iJRASET
International Journal For Research in Applied Science and Engineering Technology

# INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

**Volume:** 6 **Issue:** II **Month of publication:** February 2018

**DOI:** http://doi.org/10.22214/ijraset.2018.2027

www.ijraset.com

Call: 08813907089 | E-mail ID: ijraset@gmail.com

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
*ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor :6.887*
*Volume 6 Issue II February 2018- Available at www.ijraset.com*

# Obstacle Detection of Robot

Dr S Govinda Rao[1], Dr P Vara Prasada Rao[2]
[1,2]*ProfessorDepartment of CSE,GRIET*

***Abstract:*** ***The obstacle detection field is a very broad one and a lot of obstacle detection systems. Almost all obstacle detection systems use a combination of passive-active technology, and in General the best solution is obtained using a vision system combined with a distance sensor like radar. After that, the data is transmitted to the processor. Hence, the processor is going to decide the proper commands and then it sends them to the driver and thus the robot will be followed in the absence of obstacle detected. In this project mainly whenever robot senses any obstacle automatically diverts its position to left or right and follows the path. Robot consists of two motors, which control the side pair wheels of each and help in moving forward and backward direction. Robot senses the object with help of obstacle sensor. IR pair is used for detecting the obstacle. The two basic parts for working with IR are the emitter and the detector. The emitter is typically an LED that emits near-infrared light. Infrared (IR) light is electromagnetic radiation with a wavelength longer than that of visible light, measured from the nominal edge of visible red light at 0.74 micrometres (μm), and extending conventionally to 300 μm. These wavelengths correspond to a frequency range of approximately 1 to 400 THz, and include most of the thermal radiation emitted by objects near room temperature. Microscopically, IR light is typically emitted or absorbed by molecules when they change their rotational-vibration movements. We have used two D.C motors to give motion to the robot. The construction of the robot circuit is easy and small .The electronics parts used in the robot circuits are easily available.***

***Keywords: obstacle detection, D.C motors, LED***

## I. INTRODUCTION

Robotics is part of Today's communication. In today's world ROBOTICS is fast growing and interesting field. It is simplest way for latest technology modification. Now a day's communication is part of advancement of technology, so we decided to work on robotics field, and design something which will make human life simpler in day today aspect. Thus we are supporting this cause. Robotics is the branch of technology that deals with the design, construction, operation, structural disposition, manufacture and application of robots [and] computer systems for their control, sensory feedback, and information processing[1].

In this paper mainly concern robot senses any obstacle automatically diverts its position to left or right and follows the path. Robo consists of two motors, which control the side pair wheels of each and help in moving forward and backward direction. Robot senses the object with help of obstacle sensor. IR pair is used for detecting the obstacle. The two basic parts for working with IR are the emitter and the detector. The emitter is typically an LED that emits near-infrared light[2].

## II. PROPOSED SYSTEM

Proposed system of obstacle detection and avoidance of robot fulfils the desired functionality and demonstrates the working of obstacle detection of robot. The detection is a kind of the robot contests to vie running speed on the line[3].

Building a basic Obstacle Detection of Robot involves the following steps.

Designing the mechanical part or the body of the robot Defining the circuits of the robot Designing the control of the robot

### *A. Advantages*

*1)* Robot movement is automatic
*2)* Cost effective
*3)* Simplicity of building

### *B. Block Diagram*

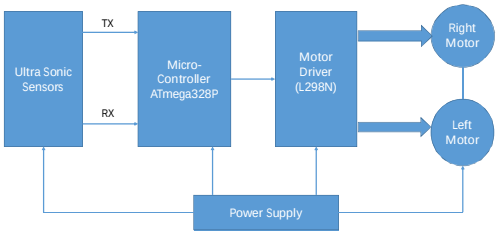
The different types of the block diagram function in the following manner:

Sensors: The sensor used is Ultrasonic sensor; they detect the obstacle by emitting ultrasonic sound. Ultrasonic sensors are often used in robots for obstacle avoidance, navigation and map. This ultrasonic range sensor works by emitting a short burst of 40 kHz ultrasonic sound from a piezoelectric transducer. A small amount of sound energy is reflected by objects in front of the device and returned to the detector, another piezoelectric transducer. The receiver amplifier sends these reflected signals (echoes) to micro-

controller which times them to determine how far away the objects are, by using the speed of sound in air. The calculated range is then converted to a constant current signal[4].

