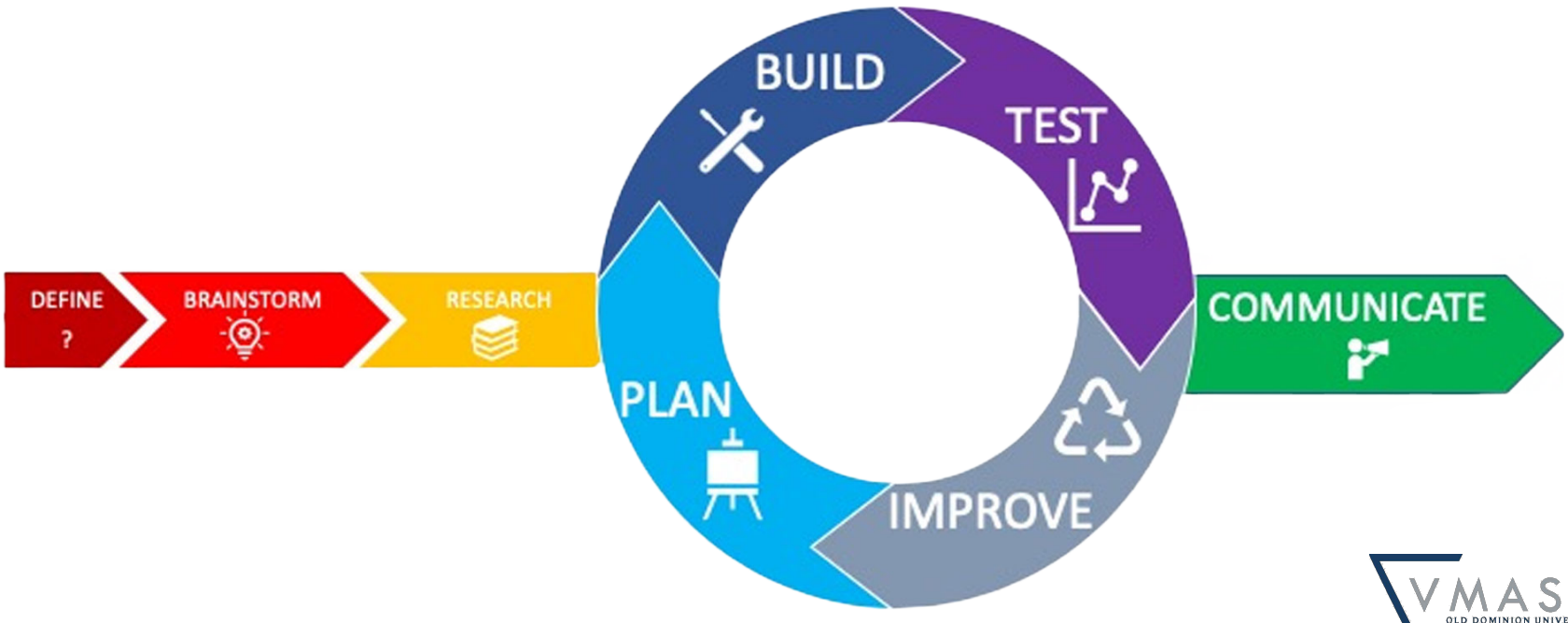
Project Management Plan

Team Member Roles

Team Goals & Timelines

Team Member Tasking

Sketches & Design Planning



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