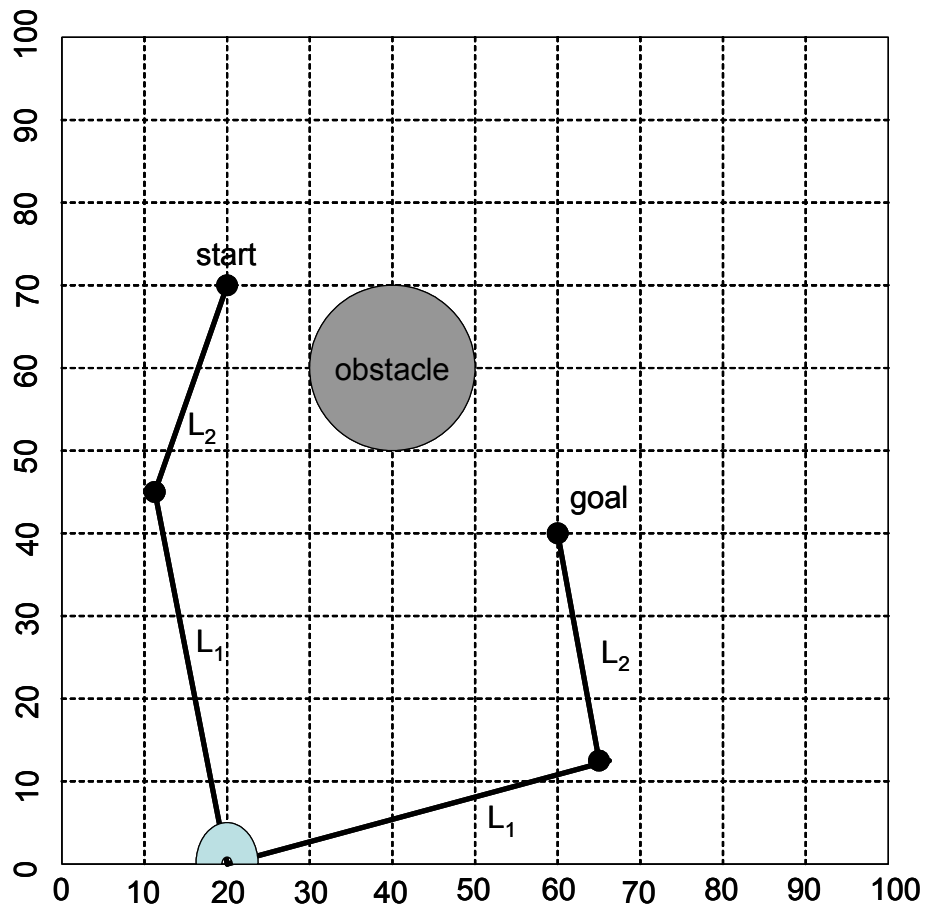


MECH 544
Robotics

Instructor: Prof. Cagatay Basdogan

PROJECT 02

In this project, you will design a 2-link robot and plan its motion such that your robot will start from an initial position at (70, 20) and arrive to the goal position at (60, 40) while avoiding the obstacle located at (40, 60) along the path (see the figure below). The base of the robot was initially placed at (20, 0). The robot is constrained to work in the square grid shown in the figure (i.e. the links of the robot should not go outside the boundaries of the square).



Project Details:

- Write a MATLAB program to display the potential surfaces (goal + obstacle) and the associated contour lines (*hint*: use the “`meshc`” command of MATLAB to display the surfaces and the contour lines)
- Write a MATLAB program that enables the user to plan the path of the end-effector point based on the “potential field” approach. The program should generate and display the path of the end-effector point on the screen for the given initial position, goal position, and the obstacle position. You should use the “`line`” command of MATLAB to display the boundaries of the square grid, the circular obstacle, and the path of the end-effector point (*hint*: treat the end-effector as a point mass moving under the influence of attractive and repulsive forces)
- Write a MATLAB program to animate the links of your 2-link robot (*hint*: use the “`line`” command of MATLAB to display the links of your robot) for the path you had planned in part b (note that you will decide on the link lengths of your robot based on the geometry and the workspace constraints of the system). If the current base location of the robot is not feasible for the solution, move it along the X-axis to suite your needs.

BONUS: You will get extra credits if you construct the configuration space map of the robot and show the path points on the map using MATLAB (*hint*: loop through all possible joint angles and check the collisions between the line segments that represent the arms of the robot and the circle representing the obstacle).

