

# Braitenberg Vehicle 4 - Crossed Inhibitory with 2 Lights

## Introduction

The code simulates the Braitenberg Vehicle 4, featuring crossed inhibitory connections. The vehicle is attracted to light sources by inhibiting the opposite wheel when a sensor detects light.

The stronger the light detected on one side, the more it slows down the opposite wheel, causing the robot to turn toward the light.

## Sensors and Navigation

The vehicle has two light sensors (left and right) placed in front of its body and slightly apart.

Each sensor detects the intensity of light from one or more sources, using an inverse fall-off function based on distance.

The left sensor inhibits the right wheel and the right sensor inhibits the left wheel.

The vehicle updates its heading based on the difference in wheel speeds and moves forward accordingly.

A slight random perturbation is added to mimic natural wandering behavior.

## Light Sources

Two static light sources are placed in the environment. The vehicle computes the light intensity at each sensor by summing the contributions from all light sources.

Light intensity is calculated as:

$$\text{intensity} = \max(0, 1 - (\text{distance} / 400))$$

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This provides a smooth gradient of attraction as the vehicle approaches a light source.

### **Visual Representation**

The vehicle is represented as a circle, with smaller circles indicating its sensors and wheels.

The brightness of the wheels reflects their speed - dimmer means slower.

The vehicle wraps around the screen edges for continuous motion.

### **Telemetry**

Debug telemetry is rendered on screen, including sensor readings, wheel speeds, heading, and computed speed.

This helps visualize how the vehicle responds to light stimuli in real time.