Control of Mobile Robotics

Spring 2016

Lab 2

Sensors and Actuators

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**Task Description**

The objective of this lab is to perform close loop control using the distance sensors and the robot’s motor actuators. This lab consists of 3 tasks.

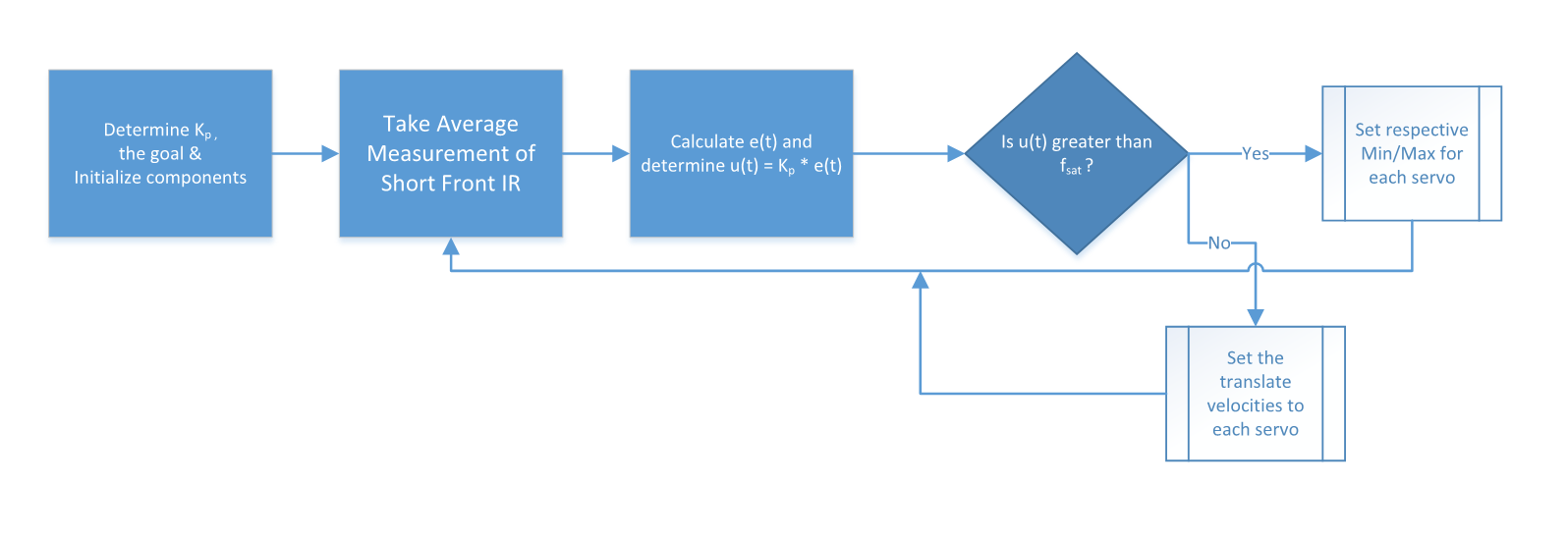
1. The students are to implement the equations below in order to make the close loop control to signal the correct velocity to move the robot from a distance of 10 inches to a distance of 5 inches from the wall. The values (0.5, 1, 3, 5, and 20) will be used for the proportional gain(Kp).

* r(t) = desired distance to the goal
* y(t) = distance from robot to the goal
* e(t) = distance error
* Kp = proportional gain
* u(t) = control signal corresponding to robot velocity
* fsat = Saturation function
* ur(t) = control signal corresponding to saturated robot velocity

1. The robot is to move around the wall while keeping a minimum distance of 5 inches from the wall. The close loop control will be used in this task.
2. The robot is to navigate centrally between walls and make turns at appropriate places. The close loop control will also be used in this lab.

# Wall Distance

The objective of this task is to have the robot operate using a control system to stop five inches before an obstacle. The desired distance to the goal is, *r(t)*, five inches. The distance is determined from the front short distance sensor. The control system will function under several values of Kp 0.5, 1, 3, 5, and 20.



# Wall Following

Given a wall, the robot will traverse the entirety of the obstacle. It will also maintain a five inch clearance from the perimeter and perform appropriate turns when reaching corners.

# Corridor Navigation

This scenario matches real world scenarios where the robot needs to navigate through corridors. The robot also uses a closed loop control implementation to read distances and adjust velocities. This loop determines when the robot needs to turn through corners.

**Conclusion**