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Obstacle Avoiding Vehicle

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Abstract: Trajectory planning is one of the most important pivotal point in pick and place tasks done by robotic manipulators. In this work, we have presented a robot, which is compact, autonomous and fully functional.This robot or a smart car is built to sense any obstacle in its path, to avoid it and resume its running involving the pre-computation of an obstacle free path.Ultrasonic sensors were adapted to implement a real-time obstacle avoidance system for wheeled robots, so that the robot can continually detect surroundings, avoid obstacles, and move toward the target area.This model has tremendous applications in vacuum cleaners, avoiding concealed paths, parking systems, assembling automobiles and in chemical industries, in scientific exploration, emergency rescue and in other isolated environments.We use an Arduino UNO with a Motor Shield along with Stepper Motors to make the car, and for sensing we incorporate an Ultrasonic Sensor which accurately and efficiently detects any obstacles in the smart car's path. The Arduino is coded such that the smart car moves backward when an obstacle arises in front of it with a maximum limit of 50cms in ideal testing conditions.Throughout the construction of this model, we educated ourselves to the Arduino coding language, the Motor Shield functionality, and comprehensively, with the working of an ultrasonic sensor and its features.In conclusion, through this project, we aim to construct a model of a smart car that is beneficial to the quotidian problems of the present generation.

Keywords: Smart Car, Intelligent Vehicle, Detection, Obstacle avoiding, Ultrasonic, etc.

I. INTRODUCTION

We proposed a robot that avoids the obstacle which comes in its path this robot is introduced because in many of the industries we have seen that many heavy components which they have to move for one place to another place which is not possible without the help of machines. With this we got idea and we introduce the robot named as Obstacle avoidance robot using Arduino. Obstacle avoidance robot is design to allow robot to navigate in unknown environment by avoiding collisions. Obstacle avoiding robot senses obstacles in the path, avoids it and resumes its running.We have make use of sensors to achieve this objective. We have used two D.C.MOTORS i.e battery operated motors. The reason behind using BO motors is it consumes less power supply and can work properly on 9 voltbattery.

The construction of the robot circuit is easy and small. The main component behind this robot is ATmega328 microcontroller which is a brain of this robot. The idea proposed in this paper is by using machine vision to guide the robot. The field of machine vision has growing at a fast pace. Machine vision applications can be divided into four types from a technical point of view. They can be used to locate, measure, inspect and identify. The robot proposed in this paper is guided with the help of machine vision.

The best part of our project is that if any obstacle is encountered by the robot the robot automatically stops, changes its path and continues to travel in the same path.The capacity to recognize and evade obstacles continuously is a significant plan necessity for any down to earth use of independent vehicles. In this way, a noteworthy number of arrangements have been proposed for this issue. Sadly, the greater part of these arrangements request an overwhelming computational burden, which makes them troublesome, if not impossible, to implement on low cost, microcontroller-based, control structures.

The latter algorithms are more complex, this system provides an alternate way to the existing system by replacing skilled labour with robotic machinery involve detection of an obstacle as well as some kind of quantitative measurements concerning the obstacle's dimensions. Once these have been determined, the obstacle avoidance algorithm needs to steer the robot around the obstacle and resume motion toward the original target. This paper presents the results an algorithm for obstacle avoidance relying on low cost ultrasonic or infrared sensors, and involving a reasonable level ofcalculations, so that it can be easily used in real time control applications with microcontrollers

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II. METHODOLOGY/EXPERIMENTAL

This section discussed the compositions of the hardware components and software implementations used for designing and constructing the project. The fabrication of thechassis and casing of the system are also discussed.

2.1. HARDWARE SETUP

The system consists of Arduino uno, 2wheels driverobotic chassis, four DC motors, L293 motor driver, sensor, Switch to on and off the system, 9v batteries and connectorsfor power supply, jumper wires, caster, nut bolts and spacer

fig 1.1 Materials needed

and other supporting tools. Sensors were used namely: the ultrasonic sensor in order to improve on sensitivity and reliability of existing systems.

The sonar system is used in HC-SR04 ultrasonic sensor to determine distance to an object like bats do. It offers excellent non-contact range detection from about 2 cm to 400 cm or 1feet to 13 feet. Its operation is not affected by sunlight or black material. The ultrasonic sensor emits the short and high frequency signal. If they detect any object, then they reflect back echo signal which is taken as input tothe sensor through Echo pin.

Firstly, user initialize Trigger and Echo pin as low and push the robot in forward direction. When obstacle is detected Echo pin will give input as high to microcontroller. Pulse In function is used for calculating the time of distance from the obstacle. Every time the function waits for pin to go high and starts timing, then timing will be stopped when pin go to low. It returns the pulse length in microseconds or when complete pulse was not received within the timeout it returns.

The timing has been determined means it gives length of the pulse and will show errors in shorter pulses. Pulses from 10microseconds to 3 minutes in length are taken into consideration. After determining the time, it converts into a distance. If the distance of object is moderate then speed of robot get reduced and will take left turn, If obstacle is present in left side then it will take right turn. If the distance of object is short then speed of robot get reduced and will turn in backward direction and then can go in left or right direction.

This robot was built with an Arduino development board on which microcontroller is placed. Arduino board is connected with DC Motor through Motor driver board (pin10, pin11, pin12, pin13) which provides power to the actuators. Actuators are used to move robot in Forward, Backward, Left and Right directions. The brief description of inputs

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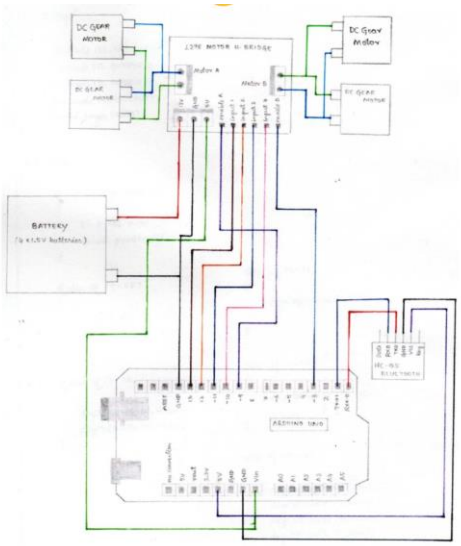

fig.1.1 Pin Diagram and connections

pins for movement of robot is given in below in table. The movement of robot will be stop whenever there is an obstacle is present on its path which can be detected by ultrasonic sensors. Ultrasonic sensors give time in length to the microcontroller as an input for further actions.

III. RESULTS AND DISCUSSIONS

The designed vehicle has to be switched on and then the vehicle moves, as soon as the vehicle encounters any obstacle in front of it the vehicle will deviate its path from the obstacle and chose another path where obstacle doesn't exist or the path were there is fewer obstacles.

IV. CONCLUSION

The objective of this task is to make an independent robot that wisely distinguishes the obstacle in its way and explores as indicated by the activities that we set for it. So what this framework gives is an option in contrast to the current framework by supplanting gifted work with automated apparatus, which thusly can deal with more patients in less time with better exactness and a lower for each capita cost. Further improvement can be achieved by adding sensors on the left and right side of the robot. Besides that, computer vision with camera features can be implemented for monitoring applications.

For further improvement, to implement an obstacle avoidance in aerospace, well-suited sensors should be used to gather the accurate information about the environment and obstacles. The laser based (LIDAR) sensor system is robust especially in off-road outdoor environments.LIDAR sensor is considered as an effective solution to the problem of obstacle detection and recognition. However, the obstacle avoidance poses challenges to the image processing using LIDAR sensor

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