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| To: | Dr. Berry |
| From: | Christopher Collinsworth, Jordan Patterson |
| Date: | 1/17/2016 |
| Re: | Lab 5 – Light Sensing |

The purpose of this lab was to use photoresistors connected to the robot to implement light sensing behavior via a reactive controller similar to that of Braitenberg’s vehicle experiments. A subsumption architecture was also implemented, including the light sensing behavior as layer one and obstacle avoidance as layer zero.

Implementation of layer one was achieved by employing four different light sensing behaviors into the robot’s program – fear, aggression, love, and explorer – which are further discussed below.

Fear behavior:

The fear behavior was characterized by having the motor speeds increase as the robot moved towards the light, with the robot veering away from the light source. This behavior was implemented by reading in the sensor data, converting the sensor values to speed values in a directly proportional manner, and then using the speed values to move the robot’s motor.

Aggression behavior:

The aggression behavior was characterized by having the motor speeds increase as the robot moved towards the light, with the robot veering towards the light source. This behavior was implemented similarly to the fear behavior, with the only difference being that the connections between the motors and sensors were crossed. Crossing the connections allowed the left sensor to control the right motor and the right sensor to control the left motor.

Love behavior:

The love behavior was characterized by having the motor speeds decrease as the robot moved towards the light, with the robot coming to rest facing the light source. This behavior was implemented similarly to the previous two behaviors, with the connections between the motors and sensors crossed as in the aggression behavior. In contrast to the fear and aggression behaviors, the love behavior employed inhibitory connections for the sensors so the motor speeds would decrease as the robot moved towards the light. This was achieved by converting the sensor values to speed values in an inversely proportional manner.

Explorer behavior:

The explorer behavior was characterized by having the motor speeds decrease as the robot moved towards the light, with the robot coming to rest facing away from the light source. This behavior was implemented similarly to the previous behaviors, with the connections being crossed and the conversion between the sensor and speed values being inversely proportional.

Implementation of layer zero of the subsumption architecture was achieved by employing obstacle avoidance into the robot’s program as in previous labs. An IR sensor was attached to the front of the robot for detection of objects. If an object was detected within five inches of the IR sensor, the robot would stop and back up a specified distance. If no light source or object was detected by any of the sensors, the robot remained still.

Calibration of the photoresistors was performed in various conditions, as well as at various distances and angles of incidence. The data from these calibration tests is included in the appendix in Table XX and Table XX.

In conclusion, the robot performed all tasks well during the lab demonstration. It successfully exhibited all four of the Braitenberg vehicle behaviors along with obstacle avoidance.