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Implementation of A Line Following Cart Based on Ultrasonic Sensor

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ABSTRACT: Nowadays, industries, hospitals, supermarkets are developed with technological advancements. Materials movement in industries, transportation of medicines to rooms, emergency wards and operation theaters in hospitals and people put the items purchased in supermarkets in a trolley or cart because it is the easiest method used in supermarkets, hospitals and industries to carry objects. However, throughout the whole process of carrying goods from one place to another takes more time and physical energy. Nowadays industries, hospitals and supermarkets are very busy with the heavy load of work and this cart can also be used without touching it which is much more important during covid time.Implementation of new idea and latest technology are the major gift to the recent generation. Utilization of these technologies has shrunk the world and brought very easy within our reach. The expansion and growth are the ideas and concepts are directly linked to the economic growth as well as development of the country. This paper presents Arduino based line following cart. Successful implementation on control is depend upon the logic utilization and with proper knowledge on the specific design model. Basically a line following cart can easily follow the line as per instructions loaded in the controller.

Keywords: Arduino, L298n, IR sensors, DC motor.

INTRODUCTION:

This project overcomes the problems raised in hospitals, industries, shopping malls, as per the survey humans are feeling difficult to carry loads from one place to a designated place so decided to design a cart which can carry loads. The machine that is usually designed to reduce the amount of human work where it is applicable. It is usually developed for reducing risk factor and effort of human work.

Arduino Uno normally includes many advance technology like interfacing, hardware and automatic control and software and all different sensors working knowledge. Project based learning in the subject of Arduino which will help the students learning due to their interest and motivation Line follower cart where one can easily understand the hardware circuits and software implementation as well as the large applied to the system. Now a days in many institutions there is a competition between students as a robot racing , robot war and many more. During recent years robots are placed in hospitals as it can save time, also save the manpower, work any hostile environment and conditions with good efficiency. UNO good Arduino which is used for controlling the cart to follow the exact line position . Cart is intelligent

programmed to follow the desired path to perform a task in military, construction, manufacturing units . Now a days android apps are there to control button, voice and line and make very user friendly.Now a days to encourage students and for educational tool as to increase the confidence and ability to take innovative ideas to implement low cost line follower. Robots are also used for different services like drug delivery, to increase transportation line follower cart is highly essential even its advantages are more in industry revolution 4.0. Obstacle detection is also an important application of a cart. Carrying cartage in a specific direction is also one application of line follower robot Importance of arduino is much more in all kind of field. so this paper describe the proposed procedure.

LITERATURE

This Line Following Robot, which is a part of AGV (Automated Guided Vehicle), an automatic robot in a simple term, can detect black or white lines to follow . Students have been developing these kinds of robots for a while. But the basic concept has always been the same. And line following robot competition held commonly to encourage students more about it . These line following robot determine the black or white line using Infrared rays. And creates its path following that line. As the robo works fully autonomously engineers have tried to bump up its abilities to make it more reliable for practical usage in various sectors and making it to capable of avoiding obstacles[12].

But research has been done to make them capable of following any color and the light sensors based on LED,LDR and RFID based on verification systems have been used to upgrade the line follower robot to that level.

A Line Following robot runs based on the sensor value it gets from the sensors. The correct sensor value leads to the proper result and important to have an accurate idea of those sensor data and so on. That is what the researchers have done. They not only built their line follower robot prototype but also went through that data. Based on the robot that takes its decisions.Path planning is the most important role for the line follower robot. As it is automatic, it has to make the decision based on the path. Usually robots can follow a straight or round-shaped path.[15] here, the vital part is to let it take its decision when there is more than one path to go and they are of different shapes obviously. A study has been already done to implement this in the prototype model[13].

PROBLEM DESCRIPTION

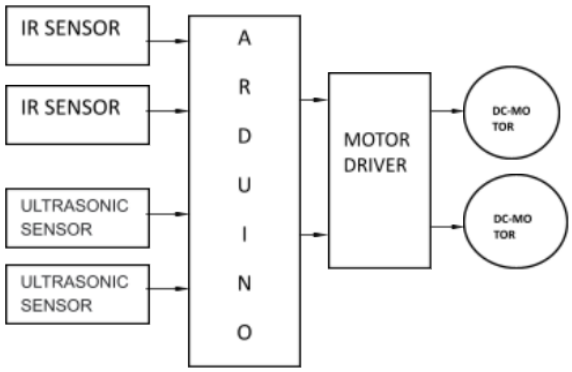
In the industry carriers are required to carry products from one plant to another manufacturing plant which are usually in different buildings or separate block and Conventionally, carts or trucks were used with human drivers. Unreliability and inefficiency in this part of the line formed the weakest link. The project is to automate this sector, using carts to follow a line instead of laying railway tracks which are both costly and an inconvenience[9].

