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Path Finding Robot by using Obstacle Avoidance System

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Abstract: ***Now a day's Robotics is a emerging technology which reduces the effort of humans. The concept of Mobile Robot is fast evolving and the number of mobile robots and their complexities are increasing with different applications.. There are many types of mobile robot navigation techniques like path planning, self – localization and map interpreting. The project is to build a mobile robot which avoid obstacle and to plan its moment. It has an infrared sensor which is used to sense the obstacles coming in between the path of ROBOT. It will move in a particular direction and avoid the obstacle which is coming in its path. An Infrared ray sensor is used to detect the obstacle and send information to controller and after processing the input microcontroller redirects robots using motors which are controlled by motor drivers.***
Keywords: Robot, Infrared Ray sensor, Motor drivers.

I. INTRODUCTION

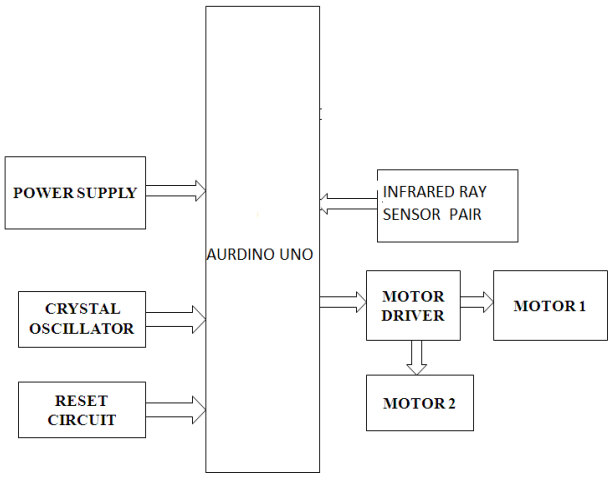
Now a day's Robotics is part of today's communication & communication is part of advancement of technology, so we decided to work on ROBOTICS field, and design something which will make human life today's aspect. Primary things required for mobile robot is obstacle avoidance and path finding in unknown environment and not to get damaged. There are some very important methods for mobile robot like wall following, edge detection, line following. One of the important use is wall following robot on a floor to clean floor. The most commonly employed method for obstacle avoidance is based on simple object detection using Infrared Ray sensor. A disadvantage with obstacle avoidance based on edge detecting is the need of the robot to stop in front of an obstacle in order to provide a more accurate measurement.

Mobile robots feature some kind of damage avoidance by avoiding collision, ranging from basic algorithms that detect an blocks to avoid a collision, using some basic program code, that initialize the robot to detect blocks. The program code is easy, since it is involved simple obstacle detection as well as some kind of obstacle distance measurement to avoid collision. Once block is determined, the obstacle avoidance program needs to direct the robot around the block and halt motion and direct robot to desired direction. In this paper the redirecting algorithm makes the robot does not have to stop in front the block and find its path. Hence the robots may overcome problems during path finding, it can direct robot during its operation avoiding the bumping with walls.

II. PROPOSED SYSTEM

This system uses several hardware modules to detect the obstacle. Whenever an obstacle is detected by IR sensor the robot changes its direction automatically using motors.

A. Block Diagram



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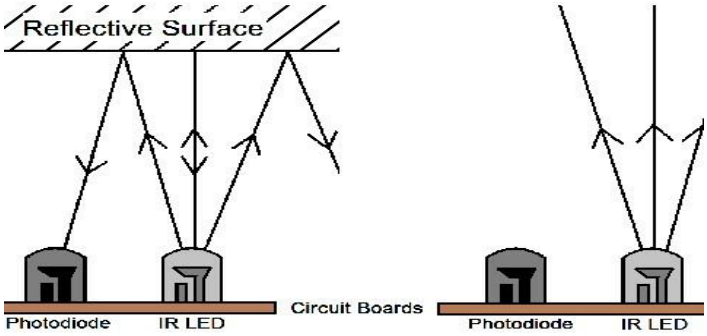
The hardware modules used are

B. Aurdino

Arduino is an open-source electronics platform based on easy-to-use hardware and software. Arduino boards are able to read inputs - light on a sensor, a finger on a button, or a Twitter message - and turn it into an output - activating a motor, turning on an LED, publishing something online. You can tell your board what to do by sending a set of instructions to the microcontroller on the board. To do so you use the Arduino programming language (based on Wiring), and the Arduino Software (IDE), based on Processing.
There are many other microcontrollers and microcontroller platforms available for physical computing. Parallax Basic Stamp, Netmedia's BX-24, Phidgets, MIT's Handyboard, and many others offer similar functionality. All of these tools take the messy details of microcontroller programming and wrap it up in an easy-to-use package. Arduino also simplifies the process of working with microcontrollers, but it offers some advantage for teachers, students, and interested amateurs over other systems

C. Infrared Ray Sensor

An infrared sensor is an electronic device that detects infrared radiation in order to sense some aspect of its surroundings. Infrared sensors detect the object's distance with infrared radiation. When the beam detects an object, the light beam returns to the receiver with an angle after reflection. Infrared sensors can measure the heat of an object. It works by using a specific light sensor to detect a select light wavelength in the Infra-Red (IR) spectrum. By using an LED which produces light at the same wavelength as what the sensor is looking for, you can look at the intensity of the received light. When an object is close to the sensor, the light from the LED bounces off the object and into the light sensor. This results in a large jump in the intensity, which we already know can be detected using a threshold.



