# Worksheet 3
# Webots Robot Odometry - 2

**Learning Outcome 2**

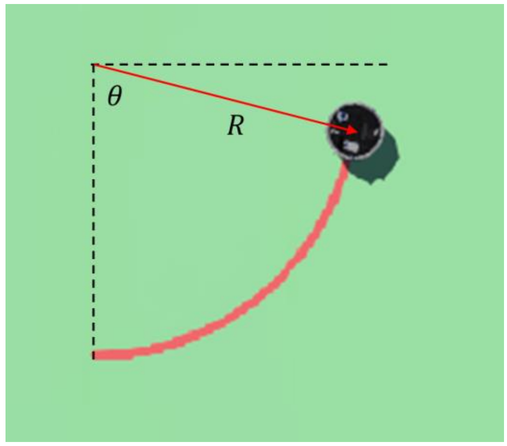
**Book Chapter 1**

**Purpose.**

To investigate the Webots ePuck travelling along an arc trajectory. This task parallels the work 'Driving Along an Arc' with the Parallax robot.

**1. The Situation.**

Due to wheel slip and other problems robots tend to move a shorter distance than they are told. Bad robot. A typical situation is shown in the box on the right, where the robot was coded to travel 90 degrees along an arc of radius 300 mm. Clearly it has stopped short.




We can make an approximate correction by measuring the actual radius $R$ and angle $\theta$. You can find the theory behind this in the book chapter. It is an *approximation* since the radius of the arc turns out to change as the robot moves! But again we can work to remove this.

**2. Moving along an Arc**

(a) Open the world **CBP_ePuck_Odometry_10.wbt** and make sure the controller **CBP_ePuck_Odometry_30.c** is selected and open in the editor.

(b) Look for the following code segments:

(i) The lines where the desired radius and angle are set, and based on these where **nL** and **nR** are calculated.
(ii)The lines where the actual arc radius and angle are calculated. This happens when the robot is finished moving.
(iii) The lines where the correction is made.

(c) Run the simulation. When the robot has stopped, the estimated radius and angle will appear on the console. Also the new values of **nL** and **nR** for the correction. Note these down. Perhaps you should grab the Octave trajectory plot.

(d) Copy the new values of **nL** and **nR** into the code labelled 'apply corrections …' after uncommenting-out the code. Now run the simulation again. What do you notice? Perhaps make another Octave plot.

(e) Now copy the new new values of **nL** and **nR** into the code and run the simulation again. What do you find?

(f) It's interesting if you continue iterating the above process. The trajectory seems to improve, even though the values of **nL** and **nR** do not converge to definite numbers. But their ratio does converge. You may want to think about why this happens, you may not.