

EXPLORATION IDEA PROFILE: Small-Scale Robotic Sensors

EXPLORATION IDEA

Robots are made to do either what is too dangerous for humans or what humans cannot. They are used in hundreds of ways, including Earth and space exploration, manufacturing, surgery, laboratory research, and mass production of consumer and industrial goods.

Our team will explore how the LEGO and VEX robots can mimic robotics at NASA. We will study the integration of affordable sensors to explore temperature and navigation/position of certain small areas and objects, similar to the thermocouples, resistance temperature detectors (RTD) and global positioning system (GPS) used in NASA missions, such as the MMS spacecraft.

TARGET AUDIENCE(S)

There is a targeted audience for each LEGO and VEX robotics education kit.

- **Elementary:** WeDo 2.0 and Simple and Powered Machines (Ages 8+/Grade Level 3rd/Beginners)
- **Middle School:** SPIKE Prime (Ages 10+/Grade Level 5th)
- **Middle and High School:** VEX IQ (Ages 12+/Grade Level 6th-12th/Intermediate)

IDENTIFIED NEEDS

Robotics provides numerous technologies that support STEM education. In addition to being fun, robots engage beginners and advanced students and incorporate many of the fundamental STEM concepts providing a learning platform that students enjoy. By teaching robotics, educators can prepare today's students for tomorrow's workplace.

www.nasa.gov



A NASA STEAM Innovation Lab participant explores sensors.
Credit: Jeff Gilbert

RELATED IDEAS/INNOVATIONS

- Use the robots to create animated stories using animation technology and software.
- Use the robots to create navigation mazes.

MATERIALS/EQUIPMENT

- LEGO Simple and Powered Machines kit
- LEGO SPIKE Prime kit
- VEX IQ kit
- Computer, Laptop or iPad

EXPLORATION IDEA TEAM

- **Team Lead:** Leslie Garrison (NASA)
- **Team Members:** Lani Sasser (NASA) and Troy Cline (NASA)
- **Affiliated Contributors:** Robert Thate (NASA Robotics Alliance), Todd Ensign (NASA IV&V)

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What's the NASA Connection?

Use the LEGO and VEX robotics to better understand how NASA uses robots such as robotic arms, robotic airplanes and scouting robots in space.

STEAM Subject Matter Target:

Science:

- Energy
- Force and Motion
- Temperature
- Global Positioning System
- Space and Earth Science Exploration

Technology:

- Demonstrate the use of computers and applications
- Understanding of the concepts underlying hardware, software and connectivity
- Demonstrate the ability to use technology for research, critical thinking, decision making, communication and collaboration, creativity and innovation.

Engineering:

- Engineering Design and Creativity
- Systems Thinking and Understanding the Role of Troubleshooting
- Research Development
- Invention and Innovation
- Research and Development
- Problem Solving
- Collaboration and Communication

Arts:

- Robot Design
- Artistic Expression

Mathematics:

- Problem Solving
- Measurement and Data
- Geometry

Exploration Idea Profiles provide a basic snapshot of an innovative NASA based idea. They are developed through a guided process involving a step-by-step guide/worksheet where participants are invited to consider additional topics that include:

- Connections to other technologies
- Connections to existing information/research
- Connections to educational standards
- Connections to existing activities/projects
- Universal design

Additional information is also included to assist with further exploration or expansion of the idea in an individualized way.

HOW TO CONNECT

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