

# PORTable Automation Device



How can autonomous vehicles change the way we think about moving supplies?

**Suggested Equipment Skill Level**

Novice User

**Equipment Skills**

Block Coding

## Marine Operations Manager

**Career & Skillset Connections**

- Decision-Making
- Communication
- Leadership

**Project Guiding Themes**

- Engineering design process
- Coding the RVR+ to meet constraints

**Suggested Software & Materials**

- Sphero App
- Map/Maze for Sphero to drive through

**Aligned VDOE CTE Course(s) and Competencies**

**Information Technology Fundamentals**

36-Weeks

**Technology of Robotic Design**

36-Weeks



# PORTable Automation Device



Mobile Robot Novice Skill Level

**How can autonomous vehicles change the way we think about moving supplies?**

## Project Problem & Career Prompt

## Project Background & Resources

Across the six terminals of the Port of Virginia, more than 4 million cargo containers are moved per year. That's almost 11,000 containers per day. At the Virginia International Gateway (VIG) in Portsmouth, about 3,500 containers are moved per day. The terminal has recently been redesigned to increase capacity. To move containers around the terminal, workers use terminal tractors or shuttle carriers. Terminal tractors are small trucks, while shuttle carriers lift containers with cables. Both are manually driven by workers. Some ports around the world are starting to use automated shuttles and tractors to move their containers. The Operations Manager at the VIG is interested in learning how the automated shuttles and tractors are programmed to move containers. With your expertise in mobile robots, you have been tasked to demonstrate this.

Automated Guide Vehicles  
<https://www.youtube.com/watch?v=aP3tReWXwYg&t=29s>

## Investigative Questions

How can automated systems be integrated into the existing terminal infrastructure?

How do the automated shuttles and tractors avoid obstacles and navigate successfully?

## Project Criteria

- Mobile Robot must be able to navigate the port designed by the teacher
- Mobile Robot must be able to successfully carry one cargo container
- Final physical prototypes must be completed prior to project deadline

## Project Constraints

- Program used to code the RVR+ must be coded by you
- Cargo container should not exceed the size of the RVR+

## Suggested Pacing

1-2 Days of research and sketching ideas

1-2 Days of Code Design and Testing

1 Day of Final Product Testing



# PORTable Automation Device Mobile Robots



## Career & Skill Set Connections

### Marine Operations Manager

A Marine Operations Manager is the person responsible for manning/crewing, maintenance, scheduling, inventory, and customer interaction.

#### Essential Skills

- \*Problem Solving
- \*People Management
- \*Troubleshooting
- \*Organization
- \*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

### Information Technology Fundamentals

Mastering Digital  
Technology Basics

Investigate the history and  
emerging advances of digital  
technology

Describe the effect of digital  
technology on business and  
society

Exploring  
Programming

Design a simple program for a  
specific application

Execute a simple program

### Technology of Robotic Design

Exploring Robotics and  
Automation Systems

Define robotics, automation, and  
control systems

Research the history and  
development of robotics, automation,  
and control systems

Programming an Automated  
System

Implement basic programming  
procedures

Program an automated system

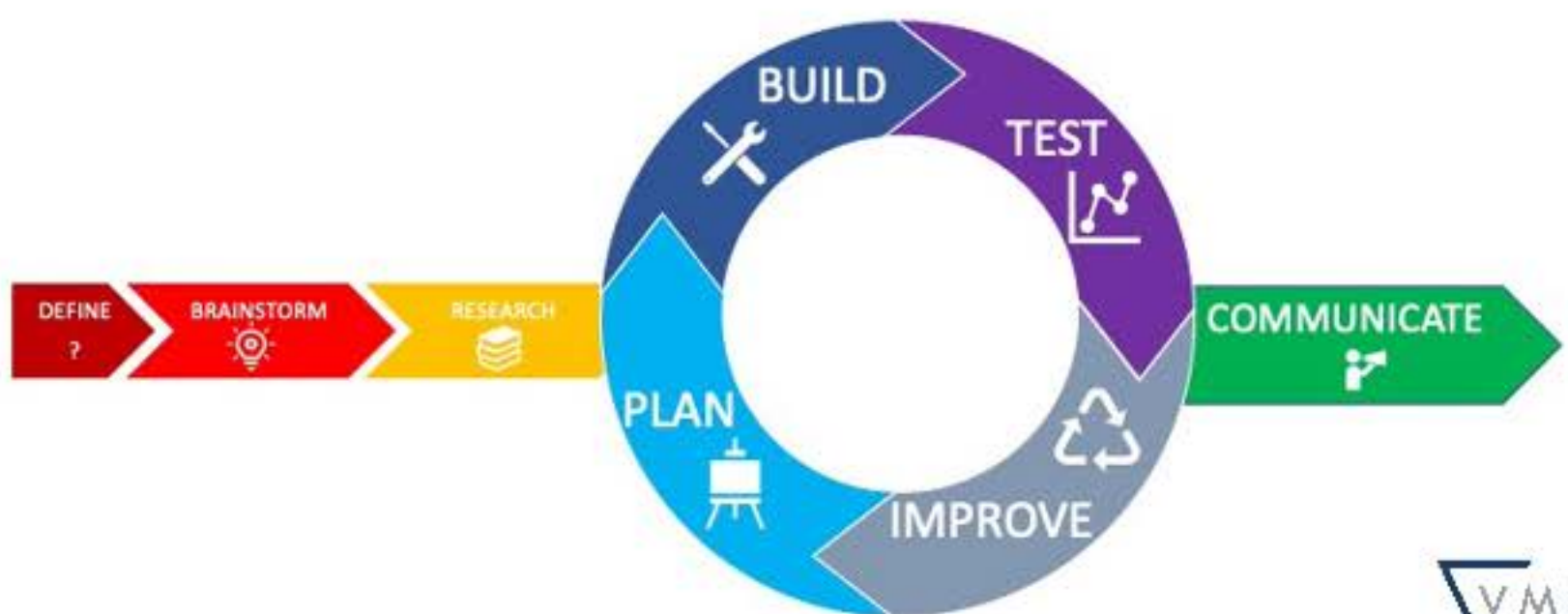
# Project Management Plan

**Team  
Member  
Roles**

**Team  
Goals  
&  
Timelines**

**Team  
Member  
Tasking**

# Sketches & Design Planning



# Notes

# Notes