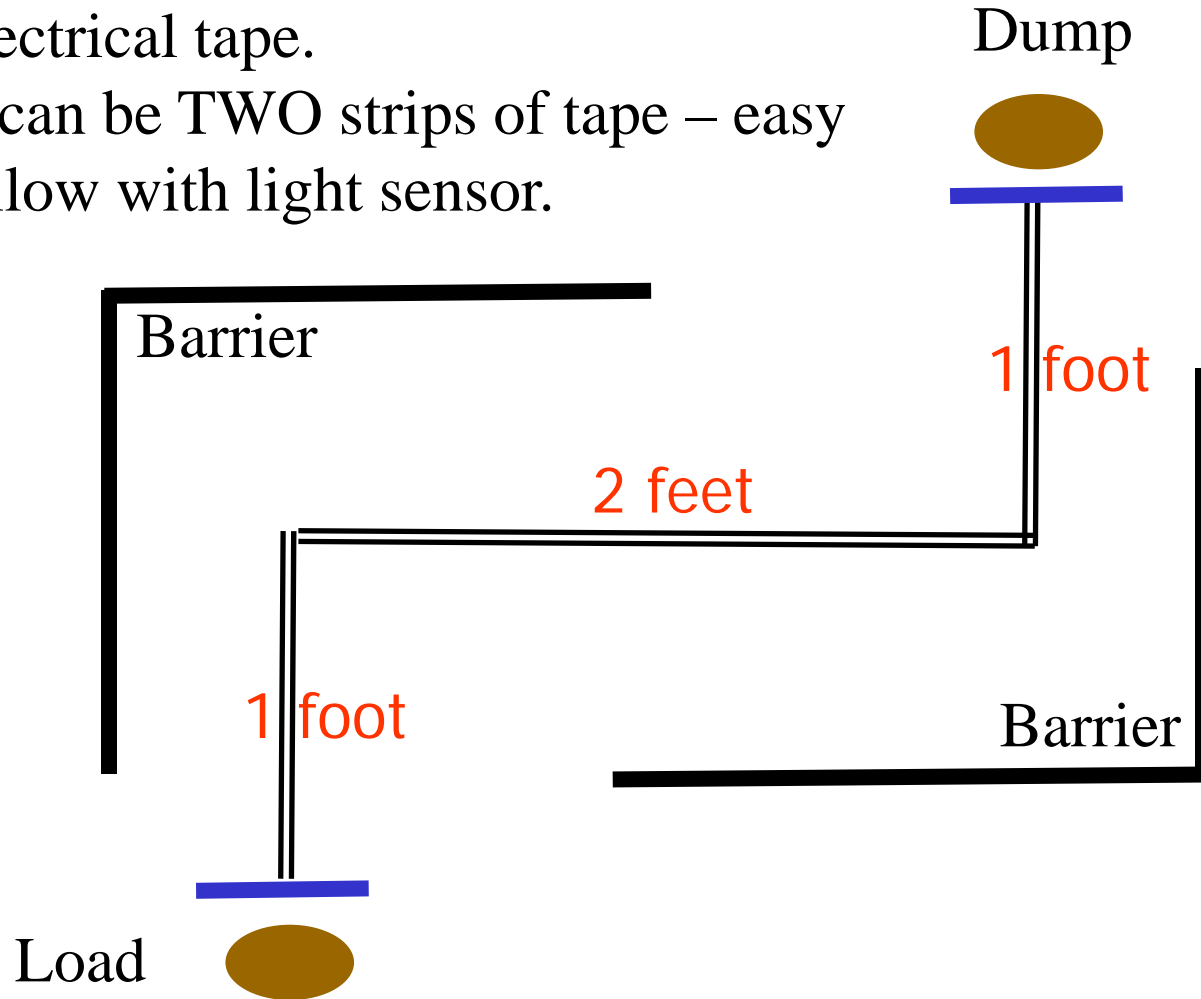


- Project: use the components in the robotics kit (and you can supplement with additional components – either made or purchased), to build a small robot that will:
- Move materials from one location to another:
- CHOICES: Your Choice of materials to move:
 - Dirt/sand (messy)
 - Small gravel (less messy)
 - Styrofoam packing peanuts (static electricity)
 - Wood or plastic Blocks
 - Wood strips or “popsicle” sticks (hard or easy to pick up?)

- DESCRIPTION/Specs/Requirements:
- Robot: between 6 inches and 2 feet high, running on wheels (three or four).
- The robot will run a course – it will pick up and transport from point A, and navigate to point B, where it will deposit the articles.
- Designed to run “autonomously”, **not** by remote control.

- The course will be a fixed path, clear of hazards except barriers that force turns.
- The robot may either:
- Navigate using a light sensor, to follow a black stripe on a white background, or some other black/white indicators on the floor surface.
- Or navigate by running the wheels in a fixed pattern, in combination with adjustments based on “bumper” contacts.
- The stop-and-load point, and the stop-and-dump point will be guarded by a small retaining wall, that you can use to “bump” against and detect with your touch sensors, if you like. This is optional, you may choose not to use these sensors or retaining wall.

Make your own course. Barriers can be electrical tape. Path can be TWO strips of tape – easy to follow with light sensor.



- If you use dirt, it will be relatively light if dry.
 - Material needs to be loose, and dry.
 - You will need to “scoop” it or pick it up somehow.
 - Carry it while navigating to the dump site.
 - Dump it at the dump site.
-
- Time to run the course is **not** critical.
 - Quantity of dirt/sand/blocks moved and dumped in the correct location is the performance criteria.
 - A robot that can make multiple trips (limit of five round-trips) is a plus.

- Successful teams in the past:
- Fabricated a “scoop” from an aluminum soda can or other materials to scoop dirt.
- Spent some time on the design of the scoop and arms and arm motion:
 - Must have sufficient strength to support a few ounces.
 - Must have a range of motion, or a mechanism, to scoop or load the articles. How to do this?
 - Must have a “dump motion” or drop motion. (Could be a rotation.)

- You may choose to work in teams of two students, if you like.
- Appears to be sufficient components to solve the problem with one kit.
- By working in teams, you can use components from TWO kits, so you will have 8 motors, two light sensors, and multiple touch sensors.
- This may make the design and construction simpler, because it adds more capability.
- No penalty for working in a team of two, but extra credit will be granted for solving the problem on your own.