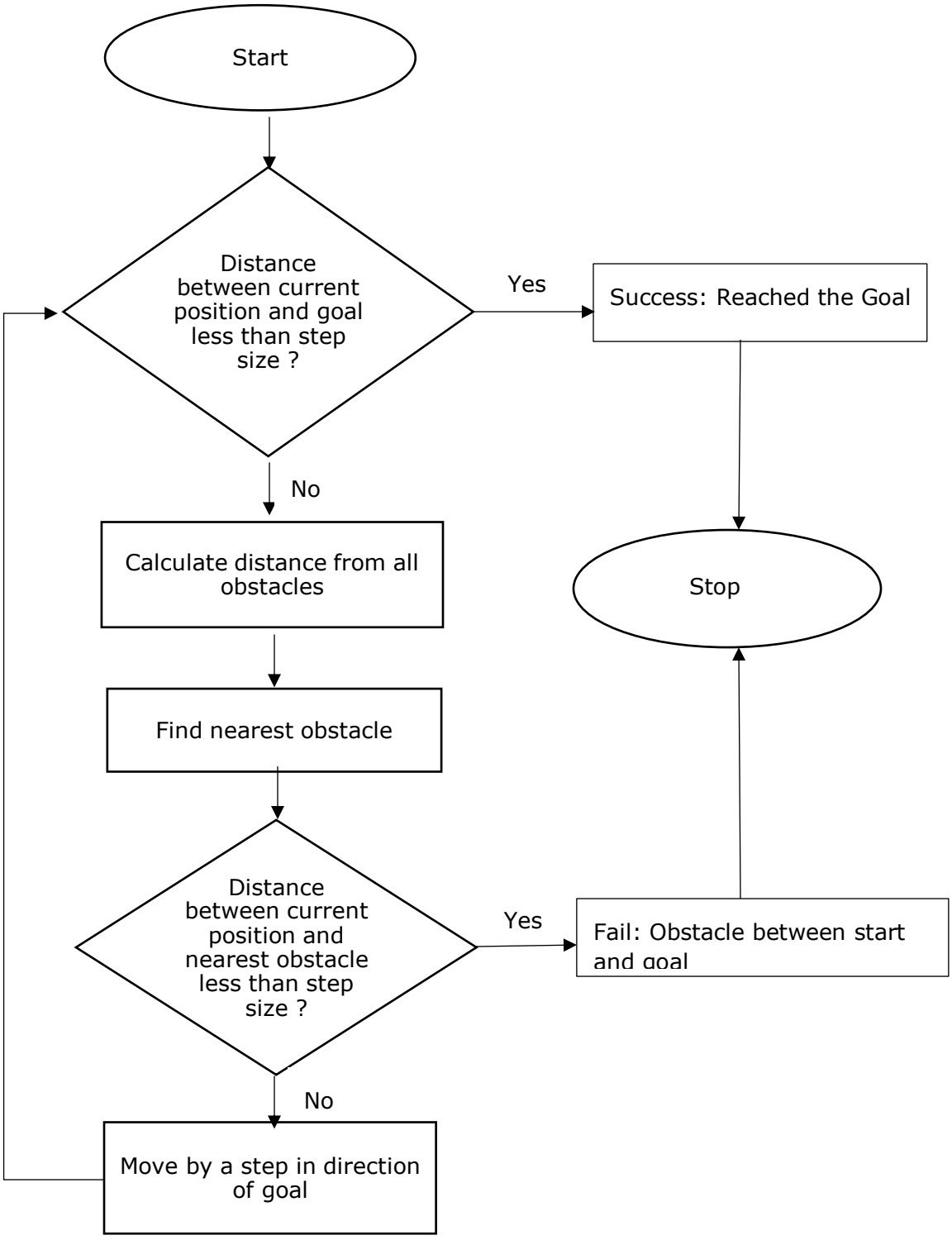
SC627 Assignment_1

E1.8 Programming Project: The Bug 1 algorithm

(i) BugBase algorithm Flowchart



(ii) Modify BugBase to implement Bug1 algorithm. Explain the roles of the geometric functions ??????

BugBase algorithm ends when an obstacle is detected. It is modified to Bug1 to continue the path to reach goal.

A loop is created to circumnavigate the bot when step size is less than nearest obstacle distance.

The distance from goal is calculated after each step made during circumnavigation.

When the bot reaches the same point where it started the circumnavigation, it again starts circumnavigation until the point of minimum distance from goal.

After reaching to that point it again checks whether moving towards the goal from that point is possible or not. If not, the program ends in failure. If it is possible to move, the above steps followed are repeated until the goal is within one step size.

Functions Used, helper.py

PointToPointDist - Function is used to find the distance between new moved position to the goal position.

PointToPolygonDist - Function is used to detect the nearest obstacle and make decision of circumnavigation .

TangentVectorToPolygon - Function is useful to direct bot movement tangential to obstacle boundary. Vector is used to circumnavigate around obstacle.

LineThroughTwoPoints - Function provides the parameters for the equation of line passing through two given points.

PointToLineDist -Function calculates the distance of a point from a line. The equation of the line is parameterized by the output of the LineThroughTwoPoints function described above.

PointToSegmentDist - Function gives the distance from a line segment. It uses the result of the function PointToLineDist to calculate the distance. It Is then used to find distance from the polygon by finding the minimum distance from each edge of polygon.

(iii) ComputeBug1 for given conditions –

Run Bug1.Py

Input: saved in input.txt

Output: saved in output.txt

(iv) Bug1 is tested in following environment and graph obtained is shown below:

Total path length = 28.0945 units

time = 379