Project Proposal

Prepared for: SE 101
Prepared by: Justin Kim
To Dr.Morton
From Justin Do Gyun Kim
September 29, 2014

Given a robot with cutting edge technologies, one can have infinite tasks for the robot to perform. For the SE 101 project, considering limited knowledge and time we have, I had to choose a functionality that satisfies both problems. However, I know that our group need to use most of the components of robots. Therefore, in any given maze with only one end, the robot is able to get to the end zone in two circumstances. First one is finding a path by itself. Other one is user interaction. First task is simple as it sounds. Robot will go through every single path in any given maze to find a end zone using its sensor and software programmed in python. Second part is where users act as an navigator. For example, user can type in turn right after 5m or turn left after two blocks. Then robot will follow the instruction to go through mazes.

In order to perform the first task, we need to build a program so that robot can find a path by itself. So we will instruct robot to go straight until it detects the obstacle or gets stalled. When robot is no longer able to move straight, we will tell robot to decide to move left or right depends on the situation. Thus we need to use commands like forward(), backward (), turnLeft (), and stop () etc. We may also build new function such as turnLeftUntilFreePath () since the paths are not always perpendicular to other paths. However, there can be a problem where robot will move in a continuous loop. Hence, our group must develop an algorithm to prevent this type of problems. If the above plan does not

go well, the robot will be programmed in different way. It will turn left or right as it moves so that it will not fall into a loop.

Diagram Example:

xxxxxxxxxxxxxxxx - R detects the wall with its sensor.
xxxxxxxx R - R turns left to find open path.
xxxxxxxx - R detects another wall, turns 180 degree, and move.

Second part is where user types in the instruction to a computer and robot receives the instruction and performs it. Since we are not knowledgable in artificial intelligence, user will not be able to give instruction as in normal talk. User must follow set of commands to type. Depending on the time it will take and difficulties, we will let user to write approximate length that robot will travel. For example, user will type “move (5m), stop () and turnRight ()”. Robot will calculate the distance that it travels and perform the task. Or TurnLeft60degree(). Otherwise, user will just command the robot individually. For instance, when Robot has to turnRight(), user types in turnRight(). Therefore, robot’s sensor and robot’s movement control is critical in this task. Without proper usage of them, robot will not be able to find the end zone.

Diagram Example

x xx xx
xxxx xx
xxx xx
xx xxx
S xxx

Set of Commands:
- Move (2 blocks);
- TurnLeft (90 degree);
- Move (2 blocks);
- TurnRight (90degree);
- Move (3 blocks);

I am certain that we will face many difficult challenges for our project. I think for the first part, the challenge will be developing an algorithm for the robot to finish mazes. I want the robot to move in a normal way like how human would do. Robot can be travelling in a loop in a maze if it is not properly implemented. So, the algorithm is very crucial. Otherwise, we must do in brute force which is checking side each time the robot moves. Also the robot control is very important for both tasks. Let's say, robot is asked to turn 50 degree to its current position, but robot motor control is not well designed, it will not find an open path.

Major tasks:

- Algorithm Design, initial design, and Learning Robots - 3 weeks.
    - It is very important part of our project. This must be taken seriously and time to finish.
- Implementing algorithm and coding - 2 weeks.
    - Having good initial approach, it will not be as difficult as the first task.
- Testing the robot - 1 week.
    - To see if Robot is working under any circumstances.