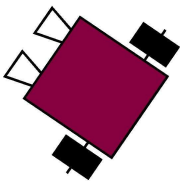


Brooklyn College The City University of New York

Exploring Robotics (CORC 3303)

UNIT A Lab, part 1 : Robot Construction and Gearing

vocabulary

- RCX
- gear
- motor
- RoboLab
- communication tower
- sensor
- touch sensor
- light sensor
- connecting lead
- axle
- beam
- brick
- bushing
- hub
- peg
- plate
- pulley
- spur
- tire

materials

Make sure you have all of the following materials before you start the lab:

- lego robot kit
- instructions for assembling the robot

instructions

1. **assemble the robot**
   - Follow the building instructions and construct the robot. Some of the parts you will use include:


RCX


motor


gear


axle

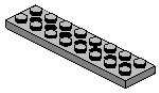

touch sensor


connecting lead


light sensor


beam


1x4 plate


2x8 plate


bushing


half bushing


peg


hub


pulley


tire

2. **download the test program**
   - The RCX is a **microprocessor**, a small computer which controls what the robot does. The RCX needs a **program** that contains **instructions** for controlling the robot. We will use an application called **RoboLab** to program your robot. RoboLab runs on a PC or a Mac and includes an environment in which you can compose programs for the robot. A program must be **downloaded** — transferred from the PC or Mac to the RCX.
     For today, your instructor will write a **test program** using RoboLab and download it for you; but later, you will learn how to write your own programs in RoboLab.

- The **communication tower** looks like this:

It is the device that facilitates downloading. It is connected to the computer's USB port. The robot is placed next to the tower, and the RoboLab user clicks on the **download arrow**

to send the program to the robot.
When the download is finished, then the RCX will sing a happy tune :-)

3. **run the test program**

- After the program downloads successfully, put your robot on the floor and turn it on by pressing the **ON** button.
- Then press **RUN**.
- What did your robot do? Write your answer below. Be precise!

---

4. **modify the robot**

- You can use **gears** to control the robot's speed — the way in which power is transferred to the robot's wheels from the motor. This is called using **gear ratios**. Your robot kit has several gears, each of different sizes. The size is measured by the number of **teeth** on the gear. How many different gears do you have and what sizes are they?

- When two gears are meshed together, if they have the same number of teeth, then every time one gear goes around, the other does too:

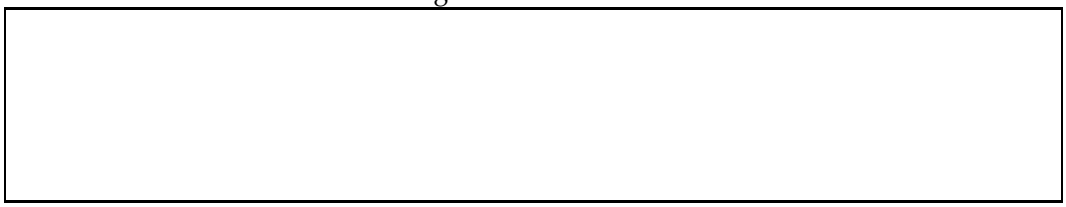
8-tooth gear 8-tooth gear

However, if one gear is larger than another, then it will rotate more slowly than the smaller gear:

24-tooth gear 8-tooth gear

In the example above, how many times does the 8-tooth gear rotate for each rotation of the 24-tooth gear?

- Draw below the current configuration of gears used in your robot. Be sure to indicate which gear is connected to the **motor** and which gear is connected to the **wheel**.



- Using gears to make your robot go slower is called **gearing down**. Using gears to make your robot go faster is called **gearing up**. Is the current configuration of your robot gearing up or down?

- Modify your robot to use a different gearing configuration. Draw the new configuration below, again remembering to indicate where the motor and wheel are connected.

- Is the new configuration of your robot gearing up or down?

- Now run the test program again. Does the robot go further or not as far as it did before? Why?