1) *Motor:* The motor will drive the wheels. An electric motor is an electromechanical device that converts electrical energy into mechanical energy
2) *Microcontroller:* This is the most important block of the system. Microcontroller is the decision making logical device which has its own memory, I/O ports, CPU and Clock circuit embedded on a single chip
3) *Driver:*L298N is used as driver IC. Motors are connected to this IC. According to program in µc it drives the left and right motor. L298N is a dual H-bridge motor driver integrated circuit (IC). Motor drivers act as current amplifiers since they take a low-current control signal and provide a higher-current signal. This higher current signal is used to drive the motors[6].

BLOCK DIAGRAM :




Construction

The hardware part includes the structure of robot that is Electronics and Communication structure, PCB (printed circuit board), blower, and battery. In this unit all the connections are being made along with the PCB.
Electronics and Communication connection wheel is connected to base very tightly to avoid errors in the system. Connection of blower is made with lower part of base and battery is connected in upper portion of base for power supply to the system which is very important battery used here is of 6v battery, blower of +5V to +9V. And along with wheel electrical motors are connected with base having r.p.m of 100 rpm[5].

### *C. PCB Connection*

A printed circuit board, or PCB, is used to Electronics and Communicational support and electrically connect electronic components using conductive pathways, tracks or signal traces etched from copper sheets laminated onto a non-conductive substrate. The PCB is printed circuit board having circuit made with cooper layer on the plate there are various steps to design a PCB for that the basic thing required is circuit.

### *D. IR Sensor Circuit*

An infrared sensor is an electronic device that emits and/or detects infrared radiation in order to sense some aspect of its surroundings. Infrared sensors can measure the heat of an object, as well as detect motion. Many of these types of sensors only measure infrared radiation, rather than emitting it, and thus are known as passive infrared (PIR) sensors. All objects emit some form of thermal radiation, usually in the infrared spectrum. This radiation is invisible to our eyes, but can be detected by an infrared sensor that accepts and interprets it. In a typical infrared sensor like a motion detector, radiation enters the front and reaches the sensor itself at the center of the device. This part may be composed of more than one individual sensor, each of them being made from piezoelectric materials, whether natural or artificial. IR Sensor includes photodiode and IR LED which play the role of receiver and transmitter respectively [7].

### *E. IR LED*

An IR LED, also known as IR transmitter, is a special purpose LED that transmits infrared rays in the range of 760 nm wavelength. Such LEDs are usually made of gallium arsenide or aluminum gallium arsenide. They, along with IR receivers, are commonly used as sensors.

The appearance is same as a common LED. Since the human eye cannot see the infrared radiations, it is not possible for a person to identify whether the IR LED is working or not, unlike a common LED. To overcome this problem, the camera on a cell phone can be used. The camera can show us the IR rays being emanated from the IR LED in a circuit.

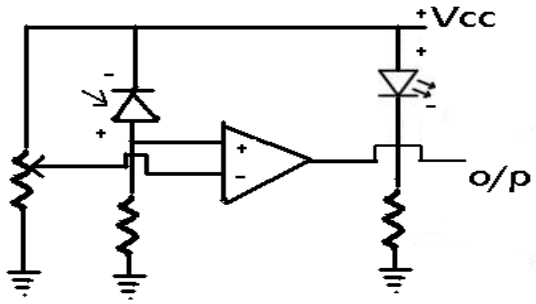



Figure: IR Sensor circuit

*F. Controller Circuit*

A microcontroller (sometimes abbreviated µC, uC or MCU) is a small computer on a single integrated circuit containing a processor core, memory, and programmable input/output peripherals. Microcontrollers are used in automatically controlled products and devices, such as automobile engine control systems, implantable medical devices, remote controls, office machines, appliances, power tools, toys and other embedded systems By reducing the size and cost compared to a design that uses a separate microprocessor, memory, and input/output devices, microcontrollers make it economical to digitally control even more devices and processes. Mixed signal microcontrollers are common, integrating analog components needed to control non-digital electronic systems. Here we are giving code to Microcontroller according to those codes our robot move; these codes are created by programming logic in Keil software and latter burn in microcontroller by flash magic software. These codes control the motor by the logic of 0 and by logic 1 and through this direction of robot is control.

