Poster ID: Designing and Implementation of Robot Mapping Algorithm for Mobile Robot

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INTRODUCTION

❖.A mobile robot is an automatic machine that is capable of movement in any given environment [1].

❖ The Capabilities of Mobile Robot:

1. Moving around based on the user's input.
2. Avoiding obstacle in front of it.
3. Calculating the path.

❖ The Criteria of Mobile Robot**:**

1. Desktop size.
   A robot that can evolve on the desk near the computer improves drastically the student efficiency during experimentation.
2. Wide range of possibilities from an engineering and educational point of view.
   To exploit this tool in various fields of education such as signal processing, automatic control, embedded programming, or distributed intelligent systems design, the robot should provide a wide set of functionalities in its basic version.
3. User friendly.
   The user interface has to be simple, efficient, and intuitive. This is an important point for the acceptance of the system by the students.
4. Low cost.
   The broad introduction in engineering classes requires a large number of robots. Knowing that the budget of many schools is constant or decreasing, this is only feasible by reducing the cost of an individual robot.
5. Open information.
   This robot has to be shared among professors, laboratories, schools and universities. An open source hardware/software development model is an effective way to achieve this goal.

ROBOT MAPPING

❖ Robotic mapping is a discipline related to cartography. The goal for an autonomous robot to be able to construct (or use) a map or floor plan and to localize itself in it. Robotic mapping is that branch of one, which deals with the study and application of ability to construct map or floor plan by the autonomous robot and to localize itself in it [2].

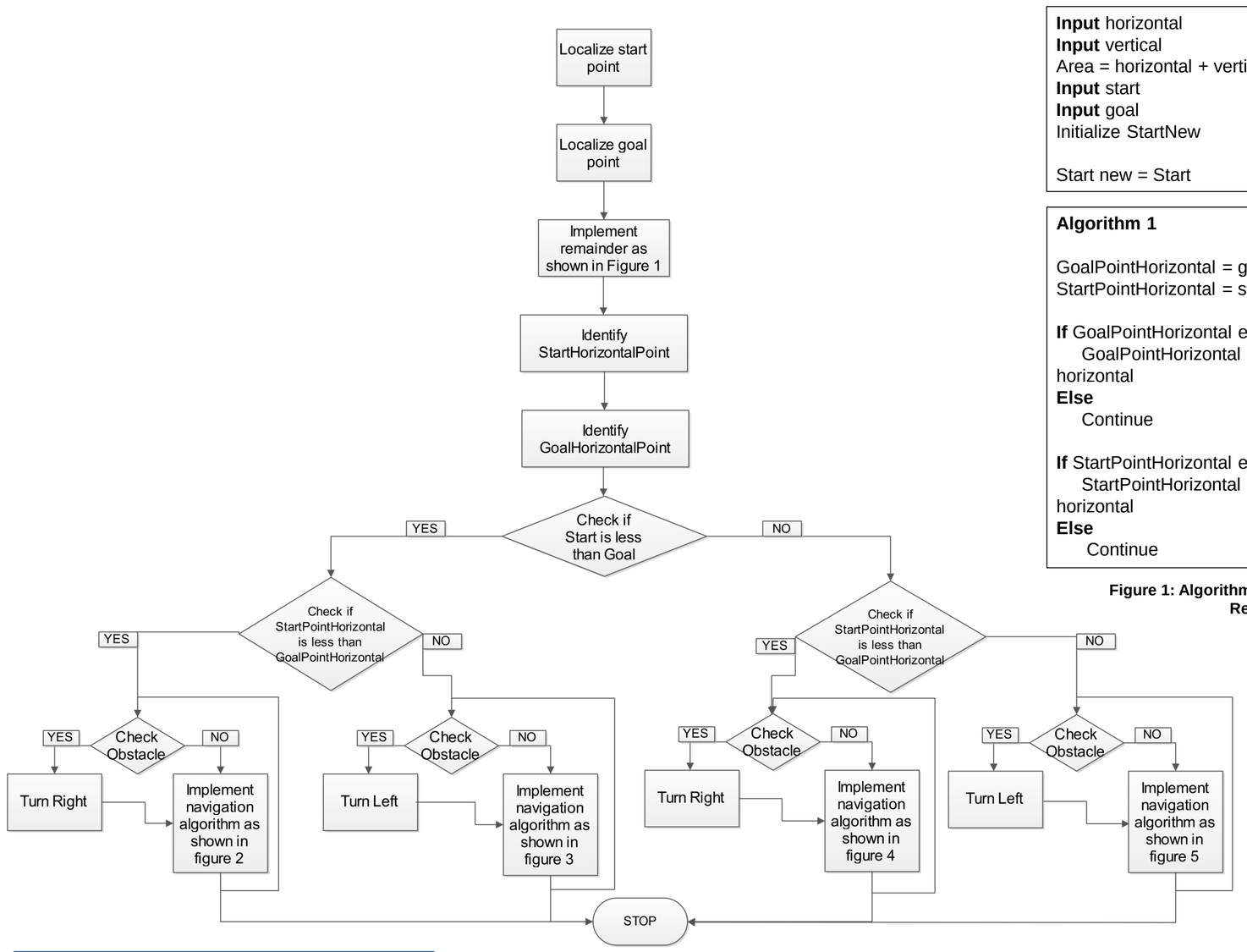
❖ The objective of the mobile robot are:

