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A NOVEL ON LINE FOLLOWING ROBOT

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ABSTRACT

The Line follower robot is a mobile machine that can detect and follow the line drawn on the floor. Generally, the path is predefined and can be either visible like a black line on a white surface with contrasted color or it can be invisible like a magnetic field. The line follower robot based on the 5081 microcontroller has been tested, and the results show that the line follower robot can walk following the black line on the white floor and can display the situation on the LCD. However ,this line follower robot still has shortcomings in the line sensor sensitivity process depending on a certain speed. At speeds of **90-150rPM,** the line follower robot can follow the path, while at 150 rpm, the robot is not able to follow the path.

Keywords— line follower robot, microcontroller

1.INTRODUCTION

In earlier days, civilization was not that developed to make robots as perfect for some specific works as of now. A robot is a machine that is usually designed to reduce the amount of human work where it is applicable. It is usually developed to reduce risk factors for human work and increase the comfort of any worker. Besides this, it helps men to do other work as it helps to clear up some time for some easy work. Our modern civilization is going towards autonomous work day by day to reduce unnecessary human efforts on easy matters and ensure more comfort and safety for the concentration on other important works. In this Line Following Robot project which is driven by two independent DC motors, the safety issue has been prioritized in the design phase. In-Line Following Mode, the robot does not require any human interaction other than using a remote control device for on/off commands.

2. METHODS

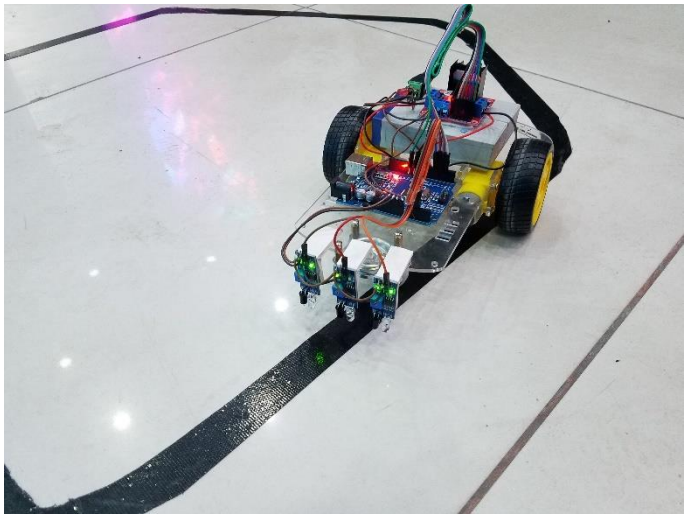
The basic concept in operating line follower robots depends on the reading of the sensor system and the motion regulation of the DC motor. The working principle of detecting lines from this robot is that each surface has the ability to reflect different light. White has the ability to reflect more light. Conversely, dark colors have the ability to reflect less light. This is used to detect lines. The sensor serves as a reader on how the level of reflection of the floor surface is given a line as a track and not. Because the principle of the sensor used is the reflection from the transmitter to the receiver, if the receiver using the photodiode gets a large beam, then the resistance of the photodiode becomes small, and vice versa. After what the surface conditions are read by the sensor, the difference is sent to the microcontroller for processing. Button functions as a regulator so that Line Follower is assigned according to our will to be processed by a microcontroller with other data. The microcontroller is a combination of a CPU, memory, and I / O integrated with the form of an IC or can be called a single chip. In the implementation of this design, the microcontroller used is the type of 5081 AVR. This microcontroller has an 8-bit architecture, where all instructions are packaged. Microcontroller, which has type AVR 5081 series as the brain of Line Follower which is responsible for processing input data and outputs data that has been processed to LCD and Motor Drivers.

