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BOT INTELLIGENCE FOR GUIDING VEHICLE AUTOMATICALLY

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ABSTRACT

Present paper shows how a Robot can reduce a lot of work load from our shoulder. This paper presents how dynamic path planning stresses upon real time path planning operation, to make the robotic vehicle capable of traversing from initial position to target position and to make the vehicle intelligent for obstacle detection and obstacle avoidance.

KEYWORDS: Robotic Vehicle Side Transmitter (RVST); PC Side Receiver (PSR); Robotic Vehicle Side Receiver (RVSR)

INTRODUCTION

We decided to work on Robotic Vehicle field and simulate something which will make to easy human life today's aspect. This paper deals with a wheeled autonomous Robotic Vehicle. It is a part of automation because Robot has sufficient intelligence to cover the maximum area [8]. In such a way the robot is able to detect obstacles of provided space and able to avoid obstacles coming in between the path of Robot with the help of microcontroller board and complete its [8].

Looking at whole system it is very difficult to understand, so we have subdivided the system in Parts to get through the whole system:

1. Mechanical and Electrical Assembly (Stepper motor, gears, dc motor, mechanical body).
2. Hardware (includes interfacing, controlling circuit for stepper motor, transmitting circuit, receiving circuit, and sensing circuit).
3. Controller (Software).

Heart of the system is the sensing assembly which senses the obstacle detection. The use of external sensing mechanism allows a robot to interact with environment in a flexible manner .This is in contrast to pre-programmed operation in which a robot is taught to perform a repetitive task via a set of programmed function.

We have used proximity sensors. Proximity sensors have binary output which indicates the presence of an object within a specified distance interval. Proximity sensors are used in robotics for a near fieldwork in connection with object grasping or avoidance. Among proximity sensors there are number of choices like ultrasonic proximity sensors, infrared proximity sensors, and inductive capacitive proximity sensors. In inductive proximity sensors sensitivity falls off rapidly with increasing distance and that the sensor is effective only for fraction of millimetre [1]. The primary problem with this method is that it is largely confined to sensing metallic objects. Again Hall Effect a sensor detects only magnetized object. The main disadvantage to capacitive sensor (often called a capaciflector) is that its usefulness is dependent on properties of the obstacles it is sensing[2] .For ultrasonic sensors response time is 48 to 90 mili sec and power voltage range 12 to 24 V[3].As we have used IR sensors because of speed of response time. Response time of IR sensors is not more than 3-5 m sec. Low Power consumption PWM output is obtained; Continuous data transmission is possible [4]. Used sensors have TTL and CMOS comparisons.

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Different types of methods have been explored for finding out obstacle detection. In our present work; we have used the edge detection method.

WORKING PRINCIPLE

First of all our system is running straight whenever some obstacle comes in front of it according to the particular sensor O/P there will be a high O/P given to particular line of the Robotic Vehicle Side Transmitter. RVST is there to transmit this signal to PC Side Receiver (PSR) which will further transmit this data to the PC controller. According to the particular condition for particular high sensor O/P. Controller will give a proper O/P to the PC Side. Function of PST is just opposite to that of PSR. PST is there to transmit the proper controlling signal to the Vehicle Side Receiver (VSR). VSR controls the direction of dc motor i.e. weather to move front, stop, reverse, it also give signal to the stepper motor weather it has to turn the vehicle right or left according to the obstacle detected by the sensor, and the same stepper motor is used for direction control of the vehicle. The direction of obstacle is shown by the high output of a particular sensor which is positioned on the periphery of the circle so as to sense obstacle in all direction.

METHODOLOGY

Edge Detection Method uses an Algorithm which identifies whether an image pixel lies on the Edges of an object or not, This Algorithm determine the position of vertical edges of the obstacle and then steers the Robot around either one of the visible edge. The line connecting to the two vertical edges is considered to represent one of the boundaries of the obstacle. Everything of obstacle detection depends on sensitivity & accuracy of sensors [5].

In flow chart two conditions are made to choose any one condition i.e. mechanically driving the Vehicle through the keyboard (i.e. Starting, Stopping, Reversing the vehicle, whenever obstacle comes we have to change the direction of the vehicle through key pressing) and automatically controlling the Vehicle.

In Automatic way the Vehicle Runs Straight forward and whenever any obstacle comes (obstacle may come from front, right, left, all directions) So according to the space where vehicle can move, the automatic controller will guide the vehicle to turn to appropriate direction by giving proper instruction to D.C motor and Stepper motor. It may also stop the vehicle if there is no space to move. When the destination is reached the Vehicle Automatically stops [6].