PROPOSED SYSTEM

Ultrasonic sensors are most often used for object detection and distance calculation and measurement,perception, dynamic object detection and perception, and other applications[10] [14].

Motor controller to control current in the motor, the motor driver act like a current amplifier[1]. L298n can have the capabilities to rotate the motor either forward or reverse direction or one can say clockwise and anticlockwise direction. Even it receives low current but it provide adequate amount to the DC motor[16].

DC Motor For proper movement of the cart two DC motors has been implemented and a castor wheel is attached[2].



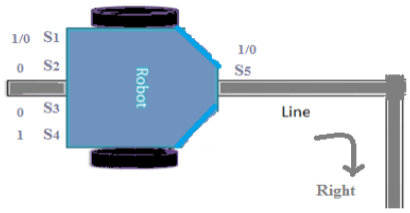
Arduino Uno:

The Arduino Uno is a microcontroller board based on the ATmega328.It has total 14 digital input/output pins in which 6 of them can be used as PWM output pins, six Analog pins,16-MHZ crystal oscillator, a USB connection, a power jack, ICSP pins and a Reset pin. It contains everything which is needed to support the microcontroller[18]. By connecting this to a computer with a USB cable start the process in the Arduino. Connecting it to a PC (personal computer), with a USB cable, the code can be dumped in the board and the desired functionality is performed[3].

IR Sensors:

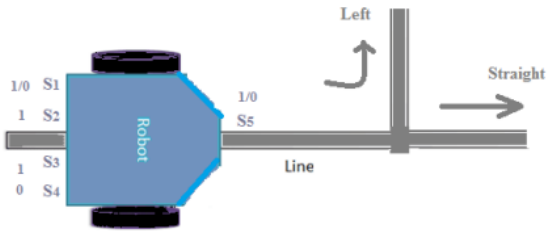
An infrared sensor is an electronic device that emits in order to sense some aspects of the surroundings.IR sensors are used to measure the heat of an object and used for detect the motion. These sensors measure only infrared radiation, rather than emitting it that is called a passive IR sensor. Normally, in the infrared spectrum, all the objects radiate in the form of thermal radiation. These type of radiation are invisible to eyes, which can be detected by only in infrared sensor. Here the emitter is simply an IR LED (Light Emitting Diode) and the detector is simply an Infrared photodiode which is sensitive to the IR light of the same wavelength as that emitted by the LED(Light emitting diode). If the IR light falls on the photodiode, the resistances and the output voltages will change in proportion to the magnitude of the IR light received[4].

In general, infrared detectors are used for object, detect, image and measure patterns of the thermal heat radiation which all object emit. The development of thermocouple is started in the 19th century.There early devices consisted of single detector elements that relied on a change in the temperature of the detector[5][19].



POSIBILE CART DIRECTION

Here to control the cart with specific mentioned line. Normally in manufacturing plant pick and placement or can say pick and drop capabilities are used. To follow a specific location and keep them on required or desired location/place. For this a specific path to be taken for consideration for smooth performance[6]. Using a feedback mechanism in control system there will be no chance of wrong movement. When there will be any sensed signal goes to the controller then it immediately gives to the motor driver IC for appropriate speed and voltage[7].



A programming instructions is given to the robot so that as per the instructions it can turn right or left or move forward[11][17].

DIFFERENT CASES AND MOVEMENT OF ROBOT

TYPES	Input					Movement of Robot
	S_1	S_2	S_3	S_4	S5	
Case-1	1/0	0	1	1	1/0	Right turn
Case-2	0	1	0	0	1	Adjustment Right
Case-3	0	0	1	0	1	Adjustment Left
Case-4	1/0	1	1	0	1	Straight over left
Case-5	1	1	1	0	0	Left turn

RESULT AND DISCUSSION

The line or path following cart can implemented successfully. This cart runs over a specific path with the help of sensors and specific logic used in the controller. Bigger size robots can change the role play of worker like supplying material to the architectural high rise construction building[8][15].The work assigned also may change in hospital like supplying medicines to all the patients within the proper time. Even more intelligent robots can send the emails within the office and can also deliver the news paper, magazines, foods to the office workers in time[20].

CONCLUSION

Now a day's health care system greatly depend upon different robotic machinery for the cost and best accuracy point of view. The programming and interfacing is the important key during final stage and also successfully complete of this work. For perfect performance one should check the battery activities in the designed circuit properly.

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