

Design of Embedded Systems (DES), Assignment 10

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Observations

The robot drives around in the field with randomly selected speed of both the left and right motors (random selection for each motor). The speed can be between 10 and 30 percent of its maximum speed.

When the robot detects a black border, it will turn its led lights to red, stop and then drive backwards with 10 percent of its maximum speed. When it cannot detect the blackline anymore, it will continue to drive backwards with the same speed during 1 second. Then it will stop again and make a random decision regarding rotation to the left or right. After this the basic behaviour as described above will continue.

When a bumper was pressed (no detection of black line present), the led on the same side of the pressed bumper will turn red. The robot will move back for 1 second with 10 % of its maximum speed. Then the robot will rotate in the opposite direction of the pressed bumper, to ensure that the robot will not hit the same object once again. The random behaviour is temporally prevented by setting the speed of the left and right motor at 20 % (both) and then moving for twice the time of its normal random behaviour, assuming no sudden interruptions.

The robot will detect an object if it is closer than 28 centimetres. In case a bottle (or other object) is detected by the robot the robot will say that it does not drink on the mission, the led lights will turn red and the robot will drive backwards for half a second with a speed of 10% of its maximum speed. It then randomly picks left or right to rotate to and then will drive in a straight line assuming no interruptions.

Special cases:

As case in which the system might fail is if the bottle is constantly moved towards the robot, resulting in the robot backing up and driving over the black line. The robot is now out of the restricted area and will not be able to go back into this area since it must go over the black line to do so.

The robot might also back up into the bottle in case the robot is between a black line and a bottle and detected the black line or has a button press. Detecting the line or press will lead to the robot driving backwards. It will then drive up the bottle, usually causing one of its wheels to come off the ground. It might escape the situation by either driving the other way, thus making the robot fall, or it might escape by its light sensor being high of the ground in which it thinks it sees a black line, which causes it to drive backwards.

In case an object is directly in front of the robot and hits both the bumpers but is not detected by the ultrasonic sensor the bumpers might fail to be properly pressed by the object.

The first special case could be solved by using a map to remember the robot's position. The second and third special cases could be solved by building more bumpers/better bumpers.