DESIGN OF CONTROLLING SECTION

Controller section is designed using language embedded C with LPT1 Parallel Port of computer. There are following program for parallel port controlling Vehicle:

```
#include<avr/io.h>
#include<util/delay.h>
void main()
{
DDRB&=~(1<<0);
DDRB&=~(1<<1);
PORTB|=(1<<0);
PORTB|=(1<<1);
DDRD=0b00001111;
while(1)
{
if((!(PINB&1))&&(PINB&2))
{
PORTD=0b00000001;
_delay_ms(10);
}
else if((PINB&1)&&(!(PINB&2)))
{
PORTD=0b00000001;
_delay_ms(10);
```

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```
}
else if((!(PINB&1))&&(!(PINB&2)))
{
PORTD=0b00000101;
_delay_ms(10);
}
else if((PINB&1)&&(PINB&2))
{
PORTD=0b00000001;
_delay_ms(10);
}
}
}
```

Controlling section is shown in figure 1.

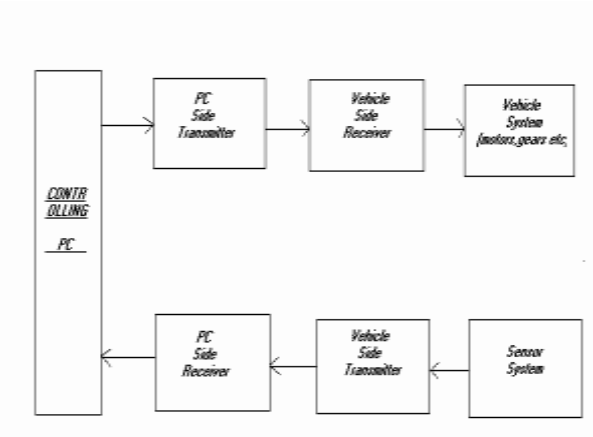

Figure 1 Controlling section of System

DESIGN APPROACH

The approach used in the autonomous Robot architecture enables a vehicle robot to take advantage of a priori knowledge of its environment to produce a path that is free of collisions with all modelled obstacles and is not dependent on any fixed track or network. The path is then passed to the motor schema manager for actual path execution. The presence of unmodelled obstacles poses little difficulty for this behaviour oriented approach to navigation [8].

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SIMULATION RESULTS

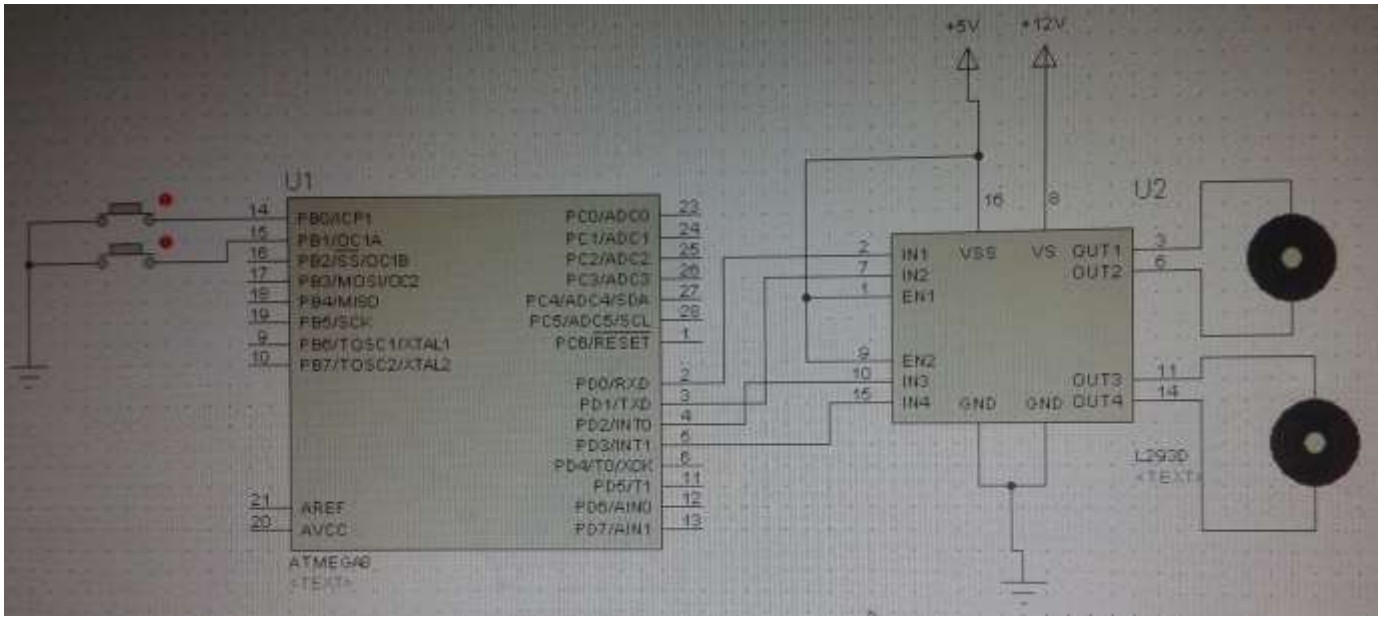

Figure 2 Simulation of parallel port motor controlled at obstacles detection by sensors

FUTURE SCOPE

Future work will involve exploitation of the fast line finder and fast region segmentation algorithms, which have already been used successfully for hallway and outdoor navigation of vehicle. As well as Hough transforms for recognition, tracking and controlled motion triggering in the FMS environment. Following points can be improved the performance of robotic vehicles:

1. Limitation of the workspace of the vehicle due to the limited length of cable can be increased by wireless transmitter and receiver.
2. FPGA can be used which will increase the no. of input output pins, it also increases the speed.
3. CCD camera can be used which will give a better imaging of obstacle.

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Flow Chart