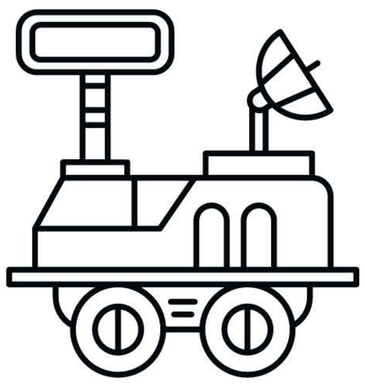
Inspector AquaBot



How can robotics and automation be used to enhance ship maintenance and safety?

Suggested Equipment Skill Level

Advanced User

Equipment Skills

Coding

Electromechanical Technician

Career & Skillset Connections

-Dexterity
-Mathematics
-Problem-Solving

Project Guiding Themes

-Engineering design process
-Coding the Raspberry Pi
-Connecting the Sphero RVR and Raspberry Pi together

Suggested Software & Materials

-Raspberry Pi
-Raspberry Pi components
-Sphero RVR

Aligned VDOE CTE Course(s) and Competencies

Electronics/Industrial Robotics Technology

36-Weeks

Engineering Explorations I

36-Weeks

Technology Foundations

36-Weeks

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Inspector AquaBot

Embedded System Advanced Skill Level

How can robotics and automation be used to enhance ship maintenance and safety?

Project Problem & Career Prompt

There is a critical need for automated inspection systems in the maritime industry. Your company specializes in creating automated robotic systems. Your team consists of a design engineer, electromechanical technician, and computer scientist. You have been hired to create an autonomous robot that will inspect small ships for cracks throughout their life cycle. The robot should be able to record or transmit videos or images of the crack and also provide a location for where the crack is. The robot should be able to navigate autonomously around spaces.

Project Background & Resources

What do cracks in ships look like? How are they currently found?

Why do ships crack?

What robots exist for inspection or quality assurance?

Investigative Questions

-What is the potential savings using an autonomous robot to do inspections? (think cost, efficiency, etc.)

-How might the design of the robot be influenced by the varied environmental conditions and surfaces it will face on a ship?

Project Criteria

-Ship must be able to identify a crack (crack is demonstrated using found materials or paper)
-Ship must be able to autonomously move around a location (designed to represent a part on a ship)
-Final working prototypes must be completed by the project deadline

Project Constraints

-Raspberry Pi equipment must be used to develop the prototype
-Program used to code the RVR+ must be coded by you

Suggested Pacing

1-2 Days of research and sketching ideas	3-4 Days of coding and design	3-4 Days of testing and adjusting (then retesting)

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Inspector AquaBot
Embedded Systems

Career & Skill Set Connections

Electromechanical Technician

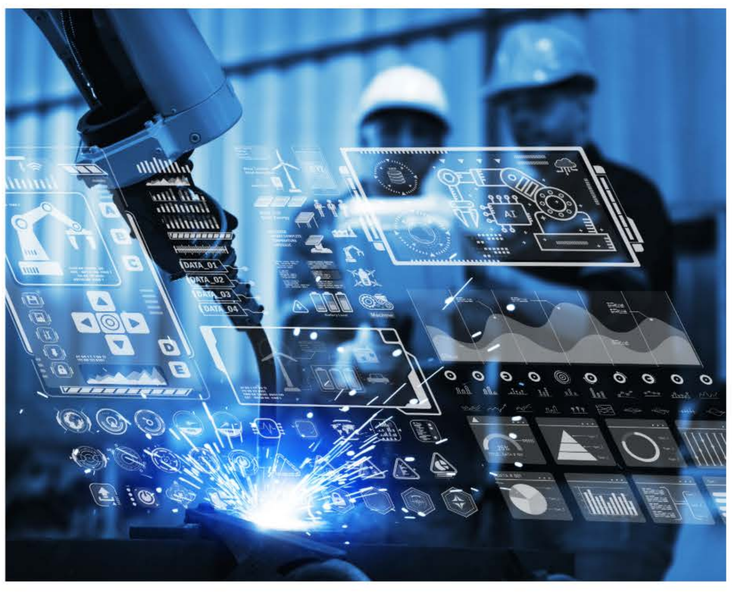
Electromechanical technicians perform work involving two or ore maintenance occupations to keep machines, mechanical equipment, or structures working.

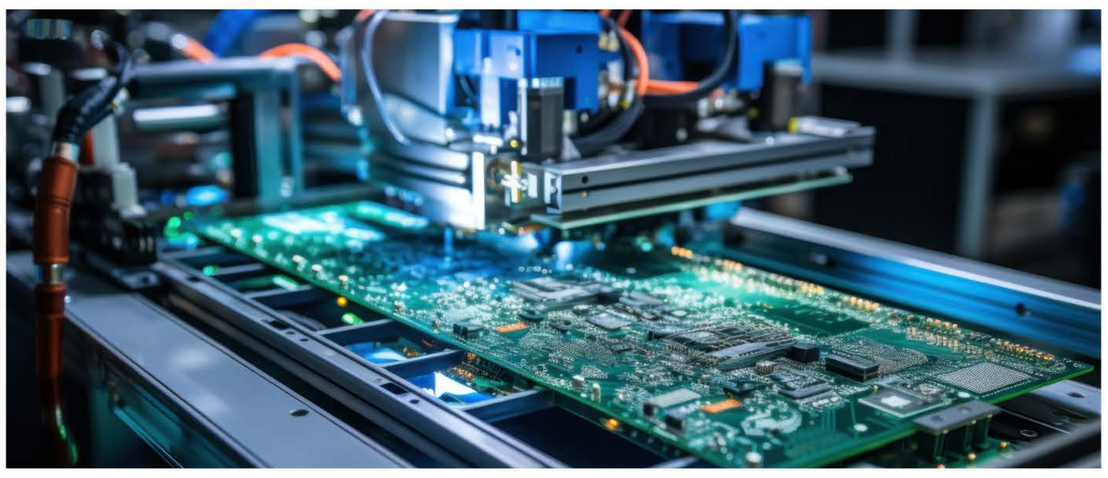
Essential Skills

*Mechanical
*Troubleshooting
*Active Learning
*Critical Thinking
*Communication

Academic Pathway

High School Diploma
and
Community College/Certification
or
Bachelor'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 Electronics/Robotics Technology Careers

Describe the skill and characteristics of a good technician

Explore occupations related to electronics and robotics technology

Explaining Robotics Applications

Explain the use of robots for industrial applications

Explain the use of robotics in the inspection and quality assurance process

Engineering Explorations I

Examining Engineering Practice

Describe continued education possibilities to support careers in engineering and technology

Explain the importance of communication between engineers and their stakeholders

Identifying Real-world Problems

Research local problems that could benefit from engineering solutions

Design an engineering solution to a local problem using an engineering design process

Technology Foundations

Controlling an Electronic System

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

Construct a functional model of an electronically controlled device

Designing a Product

Collect information about a technological problem to be solved

Construct a prototype of the best solution

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Project Management Plan

Team Member Roles

Team Goals & Timelines

Team Member Tasking

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Sketches & Design Planning

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Notes

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Notes

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