Construct a vehicle which can manipulate its way through the course shown in Figure 1 beginning at the position labeled "Your Car" and ending in the position labeled "Lighted Garage". Your vehicle must carry 3 marbles from start to finish and must drop all three marbles into the garage after your vehicle stops.

Rules and Notes:
1. You may use only the parts furnished which include a complete Lego set with motors and a computer board.

2. Your car must fit through gateway in the diagram. The gateway will be 1 foot wide and will have lighted obstacles on either side. The center of the gateway will be the midpoint between the two lights.

3. Your car must sit at the starting point until the room lights flash exactly three times. In other words, you must put your car down on the track, push reset, and your car must not begin the course until the room lights flash three times. The room will be normally dark so your car should start after the lights go out for the third time.

4. There will be at least three randomly placed obstacles on the track in the zone marked. These obstacles may be detected by bump switches. There will be at least 1 foot of clearance between obstacles.

5. The lighted garage will be 1' x 1' x 1' and will have an open front face and a light in the back. Your car must stop when it bumps into the light in the garage. When it stops it should drop the three marbles you are carrying and beep three times to signal success.
Figure 1
Course for Lego car.
Project Teams

Each team for this project will consist of 4 students and each student will have specific responsibilities. Each student will be the team leader in their particular area of responsibility. The four areas are: Coordination, Software, Construction, and Documentation. The responsibilities of each area leader are as follows:

Coordination - Responsible for arranging all meeting times and places. The Coordinator will also be the "keeper" of the parts and will be responsible for seeing to it that parts are available when they are needed and for working with the instructors on problems related to parts and equipment.

Software - Responsible for organization of the software and for its proper operation. This includes documenting and adding comments to all of the source code.

Construction - Responsible for the physical construction of the project. The constructor will ultimately be responsible for what the project looks like.

Documentation - Responsible for keeping the project notebook and presenting the final project. The documentarian will be the team spokesperson and will be responsible for producing the written documentation for the project which is to be handed in.

**Project Notebook:** The project notebook will be a log of all of the team activities related to the project. Each entry in the notebook should list the time and date of the activity, the team members present, and should summarize the important results. This might include rough sketches of various designs in software or hardware and it may include printouts of software. The notebook should also have a complete log of the time spent by each project member working on the project (alone or as part of the team).

**Final Presentation:** Final projects will be presented on Wednesday, December 8 (Reading/Study Day). The presentation should consists of a demonstration of the vehicle produced and an oral summary of the results.

**Grading Scale:**

<table>
<thead>
<tr>
<th>Points</th>
<th>Activity</th>
</tr>
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<tbody>
<tr>
<td>20</td>
<td>Project Notebook</td>
</tr>
<tr>
<td>20</td>
<td>Complexity and creativity of design</td>
</tr>
<tr>
<td>30</td>
<td>Successful completion of the course</td>
</tr>
<tr>
<td>30</td>
<td>Successful delivery of marbles to garage</td>
</tr>
</tbody>
</table>