Comp3302 Braitenberg Vehicles

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Purpose	To use the light sensors to drive an ePuck to emulate some Braitenberg vehicles.
Files Required	Webots project folders on website. **CBP_3302_Braitenberg_Light.wbt** world.
PP Contribution	PP3
Send to Me	If you are working online, send me a movie-clip of your solution
Homework	

Activities

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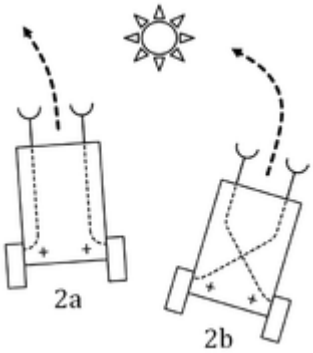
1 Braitenberg Vehicles 2a and 2b

These vehicles have two light sensors (eyes) and two driving wheels. Depending on how the motors are connected to the eyes, the vehicle will either approach the light or flee from it. Here's the two vehicles



(a) Open up the world **CBP_3302_Braitenberg_Light.wbt** where you will find a single ePuck and a single light source. Make sure the controller **CBP_3302_Braitenberg_Light.c** is selected and open in the editor

(b) In the Scene Tree panel on the left, open the node **TexturedBackgroundLight** and make sure the **luminosity** is set to 0.001 or so the background light will have minimum effect.

(c) Now let's think about how to code the controller for **2b**. You have the following variables declared

inputs	**double leftEyeIntens**	raw light sensor reading **ls7**
	double rightEyeIntens	raw light sensor reading **ls0**
outputs	**double omegaL**	angular velocity of left motor
	double omegaR	angular velocity of right motor

(i) First it's probably best to convert the raw light sensor readings to intensity values using the **invertLightSensorVals(…)** function which is in CBP_3302_Helper_1. So do this.

(ii) Then it's probably best to *normalize* these new values into a range 0.0 to 1.0. You will easily work out how to do this, just think about the range of values you will get. For example if the max value of leftEyeIntens were 2048 then to normalize you would write
leftEyeIntens = leftEyeIntens / 2048;

(iii) Now to the motors. You need to drive the left and right motors, so you will need to code expressions for
omegaL =
omegaR =

You must use the correct normalized eye intensity, just look which eye is connected to which motor.

Also the intensities are normalized into the range 0.0 – 1.0. Since the maximum motor speed is **MAX_SPEED** you should use **MAX_SPEED** in your expressions for the omegas.

(d) Get the code working and observe the robot moving towards the light. You can select the LAMP in the Scene Tree and move the light around. The robot should follow you.

(e) Now change your code slightly to get robot **2a** working.

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2 Investigations!

Here's some suggestions for original investigations

i) How do the vehicles respond to two or more light sources? (Copy and paste the LAMP node)

iii) What happens when there are two vehicles in the world?

iv) What happens if you place a light on one vehicle (and have a second without a lamp in the world)? You can add a light by adding to the **turretSlot** in the **CBP_ePuck** node. Proceed like this:
a) Right click LAMP in Scene Tree
b) Expand the CBP_ePuck node
c) Right-click on **turretSlot** (don't expand)
d) Expand **turretSlot** then **LAMP** and set **translation** to {0, 0.05,0} so the light is just above the robot

v) What happens if both robots have a light?

vi) What happens when you have N robots with lights (N = 2,3,4,5,6,…} and no lamp in the world?
