

Controlling the Robot move, turn and draw

Video Task

In order to correctly position and control your rover on the planet's surface you will need to be able to accurately rotate the rover onto a particular, sometimes specified, bearing. Along this direction you then need to be able to command the Rover to travel an exact distance – in cm.

There are various sensors already installed on the rover, one of these is a 3D magnetic sensor. For distance measurements, use the incremental encoders on the track motors.

Your task is to modify your Earth station GUI to use these sensors such that a command issued from the GUI will rotate the rover accurately by a specified number of degrees ("n"), utilising appropriate feedback. Note that the magnetic field on the planet and at the earth based test site is affected by local magnetic objects. However, if the rover is rotated transient but repeated changes in the magnetic field can be detected and measured. Also required is a method through which the Rover needs to travel an accurate distance and the stop and await the next command.

Once these two functions are implemented, their functioning will be demonstrated through the use of a pen attachment drawing lines on paper on the floor. The instructions for these 'drawings' will be made available in Week 4.

You are required to produce a short, around 3 minute video demonstrating the drawings being made by the Rover.

Procedure:

1. Referring to the communications protocol and by modifying the functionality of your Earth station investigate how the sensors can be read through the GUI.
2. Rotate the rover under Earth station control and by capturing sensor data create a procedure for reporting the current bearing of the rover.
3. Write a command on your GUI which will cause the rover to rotate by "n" degrees where "n" is entered into your GUI and is a number between 1 and 360.
4. Write a command that will travel an accurate "m" cm distance in a straight line.
5. Optionally create a queuing mechanism through which the Earth station gui can autonomously carry out the drawing.
6. Create a short, ~3 minute, video of your work. The video should explain how you completed this task, how your algorithm works and its accuracy.

Scoring:

| Achievement | Maximum Possible Score (50) |
|---|-----------------------------|
| Production quality of video presentation | +10 |
| Demonstration of moving accuracy | +10 |
| Demonstration of turning accuracy | +10 |
| Drawing of shapes – accuracy | +10 |
| Drawing of shapes – automation/sequencing | +10 |