But for the purpose of providing this logic to motor we use an IC that is L298N having 16 pin it get input by output of microcontroller this make robot an intelligent or autonomous robot this IC also amplifies the current and provide to motor [8].

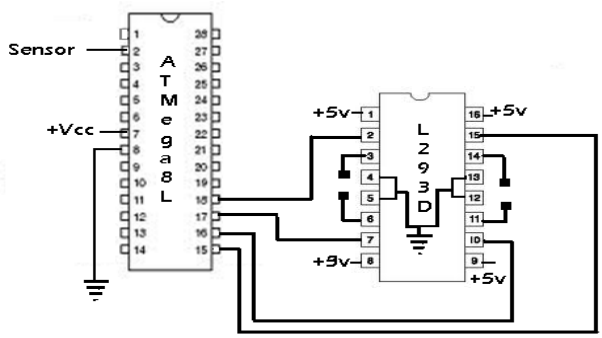



Figure: Controller Circuit

After having the circuit it is easy to design PCB. Circuit is traced in PCB by using different software here we have used PCB Express software to design layout then it is etched and further the component are sold in it.

Now when all the PCBs are connected according to required condition and the electro-Electronics and Communication structure is ready still the system will not work without software unit.

*G. Software Unit*

Computer software or just software is a collection of computer programs and related data that provides the instructions for telling a computer what to do and how to do it. Software refers to one or more computer programs and data held in the storage of the

computer for some purposes. In other words, software is a set of programs, procedures, algorithms and its documentation concerned with the operation of a data processing system.

Program software performs the function of the program it implements, either by directly providing instructions to the computer hardware or by serving as input to another piece of software. The term was coined to contrast to the old term hardware (meaning physical devices). In contrast to hardware, software "cannot be touched". Software is also sometimes used in a more narrow sense, meaning application software only. Sometimes the term includes data that has not traditionally been associated with computers, such as film, tapes, and records. Here we are using various software to design our project we required software for designing PCB layout, microcontroller programming, burning of microcontroller.

Let us see different software unit in this paper:Here first let us see how to design a PCB over which we are using these software so following steps we are using to design a PCB: Choose a method to use for creating the PCB. Your choice will usually be based on the availability of materials needed by the method, the technical difficulty level of the method or the quality of PCB you desire to obtain. The quality of PCB obtained varies according to the materials you use but generally, it is a good method for simple to intermediate levels of complexity circuits. Circuits involving more close wiring and tiny wires usually use other methods. UV etching method: this method requires more expensive materials that might not be available everywhere. However, the steps are simple; it requis less safety measures and can produce finer and more complicated circuit layouts. Mechanical etching/routing method: this method requires special machines that will mechanically etch away unnecessary copper from the board or route empty separators between wires.

It can be expensive if you intend to buy one of those machines and usually leasing them requires the availability of a workshop nearby. However, this method is good if you need to create many copies of the circuit and also can produce fine PCBs.

