

# Mobile Robots

## AUTO4508

### Lab Assignment 4 – *Individual* – A-Star

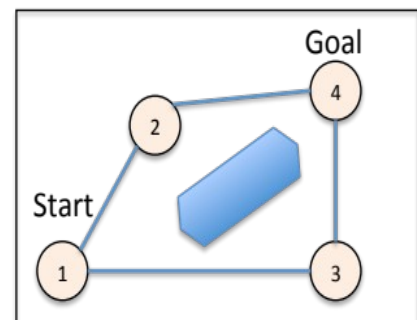
Points: 10

#### EXPERIMENT 1 (4 points)

Read the (x, y) coordinates in mm for up to 20 nodes from file: `nodes.txt`

Following each set of coordinates is the connectivity list to other nodes, as not every node is reachable from every other node (e.g. blocked by obstacles).

**Start node** is the first node, **goal node** is the last node in the file. Coordinate origin [0,0] is bottom left.



#### Example file matching the drawing above:

```
100 100 2 3      // Node 1 (Start): x = 100, y = 100, has links to nodes 2 and 3
200 400 1 4      // Node 2:      x = 200, y = 400, has links to nodes 1 and 4
700 100 1 4      // Node 3:      x = 700, y = 100, has links to nodes 1 and 4
700 500 2 3      // Node 4 (Goal): x = 700, y = 500, has links to nodes 2 and 3
```

For debugging purposes print the connection matrix after reading the input file. If two nodes are not connected, print “-1”. Draw node graph to LCD.

Distance output for example (no connection = -1):

0.0	316.2	600.0	-1.0
316.2	0.0	-1.0	509.9
600.0	-1.0	0.0	400.0
-1.0	509.9	400.0	0.0

#### EXPERIMENT 2 (4 points)

Calculate the A\* algorithm from **starting node 1** to **goal node 4** (in this example)

- Use the Euclidian distance as lower bound to goal as well as the actual driving distance (if reachable)
- Print the **shortest path and distance** from start to goal. Draw path on LCD.

#### EXPERIMENT 3 (2 points)

Drive the robot in the given environment along the shortest calculated path. Draw driven path to LCD.