

# Programming Robots

## Computer Science

### Objective

Students learn simple computer programming skills by programming an autonomous robot.

### Learning Outcomes

Students will learn:

- How to program a robot to maneuver to create the first letter of their first name

### Essential Questions

- What kind of engineer work on robots?
- Can you make a car that drives itself?
- How do Computer Scientists program robots?

### Time Required

- Introduction (15 minutes)
- Activity (30 minutes)

### Assessments

- Students will create a diagram of the maneuvers they will use to program the robot to create the first letter of their first name.

### Materials

- 1 9V battery per robot
- 2 AA batteries per robot
- Worksheets
- Classroom set of robots (available through the College of Engineering)

### Lesson Description

Ask the students if they have ever seen futuristic movies where cars drive themselves. Ask them how they would feel if they rode in a car that drove itself. Tell them that the Governor and other State leaders took a ride in the Red Rover. The Red Rover was created by the University of Utah's Robotics Professors as part of DARPA's Urban Challenge. The Red Rover maneuvers itself through city streets and has sensors that can determine if there are pedestrians crossing crosswalks; if a light is red, yellow, or green; and it can match the speed of the car in front of it. The Red Rover is an example of an autonomous robot.

The WAO Kranius is also an autonomous robot. Place the students into groups of 2 or 3 (no more than 3). Distribute one robot to each group, and have them follow directions the directions provided below:

Ask the student to turn the robot on; have them press the RESET button. The LED lights should illuminate. This means that the robot is ready to be programmed. If the lights do not illuminate, then there is a problem. Ask the students to press RUN/MODE and then DEMO 3. The robot will beep and then begin moving. The robot is in “Autonomous” Mode and will respond to obstacles. Have the students place objects in front of the robot and watch as it moves to avoid them.

The WAO Kranius requires three functions to operate: Speed Value, Direction Value, and a Time Value. Have the students press RESET, then HIGH, then UP ARROW, then 3, then ENTER. The robot is now ready to move, but will not move until told to do so. Press RUN/MODE. The robot will move forward. Each direction requires these steps:

Speed (High or Low)  
Direction (forward, backward, right, left, etc.)  
Time (1-99)  
Enter

Have the students try out different maneuvers. Note: If students wish to use the circle functions, they must NOT use the Speed value, ex. they will press the CIRCLE (either right or left), Time Value, ENTER, and RUN.

Now have the students program their robots to spell the first letter of their first name by first making note of the maneuvers and then programming the robot. Each student in the group must take a turn with the programming.

Please see the attached worksheet for additional information.

#### Additional Enrichment

Create a maze on the floor before the students arrive, and ask the students to program their robots to maneuver through the maze.