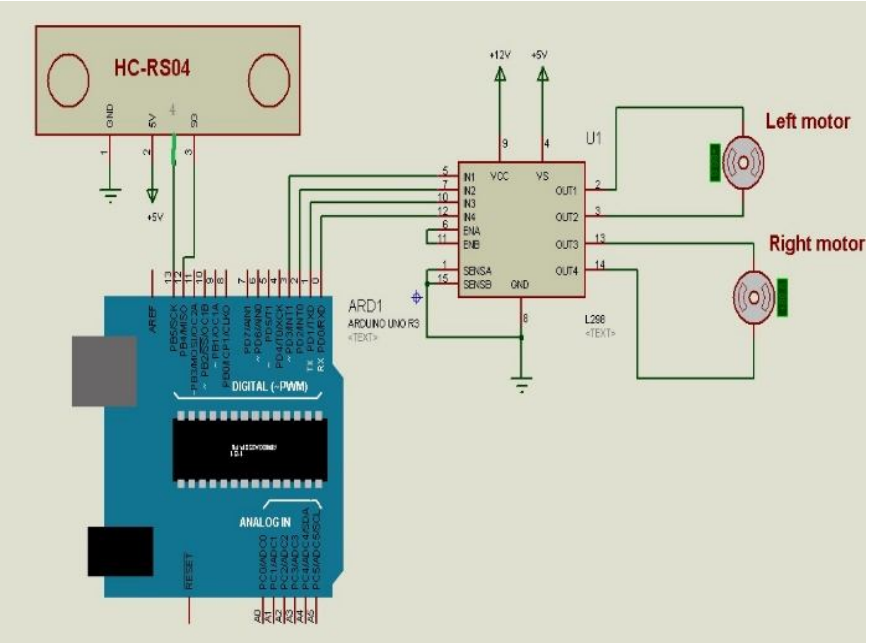
Laser etching method: this is usually used by large production companies, but can be found on some universities. The concept is similar to mechanical etching but LASER beams are used to etch the board.

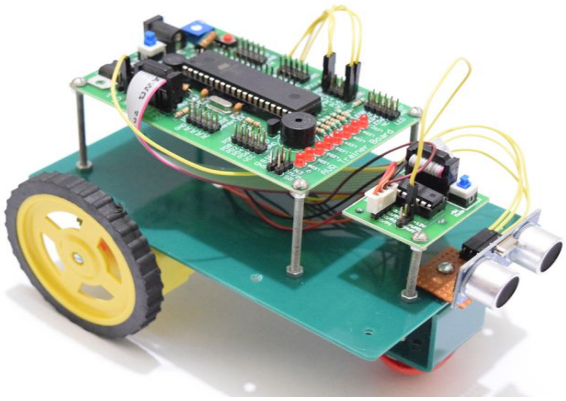
It is usually hard to access such machines, but if your local university is one of the lucky ones having such machine, you can use their facilities if they allow it.

*H. Ultra-Violet etching method specific steps*

*1)* Draw the PCB layout on the special copper coated board.
*2)* Cover the board with a transparent sheet (optional)
*3)* Put the board in the UV etching machine/chamber
*4)* Turn on the UV machine for the specified amount of time depending on the specification of the board and machine.

