Opportunities for Driverless Cars

Team 45
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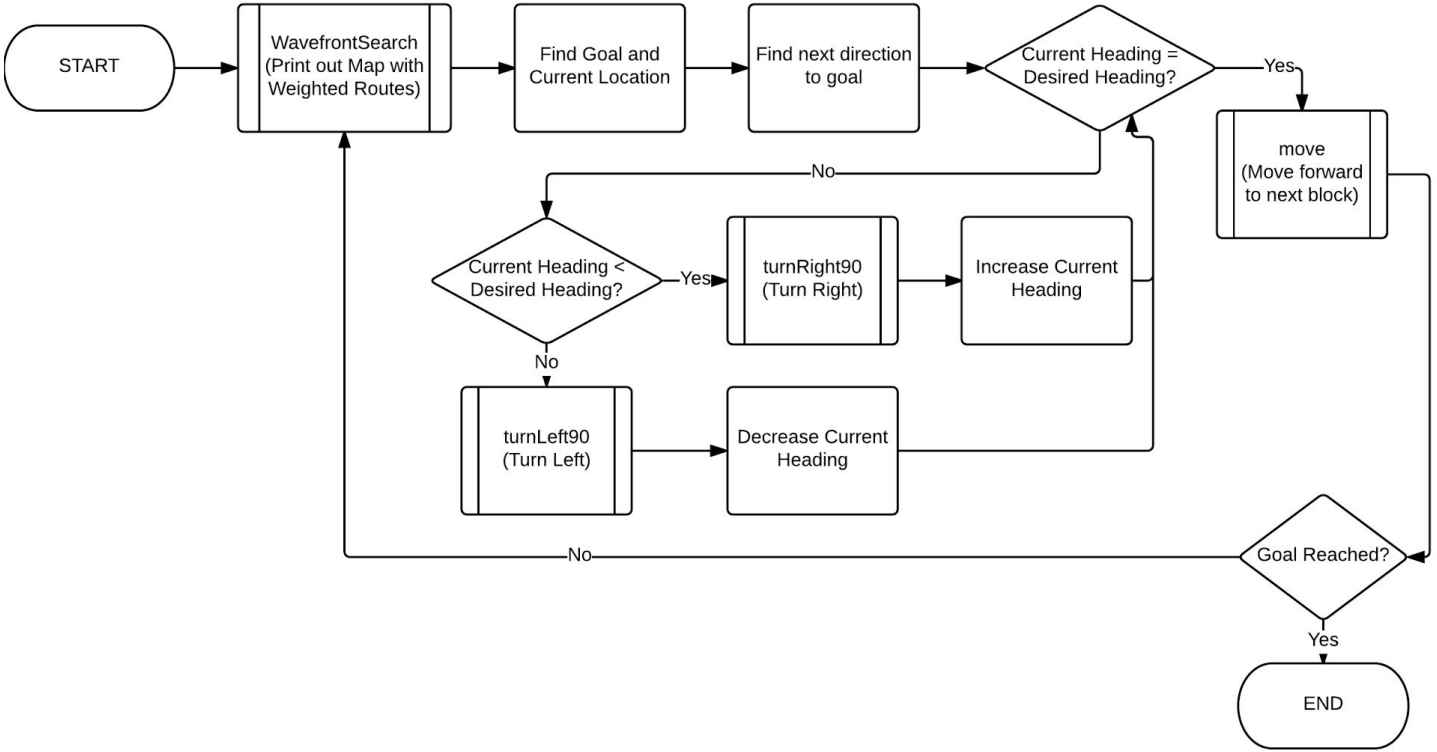
Overall Logic



Logic Details

Move Forward

- Convert Number of blocks to travel into degrees wheels need to turn (*degrees*)
- Reset Encoder Values to 0
- Set Target Values to *degrees*
- Turn on the motors
- Run motors until target is reached
- Stop for 1/2 second

Logic Details

Turn Right/Left 90 degrees

- Convert Number of blocks to travel into degrees wheels need to turn (*degrees*)
- Reset Encoder Values to 0
- Set Target Values to *degrees*
- Set motors to opposite directions
  - Turning Right -- (-50, 50)
  - Turning Left -- (50, -50)
- Turn on the motors
- Run motors until target is reached
- Stop for 1/2 second

Logic Details

PrintWaveFrontMap

- Iterates through the map
- Prints “R” for the robot’s current position, “G” for the goal, “X” for any obstacles, “*” for any square the robot has moved over, and the numbers for the wavefront search algorithm (explained later)

Logic Details

WavefrontSearch

- Finds location of the goal by setting currentWave to 2 and searching for currentWave value in the map
- Checks in every direction around the goal. If the square exists and contains a zero, it sets it to currentWave + 1
- After checking all directions, it increments currentWave, prints the map, and waits half a second
- Repeats the process with currentWave = 3
- Ends when there are no locations equal to the currentWave value

Output of PrintWavefrontMap at Beginning

11	10	9	8	7	6	5	4	5	6
12	1	1	7	6	5	4	3	4	5
13	99	1	6	5	4	3	2	3	4
12	1	1	7	6	5	4	3	4	5
11	10	9	8	7	6	5	4	5	6

Logic Details

NavigateToGoal

- Finds starting location of the robot
- Checks in every square around the robot, searching for the lowest value not equal to 1 (a barrier) and setting nextDirection
- Set's the robot location to the square with the lowest value
- Compares currentDirection to nextDirection to determine how it needs to turn. It changes currentDirection as it turns in 90 degree increments
- Moves forward 1 block and waits .5 seconds
- Repeats until it reaches the goal

Output of PrintWavefrontMap after Robot Reaches Goal

11	10	9	8	7	6	5	4	5	6
12	1	1	7	6	5	4	3	4	5
*	99	1	6	5	4	3	2	3	4
*	1	1	7	6	5	4	*	4	5
*	*	*	*	*	*	*	*	5	6

Advantages and Disadvantages of the Code

Advantages:

- Determines path before movement begins
- Error checking is good
- Good Naming Convention within Code

Disadvantages:

- Robot can only turn in increments of 90 degrees.
- If Robot is facing West and wants to go North, it must turn 90 degrees three times.
- Robot moves one block at a time, and waits 0.5 seconds per block moved.