



Lego® Robot—Autonomous Maze Traveler

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Overview:

In this project, student teams will use a Lego® Mind Storms kit to design, build and program a robot that will autonomously traverse through a simple maze. The purpose of this project is to help the students develop their logical processing skills.

Learning Objectives or Student Outcomes:

By the end of this lesson or activity, students will be able to

1. work as a team using a Lego® Mind Storms kit to design and build a robot that will autonomously traverse through a simple maze, and
2. demonstrate the development of logical processing skills through computer programming and problem solving.

Length of Lesson:

The length of the lesson will vary depending on the amount of in-class time devoted to the project and the amount of out-of-class time deemed necessary by the instructor.

Prior Knowledge to Ensure Student Preparation:

Students should have some prior knowledge of computer programming.

Team Size/Composition:

Teams of 4 work best; if necessary, teams of 3 or 5 people may be formed.

How is *positive interdependence* ensured?

Positive interdependence is ensured through the creation of *one* final product for the entire team.

How is *individual accountability* ensured?

Peer assessment is used to ensure individual accountability.

Components of Assessment:

The assessment is structured in levels. Teams may choose from four levels of difficulty, each of which is worth 60%, 70%, 80%, or 90%. In addition, up to 10% may be earned through creative use of the provided materials/parts. Peer assessments will also be factored into the grades.

Team Skills Needed for Success:

Team members must have the ability to cooperative and communicate. They must also feel free to give and receive constructive feedback and to share their own ideas with the other group members.

Materials Needed by Students:

Each team will need a Lego® Mind Storms kit, a computer and computer programming tools.

Instructions to Students:

1	Introduction to Project Programming and problem solving is an art in that it requires a good deal of imagination, ingenuity and creativity. But it is also a science in that it uses certain techniques and methodologies. By definition, a computer program is a sequence of instructions that must be followed to solve a particular problem, and the main reason people learn programming is so that they can use the computer as a problem-solving tool. To this end, the purpose of this project is to help you develop your logical processing skills.
2	Project Objectives In this project, you will have the following two objectives: <ol style="list-style-type: none">1. Work as a team using a Lego® Mind Storms kit to design and build a robot that will autonomously traverse through a simple maze; and2. Develop logical processing skills through computer programming and problem solving.
3	Choosing Your Level of Difficulty There will be four levels of difficulty that you can choose to develop the robot logic for. They include: <ol style="list-style-type: none">1. following the correct path, in the form of a solid one inch solid black line, through the maze (worth 60%);2. following the correct path through the maze, but when an obstacle is encountered, the robot reverses its course and returns to the start position (worth 70%);3. following the correct path, in the form of a one inch diameter dotted black line where the dots appear on two inch on centers, through the maze (worth 80%); and4. the robot finds its way through the maze without the aid of a marked path (worth 90%). <p>Up to ten percent credit will be awarded for creative use of the parts provided.</p>
4	Design Constraints Other design constraints are as listed below: <ol style="list-style-type: none">1. You may not consult any other documentation, or persons, other than those provided.2. You are only allowed to use the materials provided.3. You may develop multiple programs.