3. RESULT AND DISCUSSION

After doing the design and manufacture of tools, the next step is to test the equipment that has been made. Tests and observations are made on the hardware and the entire system contained in this line follower robot. Testing the 5081 microcontroller-based robot line follower, the steps that need to be taken are as follows: Prepare components. Check all parts of the electronic circuit. In this stage, the inspection starts from checking the current source, and placement of components, and checking the soldering lines on the PCB. Line follower robot assembly, i.e., assembly between mechanical parts and electronic parts. Connect the circuit to a 12-volt DC voltage source. Press the switch on / off button. Check the electronic input and output ports of the microcontroller. Make sure the LED is on and the LCD can display data A. Sensor Testing The working principle of the sensor is simple, which utilizes the nature of light that will be reflected when it comes to light-colored objects and will be absorbed when it comes to dark-colored objects. The line used is a dark-colored line (black), and the floor is white, thus when the sensor hits the black line, the LED light is absorbed more. So the reflection becomes weak and not about the photodiode. Whereas if the sensor hits the white floor, then the reflected light from the LED will hit the photodiode. This difference in light intensity is used to detect lines. Seen from the picture above that the input of the left end sensor with portA0 address is regarding the black line, so the current cannot flow or has low logic. While the other sensors on the floor are white then high logic, then the microcontroller will process this input, then the output can be seen on the LCD display that is 11111110.

B. Driver Motor Test Motor driver testing is done in two ways, firstly, testing the driver by using a speed regulation program and the direction of rotation of a DC motor. Then the second way is by testing the driver by using the input voltage that comes from the sensor as a regulator of the direction and rotation speed of the DC motor. Basically, there are two parameters that will be obtained, namely the speed and direction of rotation of the DC motor. DC motor speed settings can be done by determining the SP, Up, and Lw values. In this setting, the values entered are multiples of 5 with provisions of 0-225 rpm. The picture above shows that the value entered for motor speed is 125 rpm.

C. Line Follower Robot Testing Robot follower line testing is carried out by using a black line on the white floor with a line thickness of ± 1.5 cm. Looking at some of the results of the line follower robot testing, it can be seen that the robot can follow the line at 90- 150 rpm motor speed, while at more than 150 rpm, the robot is not able to follow the path. Based on the results that have been made where this line follower robot consists of the 5081 microcontroller as the main controller that will process the data. This microcontroller has input in the form of sensors and pushes buttons and output in the form of motor drivers and LCD. The sensor used is the photodiode to function as a line detector, and push buttons are used to provide input data to the microcontroller. LCD output is used as a display that displays data and the motor driver is a regulator of the motor rotation, which will be a robot drive. Here can be seen the importance of the role of the microcontroller, in which the microcontroller will process the input data and regulate the output. Seeing from all the results of testing on the line follower robot the performance of this robot is in accordance with the program embedded in the 5081 Microcontroller.



4.FUTURE WORK

Line following robot based health care `management system can play a vital role in the field of hospitality. Robotics is a grooming technology. By using robot in the government and private hospitals the cost for the cure can be reduced. It can be very beneficially for the patients. In India many people hesitate to admit in the hospital because of costly medical practitioner. Monitoring of every patient is very difficult for the nurses in the hospital. So a camera can be placed in the line following robot, from which the status for every patients can be handle from a single room. In the bed of the patient an accelerometer can be placed from which if a patient have a heart attack then that device can operate a alarm circuit. Line following robot's application over electronics engineering can't be underestimated. This line following robot can be use as carrying the load and many more applications.

5.CONCLUSIONS

Based on the contents and discussion described, it can be concluded that the 5081 microcontroller can be used as a processing system for all systems in the line follower robot with a performance that is in accordance with the program created. The design of the mechanical part of the line follower includes the robot frame, the placement of sensors,and also the robot drive in the form of a robot wheel. The design of the mechanical part consists of 2 parts, namely the robot frame and gearbox so that making this robot lighter makes the movement of the robot easier. The design of electronic parts includes a line sensor circuit, microcontroller, DC motor, DC motor driver, signal conditioner, LCD output,and power supply (battery). The design of this electronic part as well as a robot frame with one-layer material that makes this robot more efficient. Program in C language, which shows the workflow of the robot in accordance with the line follower robot planning. So that the line follower robot can follow the line with the accuracy of the sensor in detecting the black line and the accuracy of the sensor in detecting the white floor.

6.APPLICATIONS

1.Automobile Industries

2.Medical

3.Agriculture

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