



Drexel-SDP GK-12 ACTIVITY

Grade 5 Science

Robotics

Lego Robotics

Grade Level 5

Lesson # 1 of 1

Time Required 2 Weeks

Summary

Students demonstrate an appreciation for subsystem interdependencies by designing, constructing, and programming a robot using the Lego Mindstorms NXT 2.0 kits.

Engineering Connection

Robotics has numerous well understood parallels to engineering; for one thing, robotics lends itself towards the integration of and understanding of systems of systems, which is a critical element of engineering. Moreover and more subtle, robotics enables students to understand the individual mini-structures that serve as interfaces to the larger element – this fosters communication between and agreement amongst the participating students when collaborating in teams.

Keywords

Lego Mindstorms, Robotics, Programming, Algorithm, Logic

Educational Standards: 3.6.4, 3.6.7

Pre-Requisite Knowledge

Learning Objectives

- Demonstrate competency for interdependent subsystems by designing a system with “interchangeable” parts; that is, parts they can develop independently.
- Implement a program that corresponds to their design, integrating sensors and effectors with a processing unit.

- Use basic logic and algorithm construction to keep their robot vehicle on a round race track using a colored track and light sensors.

Procedure

- Introduce students to the NXT brick using the “Try Me” applications included in the NXT brick. Particularly, they should try out the light sensors, holding it up to various colors and noting the output. From the solar energy unit, they should recall that dark colors will absorb more light, while light colors will reflect more light back into the light sensor.
- Have students first “figure out” as a class how to keep the robot on a track. They must figure out when the robot should turn, how long it should move, and how long it should repeat the process. If students get stuck, they may add colored construction paper to the racetrack to assist them. The answer lies in using the light sensor to detect relative light and use that information to continuously zig-zag the robot back and forth along the track.
- Have students use the instructions in the NXT kit to build a simple robot vehicle, to learn the parts.
- Using the projector, write a simple program with the class that will have the vehicle move under certain conditions, i.e. when the touch sensor is pressed.
- Have students design their own wheel-based robot, assigning a building task to each member of the group and then integrating their subsystems at the end.
- Take students to the computer lab and have them program the robot to drive around the racetrack. Then run the programs on the track!

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