

# Autonomous Industrial Robot with Safety Management

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**Abstract-** Robot is a machine that is usually designed to reduce the amount of human work where it is applicable. It is usually developed for reducing risk factor for human work and increase comfort of any Industry or worker. High performance, high accuracy, lower labor cost and the ability to work in hazardous places have put robotics in an advantageous position over many other such technologies. In this project a line tracer robot or follower has been presented which will trace a black line on a white surface or vice-versa. We have made use of sensors to achieve this objective. The main component behind this robot is ATmega328P microcontroller which is a brain of this robot. The idea proposed in this project is by using machine vision to guide the robot. The presence of hazardous LPG gas leakage in a domestic, work place, also, stored gases container gas which exhibits ideal characteristic is use. For that sake, an alarm unit is used to vibrate an alarm which is buzzer. Buzzer gives an audible sign of the presence of LPG volume. The sensors are widely used to detect essence of propane, iso-butane, LPG and even smoke. The sensor has an advantage to combine a sensitivity response time. If the LPG sensor senses gas leak from work place or home, sensor output goes to active low (logic-0) condition. Arduino UNO is used in the project; low signals are overlooked by the Arduino and gas leakage is been noticed by the Arduino. The Arduino UNO turns on the LCD and buzzer. It even turns on the GSM modem after that, it continues to send messages SMS to mobile number specifically mentioned in the program of the source code for alerting danger to the people.

## I. INTRODUCTION

It's important to monitor the industrial processes at different levels for safety point of view. We have made a robot that has several works to perform besides

following a line and continuously rotate in the industrial floor area. This robot follows a line without going to other direction. The construction of the robot circuit is easy and small. This can also be used in many applications such as automatic valet parking in efficient way. Here firstly, we chose a configuration to develop a line follower only using two infrared sensors with connection of Arduino Uno through motor driver IC. The robot starts to rotate according to the line path and monitor the parameters like is there any kind of harmful gases are generating inside the industry and if any leakage of gases found immediately this information will be send to control room using Bluetooth technology. For the overall operation of the robot be required voltage of DC 6 V which is taken from a battery and the battery is rechargeable type which is possible to charge through a DC power supply which is designed with a transformer and suitable regulator circuit.

The usage of the gas brings great problems in the domestic as well as working places. The inflammable gas such as Liquidized petroleum gas (LPG), which is excessively used in the house and at work places. The leakage of the gas causes destructible impact to the lives and as well as to the heritage of the people. So, by keeping it in the concept of the project we have determined to develop an examining system which finds the leak of LPG gas and protects the work places by taken correct precaution at correct time. This system provides the information such as when a gas leakage noticed sensors of in the project are used to notice the gas leakage and immediately turns ON the buzzer for the danger indication. Buzzer is a clear indication of gas leakage. By the detection of the hazardous gas the alerting message reached to the person who has control over it from the GSM. Detection of the gas leakage is important and halting leakage is important equally. The main objective of this project is that it is extremely accurate with a least cost, this project system is best to detect gas leakage

and also warn people around by buzzer beep sound and an SMS is been send to the responsible person for preparatory safety calculations.

## II. METHODOLOGY

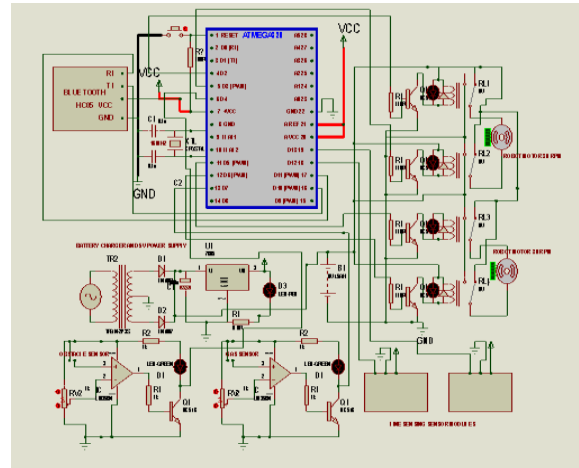
- Collecting information from the website and understand the behavior and working of electronic and mechanical components.
- Designing and implementation of the DC Motors connected with the wheels
- Designing and implementation of the robot mechanism and assembling of the entire necessary components hardware mechanical module on the robot surface
- Testing of the individual operation by sending a Bluetooth signal to the mobile
- Testing and calibration of all the operation of the robot
- Final tune up of the result to get the maximum efficiency from the robot
- Preparation of report and presentations. Designing and implementation of an obstacle sensor and its working.

## III. WORKING PRINCIPLE

The line following robot is one of the self-operating robots. That detects and follows a line drawn on the area. The line is indicated by a white line on a black surface or a black line on a white surface. This system must be sensed by the line. This application depends upon the sensors. Here we are using two sensors for path detection purpose. That is a proximity sensor and an IR sensor. The proximity sensor is used for path detection and the IR sensor is used for obstacle detection. These sensors are mounted at the front end of the robot. The microcontroller is an intelligent device that controls the whole circuit.

- Initially draw the path on a light-colored surface with black color tape.
- Place the robot on the floor.
- Now power on the circuit.
- The robot moves in the specified path.
- When it moves out of path, sensors check it and automatically adjust the robot.

## IV. CIRCUIT DIAGRAM



## V. APPLICATIONS

- Robot movement through line trace
- Harmful gas detection
- Wireless Bluetooth-based indication to control room
- Front obstacle detection
- This can be used in a driverless car system with some added features like obstacle detection.
- This can also be used in industrial and defense applications.
- It can be used to deliver mail within an office building, industrial floor, medical ward, and any robotics lab for education.
- It can be any mass transit system either bus stations or any airports.
- Line follower robots can be applied in military spy and kids' moving activities.

## VI. ADVANTAGES

- Least manpower required
- No risk because of no manpower on the robot

## VII. DISADVANTAGES

- Line follower robot requires 2-3 inches broad line.
- It may not move properly if the black line drawn is of low intensity.
- The IR sensors may sometimes absorb IR rays from surroundings also. As a result, robots may move in an

## VIII. FUTURE SCOPE

- Smarter versions of line followers are used to deliver mails within office building and deliver medications in a hospital
- This technology has been suggested for running buses and other mass transit systems and may end up as a part of autonomous cars navigating the freeway.
- Smarter versions of line followers are used to deliver mails within office building and deliver medications in a hospital.
- The Line follower developed is also sensing any type of obstacle in its way and can also control speed with the help of speed regular.
- Further Improvement can be done in the robot by using more number of IR sensors or any array or IR sensors.
- Further the robot can be programmed with fuzzy logic to find its own path among given set of path from source to destination which will be shortest of all.

## CONCLUSION

In this project we have studied and implemented a Line Following Robot using a microcontroller for blind people. The programming and interfacing of microcontroller has been mastered during the implementation. The Line follower with the obstacle detection and speed controller is different from other available robots.

Other major feature of the robot is that the construction, it is pretty much easier to construct and also cost efficient. A line following robot is designed, developed and implemented that does not need any remote controller, Bluetooth, Wi-Fi, GSM, etc. This will run automatically with following a given line using Arduino microcontroller. This line follower robot is low cost but very effective for various purposes. This approach can be applied in different sectors like an office building, industrial floor, medical ward and any robotics lab for education purpose.

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