mBot Ranger Robot

Mid-Valley
STEM-CTE HUB

www.midvalleystem.org
midvalleystemctehub@linnbenton.edu
Linn-Benton Community College
Albany Campus - CC-212

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mBot Ranger Robot

The mBot Ranger Robot kit offers hands-on STEM learning through robotics and coding. Students build and program versatile robots to perform various tasks, developing skills in engineering, computer science, and problem-solving. With multiple configurations, the kit supports projects that foster creativity, critical thinking, and teamwork.

Grade Level

4th - 12th grades

Group Size

Up to 4 students per robot

Time Duration

45 minutes - 2 hours

Content of Kits

Components

Two full Mbot Ranger sets:

- mBot Ranger Robots
- Over 100 mechanical parts
- Me Auriga mainboard
- Sensors (line follower, ultrasonic)
- various electronic modules

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Usage

Getting Started

1. **Familiarize with Components:** Review all parts in the kit and learn how to operate the robots.

2. **Choose Your Model:** Decide which of the three robots (Land Raider, Dashing Raptor, Nervous Bird) to build first.

3. **Assemble the Robot:** Follow the instructions to assemble the chosen robot model using the mechanical parts and electronic modules.

4. **Program the Robot:** Use block-based programming or Scratch coding to program the robot's behaviors and functions.

5. **Control and Experiment:** Use a smartphone or tablet to control the robot, experimenting with programming skills like volume control, light detection, and obstacle avoidance.

Storage

Store all parts and modules in the kit box to keep them organized and prevent damage.

Troubleshooting

- Ensure all connections are secure and correctly configured.

- Check for software updates to the programming interface and mainboard firmware.

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Activity Guide

Beginner

Basic Movements
Have students assemble the mBot Ranger robot and program it to perform basic movements such as driving forward, backward, turning, and stopping. This activity introduces foundational programming concepts and mechanical assembly.

Intermediate

Enhanced Features
Integrate sensors into the mBot Ranger, such as the line follower or ultrasonic sensor, and program the robot to complete tasks like following a line or avoiding obstacles. They will write more complex codes to make the robot react to its environment, experimenting with logic and sensor-based decision-making. This activity builds on their previous knowledge of basic movements, allowing them to explore how sensors impact robot behavior and enhance problem-solving skills.

Advanced

Custom Creations
Have students take their programming and mechanical skills to the next level by combining various programming techniques and modifying the robot's structure. They may design unique robot behaviors, such as creating a robot that picks up objects or navigates more complex environments. This project encourages creativity, critical thinking, and the application of advanced robotics principles, enabling students to innovate and experiment with complex systems.

Extension Activities:

Robot Challenge Day
Students participate in a robot challenge where they showcase their custom-programmed mBot Ranger robots in various competitions such as obstacle courses, line-following races, or autonomous tasks. The event encourages collaboration, friendly competition, and real-world applications of engineering and coding principles, giving students an opportunity to demonstrate their problem-solving, design, and programming skills.

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Learning Extensions

STEAM Connections: Tech - Robotics - Engineering

Learning Objectives:

- Enhance understanding of robotics.
- Introduction to programming.
- Mechanical assembly and manufacturing.

Career Connections:

- **Robotics Engineering –** Assembling and programming the mBot Ranger introduces students to the fundamentals of robotics, preparing them for careers in robot design and applications like manufacturing and healthcare.
- **Mechanical Engineering –** Modifying the robot's structure and integrating sensors helps students develop skills in mechanical design, system integration, and problem-solving, essential for careers in mechanical engineering.
- **Software Development –** Programming the mBot Ranger helps students build skills in software development, particularly in robotics, automation, and embedded systems.
- **Automation –** Integrating sensors and autonomous functions with mBot Ranger introduces students to automation technology, relevant to careers in smart manufacturing, logistics, and industrial automation.

Essential Employability Skills:

- Critical thinking
- Creative problem-solving
- Computational thinking
- Technology literacy
- Communication
- Self-starting

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Resources and Accessibility

Safety Guidelines

- Handle all electronic components with care to prevent short circuits or damage.
- Maintain a tidy workspace to prevent accidents.

Accessibility

- Provide modifications or tools for students who need assistance handling small parts or detailed assembly.
- Ensure the programming software is accessible, with text-to-speech or enhanced visual aids if needed.

Library Catalog

Library Resources

Feedback

QR to feedback survey