

# Comp1421 Braitenberg Vehicles

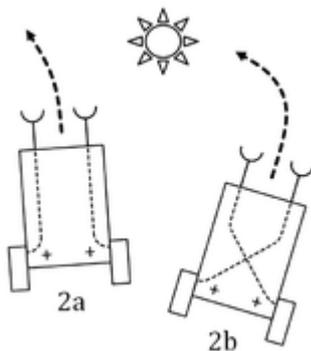
C.B.Price January 2021

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| <b>Purpose</b>          | To use the light sensors to drive an ePuck to emulate some Braitenberg vehicles. |
| <b>Files Required</b>   | Webots project folders on website. <b>CBP_1421_Braitenberg_Light.wbt</b> world.  |
| <b>ILO Contribution</b> | 1  |
| <b>Send to Me</b>       | If you are working online, send me a movie-clip of your solution                 |
| <b>Homework</b>         |  |

## Activities

### 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\_1421\_Braitenberg\_Light.wbt** where you will find a single ePuck and a single light source. Make sure the controller **CBP\_1421\_Braitenberg\_1.c** is selected and open in the editor.

Now we shall complete the code template provided to make vehicle 2a.

(b) There are two variables declared **leftEyeVal**, and **rightEyeVal**. Find these and assign them to the appropriate elements of **light\_vals[...]** array.

(c) As you found out in the last worksheet, these values have ranges 0 – 4095. Add two lines of code to *normalize* the values to the range 0.0 – 1.0.

(d) Now we must write code for the motor drive speeds **omegaL** and **omegaR**. We will express these as a fraction of the max allowed speed **MAX\_SPEED** so you will need to code something like this

```
omegaL = ( ?? + ?? ) * MAX_SPEED;  
omegaR = ( ?? + ?? ) * MAX_SPEED;
```

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The question is what goes inside the brackets (?? + ??). Well you need two things – first a constant value so the robot will move irrespective of any lights – second some control signal from **eyeLeftVal** and **eyeRightVal** to make the robot respond to the eyes.

(e) Compile and Debug and make sure the robot behaves as planned.

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## 2 Investigations!

Here's some suggestions for further work and original investigations

(a) In the Scene Tree, select the **LAMP** node. Now move the lamp around in the world and check that the robot follows the lamp.

(b) Change your code to obtain Vehicle 2a behaviour.

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

(d) Back to Vehicle 2b What happens when you have several robots in the world? (Copy and paste in the Scene Tree).

(e) What happens if you place a light on the vehicles. 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 paste **LAMP**
  - e) Expand the lamp node and set **translation** to {0, 0.05,0} so the light is just above the robot
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