Pin, Control Indicator	Description
Vcc	3.3 to 5 Vdc Supply Input
Gnd	Ground Input
Out	Output that goes low when obstacle is in range
Power LED	Illuminates when power is applied
Obstacle LED	Illuminates when obstacle is detected
Distance Adjust	Adjust detection distance. CCW decreases distance. CW increases distance.
IR Emitter	Infrared emitter LED
IR Receiver	Infrared receiver that receives signal transmitted by Infrared emitter.

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III. MOTORS

A DC motor is a rotary electrical machine that converts direct current electrical energy into mechanical energy. L293D is a motor Driver IC which allows DC motor to drive on either direction. L293D is a 16-pin IC which can control a set of two DC motors simultaneously in any direction. It means that it can control two DC motor with a single L293D IC. It decides which motor will be in motion or stop in according to the incoming signal from the microcontroller. The brief description for pins for motor movements which makes robot to move and find path.

Action	RHS Motor	LHS Motor	RHS Motor		LHS Motor	
			Pin 2	Pin 7	Pin 10	Pin 15
Move Forward	Clockwise Rotation	Anti-clockwise Rotation	LOW	HIGH	HIGH	LOW
Move Backward	Anti-clockwise Rotation	Clockwise Rotation	HIGH	LOW	LOW	HIGH
Turn Right	Stop	Anti-clockwise Rotation	LOW	LOW	HIGH	LOW
Turn Left	Clockwise Rotation	Stop	LOW	HIGH	LOW	LOW
Stop	Stop	Stop	LOW	LOW	LOW	LOW

Generally operating voltage of dc motors is +5vto+10v.Here HIGH refers to +5volts.LOW refers to 0v. The basic forward, backward, left, right is described here.In the circuit an Arduino UNO is used as the platform. Gear Motor is connected to Arduino UNO via motor driver IC L293D. A motor driver IC consists of two H-bridge circuits which can be used for controlling two motors simultaneously. An L293D has 4 input pins, 4 output pins, 2 enable pins, Vss, Vcc and GND. Vcc is the voltage that it needs for its internal operation. L293D will not use this voltage for driving the motor. For driving the motors it has a separate provision to provide motor supply Vss.



IV. IMPLEMENTATION

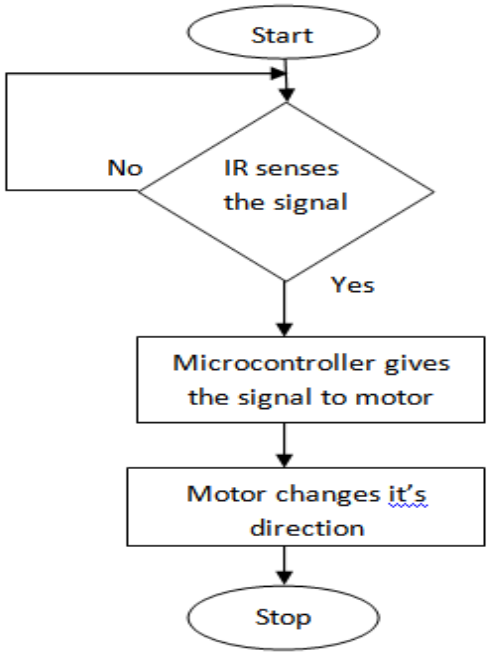
Sensors and motors are connected to the Arduino board. Microcontroller is able to sense the environment through receiving input from sensors. It is also able to control its surrounding through controlling motors and other actuators.

Arduino is a popular programmable board used to create projects. It consists of a simple hardware platform on which microcontroller is placed as well as a free code editor which has a “one click compile or upload” feature. The Arduino programming language that is based on the processing are used to program the microcontroller found on the board. Due to its open source environment, we can able to easily write and upload codes to the I/Oboard. Arduinoenvironment is written in Javahence it can be run on Linux, Mac OSX and Windows platforms.