1. Robot is able to receive the input data from the user's android device via Bluetooth module.
2. Robot is able to construct and use map to accomplish its task.
3. Robot is able to avoid the small obstacle which block its way to accomplish the task.
4. Robot is able to calculate the path that has been taken.

ROBOT COMPONENT

The component of the robot are:

1. Arduino Mega 2560
2. Arduino Sensor Shield
3. Driver Stepper Motor ULN2003
4. Stepper Motor 28BYJ-48
5. Wheel
6. Acrylic body
7. Arduino Bluetooth module
8. Ultrasonic Sensor
9. Cable Wire/Jumper
10. Battery Box
11. Battery 3.7 volt Li-Po



Input horizontal
Input vertical
Area = horizontal + vertical
Input start
Input goal
Initialize StartNew

Start new = Start

Algorithm 1

GoalPointHorizontal = goal % horizontal
StartPointHorizontal = start % horizontal

If GoalPointHorizontal equal to 0 Then
GoalPointHorizontal = GoalPointHorizontal + horizontal
Else
Continue

If StartPointHorizontal equal to 0 Then
StartPointHorizontal = StartPointHorizontal + horizontal
Else
Continue

Figure 1: Algorithm 1 for Localization using Remainder

CURRENT AND FUTURE WORK

❖ Some point that we have done regarding designing the mobile robot are:

1. Robot has been able to receive user's input via Bluetooth module.
2. Robot has been able to construct and use map to move from one point (start point) to another point (goal point).
3. Robot has been able to avoid small obstacle.
4. Robot has been able to calculate the path that has been taken.

❖ The next project regarding the improvement and development this mobile robot are:

1. Some robots will be built based on this robot.
2. Each robot will be able to communicate with each other via Bluetooth module.
3. One robot will act as a leader and be able to lead the other robots.
4. The robot will be able to avoid any kind of obstacle.
5. The robot will be able to save the previous path to be used for the other robot to take the shortest path.

Figure 6: Arduino Mobile Robot

Figure 2
shows **the algorithm 2** for horizontal case in term of going to up from the right to the left side

Figure 3
shows **the algorithm 2** for horizontal case in term of going to up from the right to the left side

Figure 4
shows **the algorithm 4** for horizontal case in term of going to down from the leftto the right side

Figure 5
shows **the algorithm 5** for horizontal case in term of going to down from the right to the left side

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