

## Homework Project 1

Given 09/09/2015, Due 09/30/2015

The aim of this project is to create a program that takes a set of triangle obstacles as input, as well as a start and target point, and shows the shortest path between them. It provides a visual feedback by drawing the points, obstacles, and the path on the screen using the `xlib` interface.

The program takes one command-line argument, a file name. The following lines give the set of triangle obstacles in the format

T (20,100) (55,63) (30,50)

The point coordinates are integers. You can parse these files easily with `scanf`. There are less than 1000 obstacles.

As first stage, you read the input, find a bounding box (give 10% added space around the boundary), open a window, and display the obstacles in it. Then you get two left mouseclick events, which give the start and target point of the shortest path. Then you construct a graph; the vertices are the two points given by the mouseclicks, and all vertices of obstacles. Any pair  $(p, q)$  of these points forms an edge of the graph if the line segment  $pq$  is not intersected by any of the obstacles; if  $(p, q)$  is an edge, then its length is the euclidean distance of  $p$  and  $q$ . Finally you run a shortest-path algorithm on this graph, and display the resulting path on the screen. Repeat this as long as the user inputs point pairs with left mouseclicks; when you receive a right mouseclick, end the program. Redraw the triangles (and path) whenever you get an 'expose' event.

The programming language is C or C++; test your code before submission using the `gcc` or `g++` compiler. Please remove all dead code; try to program as clearly as possible, since I try to read it. Do not copy code from another student.

Submit your source code by e-mail to [phjmbrass@gmail.com](mailto:phjmbrass@gmail.com); include the course (I96) and homework number in the subject line, and your name as a comment in the homework file. If you submit multiple files, you can pack them with the `tar` archiver.