Project: Finding Light source

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Introduction

• GOAL : The e-puck finds the source of radiation while avoiding obstacles

• TOOLS : Webots and an e-puck

• INVOLVES: signal processing from the sensors, C programming.
e-puck, a Braitenberg vehicle

• Braitenberg models

• Braitenberg coefficients and speeds

\[
\text{speed}_{\text{left}} = \sum_{i=0}^{n} \alpha_{\text{left},i} \left(1 - \frac{\text{ps}_{\text{value}_i}}{\text{ps}_{\text{range}}}ight)
\]

\[
\text{speed}_{\text{right}} = \sum_{i=0}^{n} \alpha_{\text{right},i} \left(1 - \frac{\text{ps}_{\text{value}_i}}{\text{ps}_{\text{range}}}ight)
\]
Coefficients in our case

- Two modes:

<table>
<thead>
<tr>
<th>Sensor</th>
<th>Following Light</th>
<th>Avoiding Obstacle</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>295 -80</td>
<td>140 -35</td>
</tr>
<tr>
<td>1</td>
<td>110 -15</td>
<td>110 -15</td>
</tr>
<tr>
<td>2</td>
<td>290 -80</td>
<td>80 -10</td>
</tr>
<tr>
<td>3</td>
<td>360 -280</td>
<td>-10 -10</td>
</tr>
<tr>
<td>4</td>
<td>-290 380</td>
<td>-15 -10</td>
</tr>
<tr>
<td>5</td>
<td>-40 320</td>
<td>-5 80</td>
</tr>
<tr>
<td>6</td>
<td>-30 90</td>
<td>-30 90</td>
</tr>
<tr>
<td>7</td>
<td>-40 320</td>
<td>-20 160</td>
</tr>
</tbody>
</table>
Coefficient optimization

• Use of Matlab
Structure of our algorithm

mode = Following Light
max_dist = maximum of proximity sensor

if max_dist > proximity threshold and mode = Following Light

    change mode to Avoiding Obstacle

else if max_dist < proximity threshold and mode = Avoiding Obstacle

    change back to Following Light
Webots to Reality

- Cross-compile function of Webots

- Initial speed tuning
Results

• Webots

24.61 s  45.76 s  50.08 s
Results

• e-puck
Conclusion

- Limits
- Applications