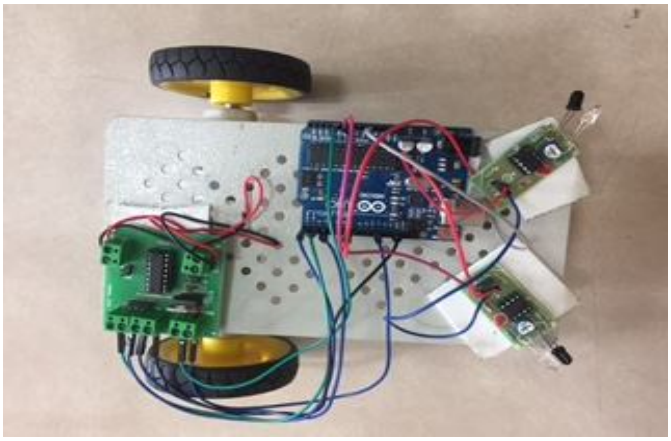
Sensors sense the object then generate a signal high or low then signal is processed by the microcontroller. Microcontroller is programmed to avoid the obstacle, when it get a signal from sensor then by processing this signal drive the motor driver accordingly ,according to the incoming signal of sensors microcontroller decide the motor direction either left or right.

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A. Flow Chart



B. Working Module



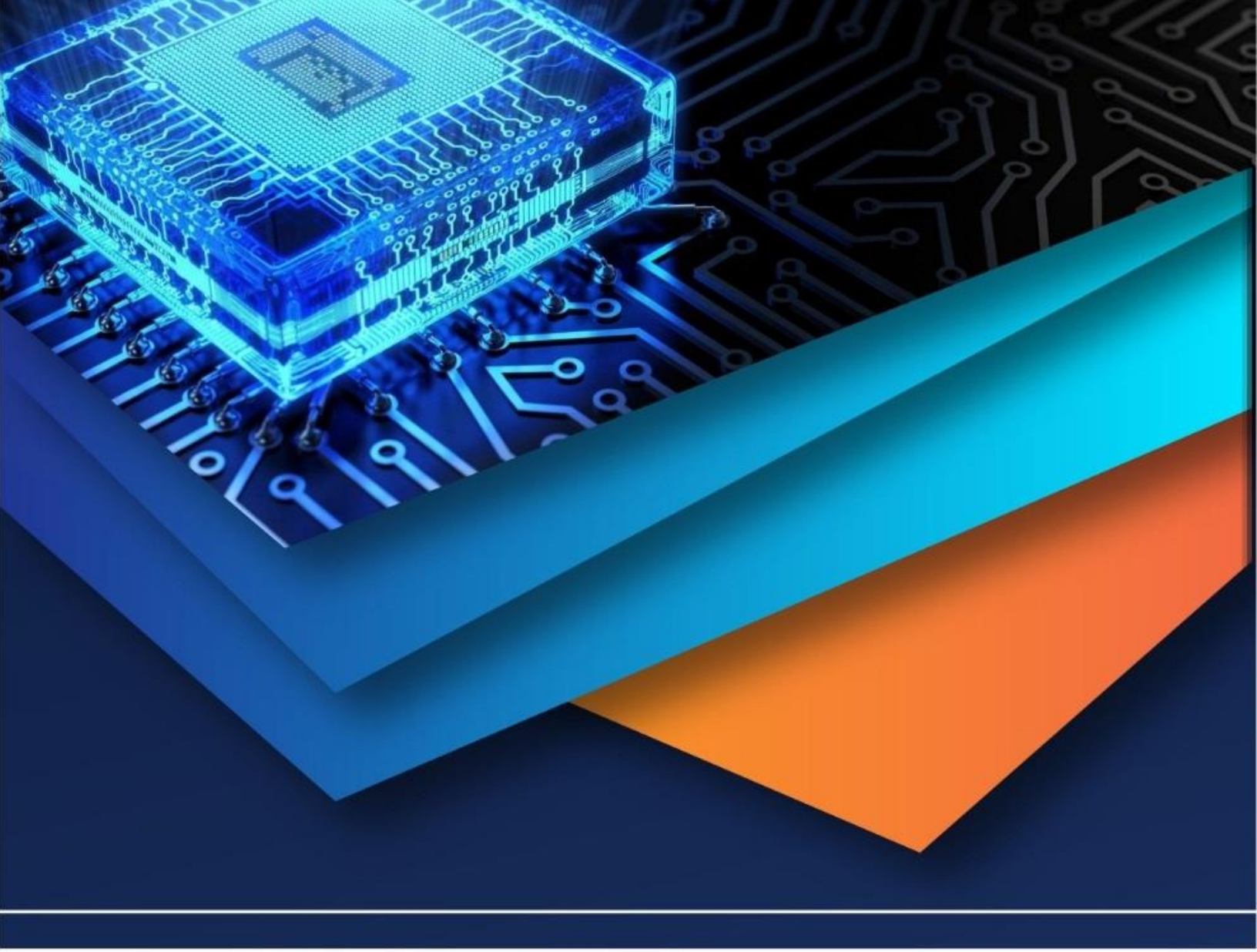
V. CONCLUSION

We build a robotic vehicle which moves in different directions like Forward, Backward, Left, and Right when input is given to it. This design createsa automatic robot which intelligently detects the obstacle in its path and directs according to the information using Infrared rays sensors. This type of mobile robot can be implemented in any environment because line following robot follows line once it comes out of it. The environment is different and difficult for its motion but we can implement obstacle avoiding robot to any environment.

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