A Study on Components Used in Constructing the RADAR

ROSHINI SOWRIRAJAN
Sr.Systems Engineer, Infosys
roshvinisowrirajan@gmail.com

THENMOZHI S.E
ML Engineer 2, Verizon Ind.
thenmozhidec@gmail.com

SNEHAA D
Advanced Analyst, EY GDS
snehaa1998@gmail.com

Abstract: **Development of Industrial Sector in India is vital. Though a few industries in India like electrical and steel production has its place all around the world, India still has many industries that have to grow. One of the reasons, these industries do not grow is due to lack of safety measures of people working in there. In-order to take safety measures, we have introduced a Radar - a line follower, with alarm system, which is able to sense the gas leakage and the temperature of the vicinity. This can reduce the danger of hazardous gas inhale and burns due to high temperature exposure to human beings working near the plants.**

Keywords: **Industrial Sector; Safety Measures; Radar; Hazardous Gas; Plants;**

INTRODUCTION

A line follower is a self-operating robot that can detect and follow the line drawn on the floor. This is built using an arduino board. Here, it is installed with a gas sensor and temperature sensor, and the digital output is visible through Visual Basics. It can work efficiently in any environment. We can see in this paper, about each and every components used in constructing the RADAR.

## COMPONENTS AND THEIR USES

TEMPERATURE SENSOR *LM35*

The temperature sensor is used to detect the temperature. LM35 temperature sensor is a thermocouple, that collects the temperature information and converts it into an understandable form for the observers. By using exclusive digital signal acquisition technique, it ensures high reliability and long-term stability. It can be used for wide temperature range from -55 to +150 degree celsius. It does not need any exterior calibration and maintains exactness of temperature. It draws only 60microA from supply and acquires low self-heating capacity. Below figure shows that the operational amplifier IC741 is used as a non-inverting differential amplifier. Hence, the output is accurate.
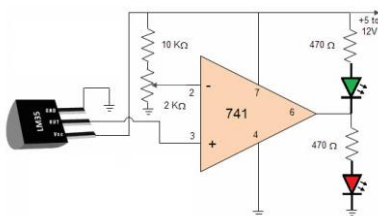

GAS SENSOR MQ3

The gas sensor is used to detect the amount of gas present in the atmosphere. MQ3 gas sensor is a low cost semiconductor sensor, specially for detecting alcohol concentration in air.
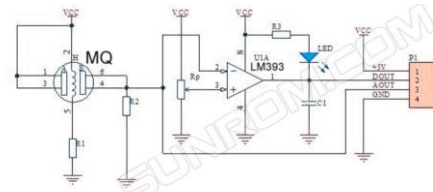
It can detect even a meagre amount of concentration of alcohol in the air from 0.05mg/L to 10 mg/L. It is also applicable for detecting gases like SnO2, methane, LPG, hexane, benzene and carbon monoxide also. It has high sensitivity and fast response time. It is stable and works for a longer period of time. Connecting 5V across the heating pins, keeps the sensor hot enough to function correctly. A resistive load between the output pins and the ground sets the sensitivity of the detector.

ARDUINO BOARD

The Arduino UNO Board is an easy-to-use hardware and software, but typically a microcontroller. It is simple and accessible for the users. It is inexpensive, extensible and open to all.
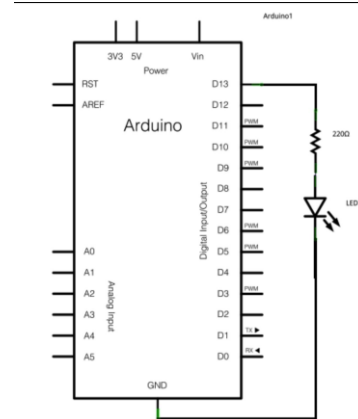
The Uno differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it features the Atmega16 programmed as a USB-to-serial converter.

ZIGBEE

Zigbee is used for the communication of the system and the robot. It is a higher level communication protocols that supports wireless transfer of data from the sensors. Zigbee is a two-way communication protocol. ZigBee Technology is used mainly for applications requiring low power, low cost, low data rate and long battery life.
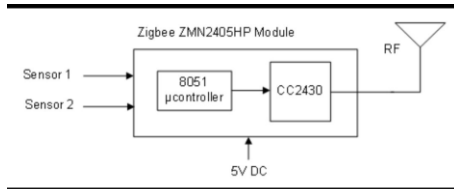
The difference being while Bluetooth and Wifi are high data rate communications standard supporting transfer of complex structure like media and software.

IR SENSORS

IR sensors are electronic devices, that can detect the motion of the object as well as heat. It is done either by emitting or detecting IR. Here, it is used to detect the object by emitting IR.
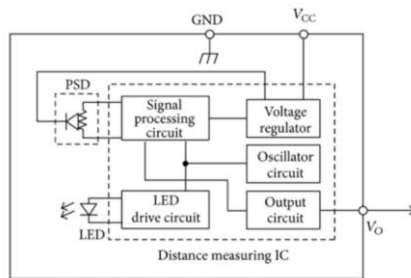
We have made use of two IR sensors which will reflect light when they come across a white surface. When the sensor is on the line it will give a digital output of 1. At the times when it is not on the line it is giving an output of 0. When the robot goes a little out of the line, one of the left or right sensors will come on the white line. For a right turn, the left sensor will return a 0(high) and the right sensor will return a 1(low).

