

ALCOHOL DETECTOR DEVICE

Introduction

An alcohol detector device is a device for estimating blood alcohol content (BAC) from a breath sample. It is used to check the blood alcohol content in blood and thus it can detect that a person is under the influence of alcohol or not. It is a portable device so we can use it easily and anywhere. This device is used by traffic police to track down the person who has consumed alcohol and is driving. As we all know that drink and drive is a criminal offense in many countries especially country like India where there is a lot of traffic and each year a lot of people lost their lives in a drink and drive cases so this device is very useful in this cases. Also, it can be used in sports activities to track whether a player is under the influence of alcohol or not. According to a news survey 'More than 2,000 people were booked for drink driving on New Year's Eve in Mumbai (455), Delhi (509), Kolkata (182), Chennai (263) and Bengaluru (667), according to various news reports'.

Components Required

1. MQ -3 Alcohol Sensor(1)
2. LM3914(1)
3. 3.9 K Ω (1)
4. 2.2 K Ω (1)
5. 470 μ F(1)
6. 20 K Ω (1)
7. Green LEDs(5)
8. Yellow LEDs(3)
9. Red LEDs(2)

Component Description

MQ-3 Alcohol Sensor :

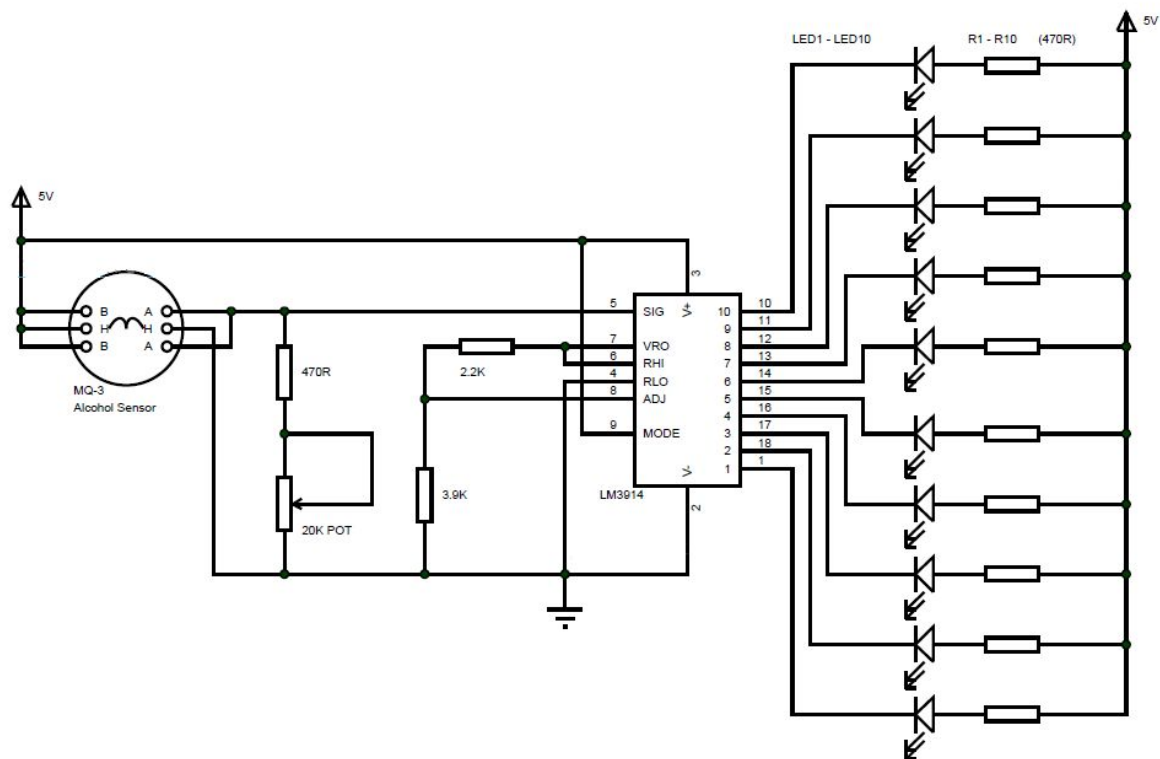
MQ-3 is an alcohol sensor that can be used to measure or detect breath alcohol concentration. It is a highly sensitive sensor with fast response time. MQ-3 can also detect Benzene, Methane, LPG, Carbon monoxide and Hexane. MQ-3 alcohol sensor is a 6 pin device out of which 4 pins are used to fetch signals and other 2 are used to provide current to heater coil.

LM 3914 :

LM3914 is a dot/bar display driver IC. It senses the analog voltage levels and drives 10 LEDs accordingly. It can be used to drive LEDs, LCDs and vacuum fluorescent displays.

It can also drive low current incandescent lamps. Several LM3914 ICs can be chained to form 20 to 100 segments.

Circuit Diagram



Circuit Design of Alcohol Tester

MQ-3 has 6 pins and the data pins can be interchanged. The heater terminals of the sensor are connected to supply and ground respectively.

Two similar data pins (A or B) are connected to supply and other two similar data pins are given to one end of voltage divider network. The other end of voltage divider consists of a 470Ω resistor and $20\text{ K}\Omega$ POT. The common point is given to pin 5 of LM3914.

Pins 2 and 3 of LM3914 are supply pins. They are connected to Vcc and Gnd respectively. Pin 9 is mode selection pin. For normal usage, it is connected to pin 3.

Pins 4 and 6 are divider low and high pins. Pin 4 is connected to ground and pin 6 is connected to pin 7. Pins 7 and 8 are reference voltage pins. Pin 7 is connected to one end of voltage divider network formed by $2.2\text{ K}\Omega$ and $3.9\text{ K}\Omega$. The other end is connected to ground. The center of voltage divider is connected to pin 8.

Pins 1, 18, 17, 16, 15, 14, 13, 12, 11 and 10 are the output pins in sequence i.e. pin 1 is output 1 while pin 10 is output 10. They are connected to 10 different LEDs of different colors.

Working of Alcohol Tester or Analyzer

In this project, a simple breath alcohol tester is designed which indicates the levels of alcohol through a set of 10 LEDs. MQ-3 is the main module in the project. It is an alcohol sensor whose conductivity changes according to the concentration of the alcohol.

The output is given to the signal pin (pin 5) of LM3914, which is an analog voltage sensing IC. According to the value at pin 5, the outputs are activated. For voltages between 0 and 5V, the outputs are activated from 1 to 10.

When the concentration of alcohol sensed is very less, the analog value will be slightly greater than 0V and hence only first few LEDs will glow.

When the concentration increases, the number of LEDs turning on also increases. When the concentration of alcohol is at intoxicated level, all the LEDs will be turned on. The sensitivity of the module can be adjusted by the potentiometer.

Applications

1. It is used by the traffic police to track down the person who is driving under the influence of alcohol or not (More than permissible value).

2. It is used in the organization such as sports, office, etc where drinking is considered as illegal and it is used to check whether the player is under the influence of alcohol or not.

Limitations

1. Changes in breathing patterns can affect breath results. For example, if an accused hyperventilates or exhales heavily before submitting to breath testing, their BAC(blood alcohol concentration) levels may drop considerably. On the other hand, if they hold their breath their BAC level will increase.

2. The designed breathalyzer can only measure the level of alcohol in terms of the number of LEDs glowing. It cannot measure in terms of a particular concentration level of alcohol.

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