M³-Seminar: Motion in Man and Machine

Project: Braitenberg's Vehicles – Synthetic Psychology: motion control for robots

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The idea behind Braitenbergs Vehicles is that robots, with only one or two motors or sensors, show a different behavior depending on their structure and different emotions are reflected.

The task of this project was to build robots, with the building set LEGO Mindstorms EV3, which can detect light and move according to principles of the vehicles of Braitenberg. The source code for the control was developed in Matlab. A flashlight was used for the experiments.

Vehicle 1: Vehicle 1 consists of one motor and one sensor. The sensor measures the ambient light and the robot moves slower or faster depending on the light intensity. If the light beam was closer to the sensor and thus the light intensity higher, the robot moved faster. If the light beam was far away the robot moved slower.

Vehicle 2: Vehicle 2 consists of two sensors and two motors. There are the variants a and b. For variant a, in each case the sensors are connected with the motor on the same side. Robot 2a always moved in the opposite direction of the light and tried to avoid the light source. Whereas robot 2b, the sensors are connected with the motor on the opposite sight, followed the light beam. Both vehicles moved faster with higher light intensity.

Vehicle 3: The structures of the robots for variant 3a and 3b match the ones from variant 2a and 2b, but the impact of the light source is inverted. If the light source is in front of the robots, they don't move faster but slower. Therefore, variant 3a behave like variant 2a, while variant 3b followed the flash light permanently. The difference to vehicle 2 was that the robots of variant 3 stopped in the immediate vicinity to the stationary light source.

Subsequently the light source was mounted on a second robot, that moved in circles. The behavior of all vehicles to that robot should be tested. Vehicle 1 was dropped out, because it only can move straight. The robots from variant 2a and 3a couldn't follow the robot, as soon they were outside the light beam. Therefore, their behavior couldn't be observed for a longer time. But for variant 2b and 3b the same behavior of the robot from the previous experiment could be observed.