THE DRIVER

Robot needs a driver IC for controlling and giving power to the motors. The microcontroller sends a signal to the driver which acts as a switch. The microcontroller only sends a signal to the switch and then the switch must give required voltage to the motors. If the received signal by the driver is high, it will rotate the motors.
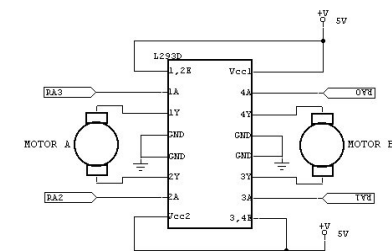
Specifications: 600mA output current capability per channel, 1.2a peak output current (non repetitive) per channel, enable facility, over temperature protection, Logical "0" input voltage up to 1.5 v, internal clamp diodes.

ROBOT CHASSIS AND BODY

There are some good materials for designing robots such as wood, plastic, aluminum and brass alloys. We must pay attention to the resistance, weight and mechanical ability for choosing one of them. There are some agents that we can use them to choose a good body, ability to perforate, incision, flexibility and etc.

In the designed robot, aluminum has been used for chassis because of its lightweight and being strong enough for our project. All components can be installed on the circuit fiber to decrease the weight. For example, motors can be fixed under the fiber and other segments can be installed on the fiber. It is better not to use any types of glue for installing components. Therefore, the components can be installed just by screws.

ACTUATORS

The movement system is an important part of a robot and its objective is how to move robot from one point to another point. There are many kinds of motors and wheels. Our choice is dependent on the robot function, power, speed, and precision. We have used four DC gearbox motors to increase speed with authentic RPM. Actuators are wheels and motors. It is better to use wheels for line follower robots. We used four wheels. All of them are joined to the motors and installed rear and front of the robot.

PATH OF LINE FOLLOWERS

The scales and angles of the path can be different in each ground. Actually each ground has its rules and maybe it is different from the others. Usually the ground color is white and the path color is black. The ground color and the line color can be exchanged together. The change in motor direction is done by giving signal to driver IC accordingly to receive signals from sensors. The robot is controlled by the microcontroller.
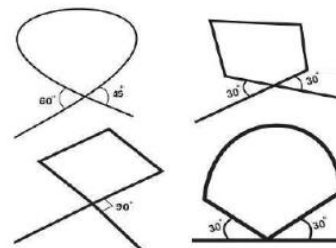
SYSTEM ARCHITECTURE
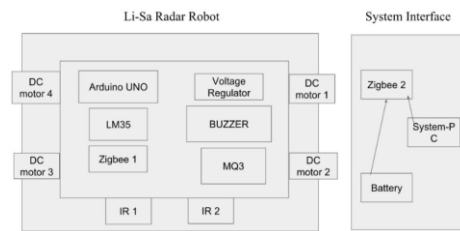
WORKING

The proposed robot system moves along path provided around the particular area or machine to be protected. The movement of the robot system is guided by line follower. A line follower system can detect and follow line drawn on the floor. Generally line is specified. Predefined path that can be either black line or white surface. It has pair of sensors and work on simple "Robot Centering Algorithm". The sensor part consists of two set of sensors. These detects black line on white surface on which robot is supposed to roam. These pair of sensors is used to assess the orientation of line follower robot in x-y plane. The output of the sensor circuit taken and given to the comparator circuit of the microcontroller The job of comparator circuit is to convert analog voltage of the sensor into digital format for microcontroller to read. The task of the microcontroller is to control left and right motors according to feedback signal given by the comparator. So that robot remains on the correct path. The motor driver circuit is to drive the motor according to the output signal from microcontroller on either direction. It can control all the motors simultaneously in any direction. It means that you can control the motors with single driver.

CONCLUSIONS

The RADAR will be installed near the plant, in-order to monitor the surroundings. The output of the sensors will be digitally represented in the system continuously using Visual Basics. Any variation in the normal level of gas and temperature is detected, then the buzzer alarm system gets activated and the controller will be notified and so the people near the plant can move from that area to a safer area. This system not only can save man power but also ensure the operation of navigation and exploring being well performed.

FUTURE SCOPE

These robots can be used as automated equipment carriers industries replacing traditional conveyor belts. This robot can also be used as automatic cars running on roads with embedded magnets. *Domestic applications:* these can also be used at homes for domestic purposes like floor cleaning etc. These can be used in public places like shopping malls, museums, etc. to provide path guidance. Wireless communication between local site and these mobile robots can also be achieved by ZigBee(1.5km) and GSM for long range communication. Camera can also be mounted on robot to monitor the surrounding operating area of the system. Various other parameters of the system can also be detected and monitored like Gas leakage, smoke, metal detection etc. using particular type of sensor. Multi robot system can be used for real time monitoring of large areas

ACKNOWLEDGEMENTS

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