Teacher Notes: Automated Mining

Description of the Activity
In this activity, students will build and program a mobile robot to travel down a mineshaft to a T-intersection. At the intersection, the robot will determine which of the two intersecting paths is the shorter, unmined tunnel, move into that tunnel, and position itself at the rock face in order to begin mining operations.

Activity summary: students will...
- Set up a test area
- Construct a robot with an independently-articulated Ultrasonic Sensor mount
- Program the robot to travel the mineshaft, find the shorter tunnel, and move down it
- Use the Compare block to make a decision between two Ultrasonic Sensor readings

Prerequisites:
- Collect enough boards or boxes to set up a test area for each group or each pair of groups
- Build a mining robot chassis for each group (optional)
- Present to class the Automated Mining introductory slideshow from Teacher Guide and have class discussion (optional)

Approximate classroom time: 3-5+ class periods (45-minute periods)
Lesson duration varies based on implementation of extension activities in Continue Section.

Note to the teacher
The most time-consuming portion of this activity is in building the robot and the Ultrasonic Sensor attachment for it. This can be done prior to students entering the classroom in an effort to conserve class time, or it can be done in class by the students. Alternatively, student teams can be given the possibility of ignoring the building instructions completely and building a mobile robot from scratch to complete the activity. This last option will take the most class time.

Make sure students pay attention to the "Tip" in the Construct section concerning realigning the Ultrasonic Sensor if it is out of place. This will avoid much frustration!

The Continue section of the activity contains several other challenges that are extensions of the work they have done in the activity. If time permits, by all means challenge a group or a class to tackle one or all of these challenges. There are no assessment criteria to support these extra challenges.

Students will be able to:
1. Set up and write a program in the LEGO MINDSTORMS Edu NXT programming software
2. Program a robot to follow a path based on a decision that it has made using sensor data
3. Understand how to use comparisons and logic values in a program