Circuit Diagram



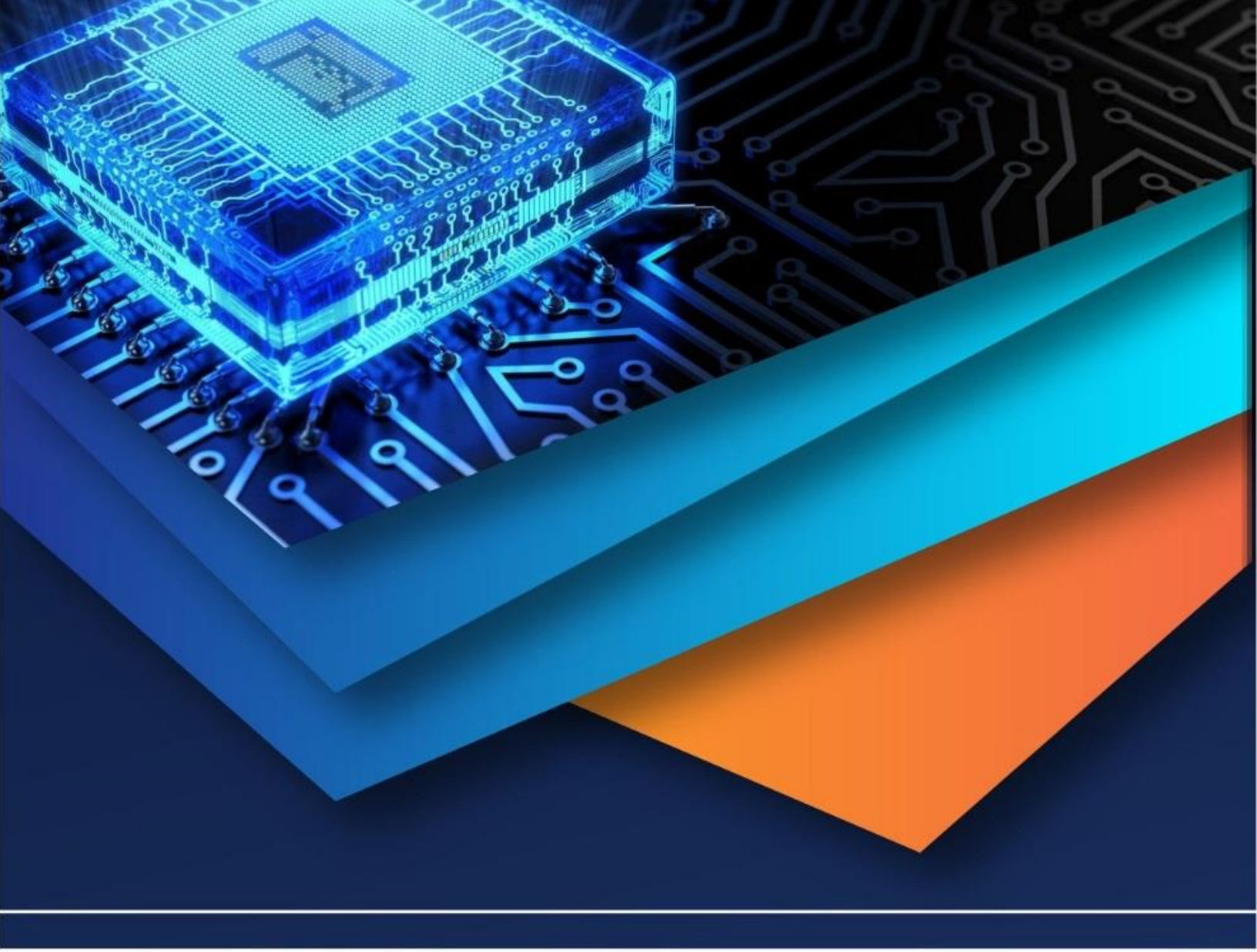


## III. CONCLUSION

As the population in humongous and the resources are scarce, it becomes highly difficult to set up such extensive projects in every location. So what this system provides is an alternate to the existing system with robotic machinery, which can handle tasks with lower per capita cost and better accuracy.

## REFERENCES

[1] Everett, H.R. 1995. Sensors for Mobile Robots: Theory and Applications. A K Peters, Wellesley, Massachusetts
[2] Horswill, I. 1994. Visual Collision Avoidance by Segmentation. In Proceedings of the IEEE/RSJ International Conference on Intelligent Robots and Systems, 902-909.
[3] Lorigo, L.M.; Brooks, R.A.; and Grimson, W.E.L. 1997. Visually-Guided Obstacle Avoidance in Unstructured Environments. In Proceedings of the IEEE/RSJ International Conference on Intelligent Robots and Systems, 373-379.
[4] Lourakis, M.I.A., and Orphanoudakis, S.C. 1997. Visual Detection of Obstacles Assuming a Locally Planar Ground. Technical Report, FORTH-ICS, TR-2
[5] Nilsson, N.J. 1984. Shakey the Robot. Technical Note 323, SRI International
[6] Cyber-ATVs: Dynamic and Distributed Reconnaissance and Surveillance Using AllTerrain UGVs. In Proceedings of the International Conference on Field and Service Robotics, 329-334.
[7] Turk, M.A., and Marra, M. 1986, Color Road Segmentation and Video Obstacle Detection, In SPIE Proceedings of Mobile Robots, Vol. 727, Cambridge, MA, 136-142.
[8] I., and Nourbakhsh, I. 2000, Appearance-Based Place Recognition for Topological Localization. In Proceedings of the IEEE International Conference on Robotics and Automation, in press.



10.22214/IJRASET

45.98

IMPACT FACTOR: 7.129

IMPACT FACTOR: 7.429

# INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY