Project Report

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Submitted To:

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Line Following Robot with Path memorization

Abstract – **In this project we try to make a line following robot (mobile robot) which can memorize the traversed path & can execute the same movements without the help of IR sensors.**

Keywords – Line Follower; Path Memorization; Robot

I. INTRODUCTION

Mobile robots have the capability to move around in their environment and are not fixed to one physical location. Mobile robots can be "autonomous" (AMR - autonomous mobile robot) which means they are capable of navigating an uncontrolled environment without the need for physical or electro-mechanical guidance devices. Alternatively, mobile robots can rely on guidance devices that allow them to travel a pre-defined navigation route in relatively controlled space (AGV - autonomous guided vehicle). By contrast, industrial robots are usually more-or-less stationary, consisting of a jointed arm (multi-linked manipulator) and gripper assembly (or end effector), attached to a fixed surface. [1]

II. LITARATURE REVIEW

In recent years a great deal of time and effort have been spent on developing systems to enable an autonomous robot to follow a marked path using a vision system. Not surprisingly, the majority of this research has been towards modifying, or designing from scratch, a full-sized road vehicle so that it can drive on ordinary roads without human supervision. Due to the large amount of space available in an ordinary road vehicle, high performance computers can be used to perform complex image processing and, typically, to maintain a mathematical model of the vehicle and the environment. Research into autonomous driving using smaller robots typically

follows one of two approaches. In the first approach a mathematical model of the vehicle and its surroundings is generated, tested in simulation, and then applied to a robot built specifically for the purpose. In the second approach a combination of a visual serving system and a kinematic model is used, again the robot is typically designed around the solution technique. Due to the size of these robots, the processing resources available are quite limited so simpler models and 11 techniques, such as visual serving, are used to reduce the processing load. [3]

III. IMPLEMENTATION

Our mobile robot (Line following robot) has the basic properties compared to other "LFR" but the extra feature it provides is memorizing the path.

Operation Procedure / Algorithm :

1. Initialize All component, I/O pin, variables, serial monitor baud rate.
2. Calibrate the IR sensor (for min, max, mid resistance).
3. Set Servos in Halt State. (90 D)
4. Read values from IR sensors.
5. Find average value for Right & Left side IR sensor resistivity. (Ravg & Lavg)
6. Check for DPDT switch input
7. **If [DPDT switch off & FLAG off]**
    a. **If [Lavg > Ravg]**
        i. Halt Left Servo & Run Right servo (20 D)
        ii. Insert 2 in array to memorize.

b. If [Lavg < Ravg]

i. Halt Right Servo & Run Left servo (160 D)

ii. Insert 3 in array to memorize.

c. If [All IR sensor give value less than mid resistive value]

i. Halt both servo.

d. Else

i. Run both servo.

ii. Insert 1 in array to memorize.

8. If [DPDT switch off & FLAG on]

a. For [array element 0 to end]

i. If [array[element] is 1]

1. Run both servo.

ii. If [array[element] is 2]

1. Halt Left Servo & Run Right servo (20 D)

iii. If [array[element] is 3]

1. Halt Right Servo & Run Left servo (160 D)

9. If [DPDT switch on]

a. If [FLAG off]

i. Set FLAG on.

b. Halt both Servo.

IV. COMPONENTS

A. Arduino Uno x 1

B. IR sensor set x 1

C. Continuous rotation servo x 2 **(modified Tower Pro MG995)**

D. DPDT switch x 1

E. Servo wheel x 2

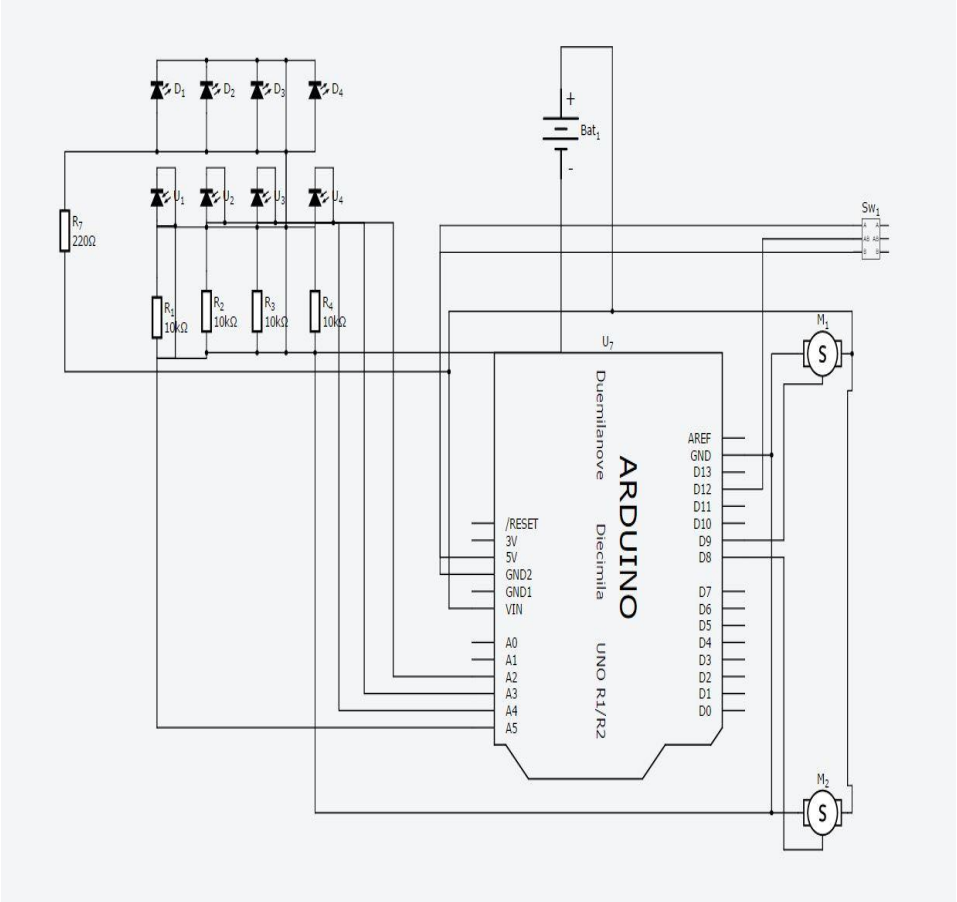
F. Ball caster x 1

G. DC Power 6 ~ 12 V

H. Jumper wires

I. Chassis x 1

V. CIRCUIT DIAGRAM



VI. CONCLUSION

Due to memory limitation of Arduino UNO (SRAM = 2 KB) we can only define Global integer array of size 500.

This mean we can only memorize 500 movements.

Another Problem is fast battery drain, we need DC Power & are using 4 x AAA Battery (1.5*4 = 6 V) & both servos (Tower Pro MG995) are using parallel 6 V for operation (60 D rotation in 0.16 s with 11KG/cm Torque) so we recommend to use DC Power supply instead of battery.

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