

# Alcohol Breathalyser Using Arduino and MQ-135 Gas Sensor



**Prepared By:**  
**Ankur Kushwaha**  
**Prahlad Roy Pareek**  
**Pankaj Patel**

**Under the Guidance: Prof. Dr Matthias Deegener**

# Introduction

A series of breathalysers measures the amount of alcohol per litre of alveolar air, which is air from the lungs. The project aims to develop a breathalyser, using the gas sensor MQ-135, an Arduino Leonardo microcontroller, and one Liquid Crystal Display (LCD) of size 16\*2. Each concentration of the alcohol sensor determines a value displayed on the Arduino Serial Port 'COM3' with a range from 0 to 1023, this corresponds to the variation of the output voltage ranging from 0 to 5-volt circuit for each concentration. The concentration is measured and displayed on the LCD, the determination of the concentration present in the air.





# Components Used:

- Arduino Leonardo Board (Olimexino-32U4)
- MQ-135 Gas Sensor
- 16\*2 LCD Display
- Breadboard
- LEDs
- Some Jumper Wires
- 5v Battery

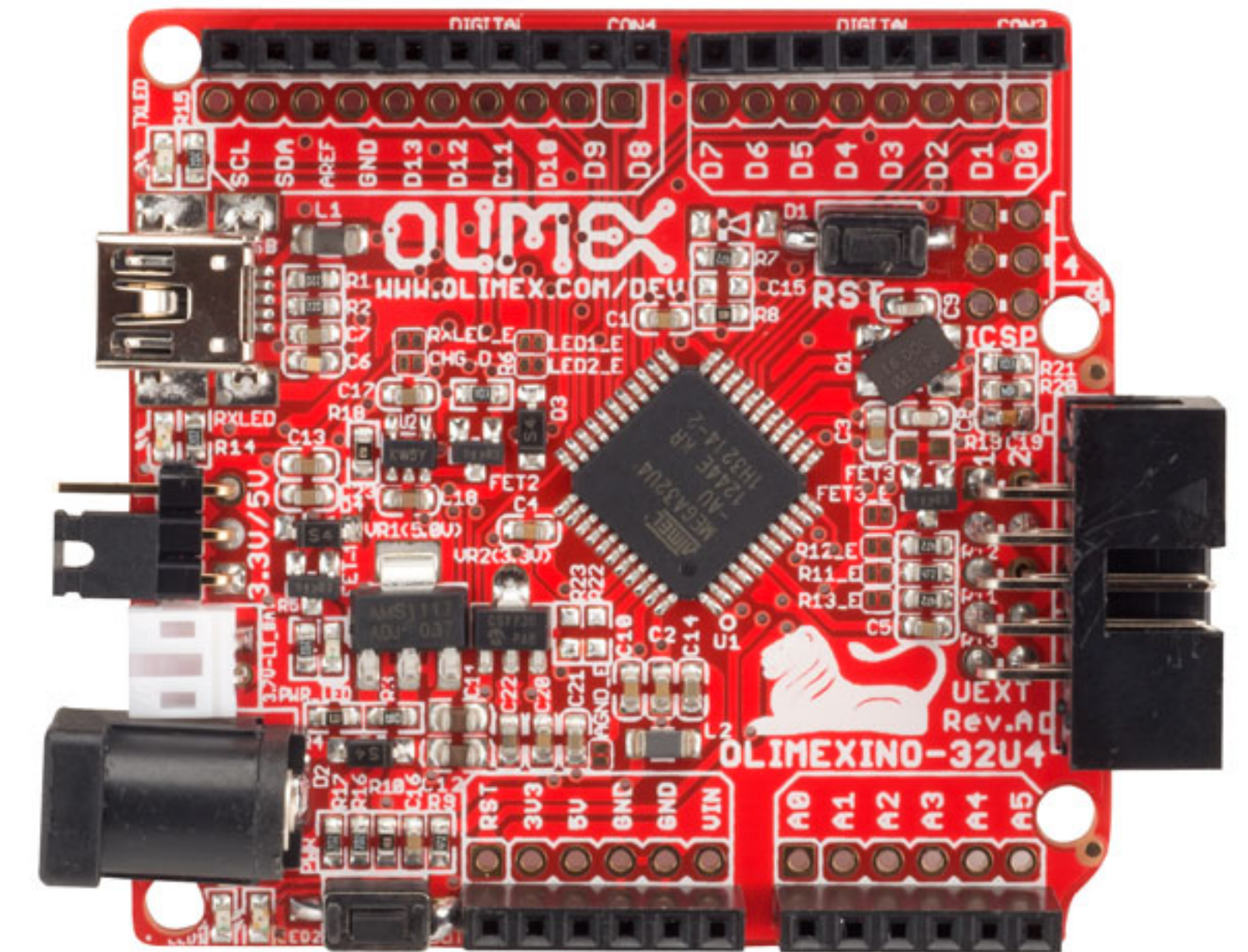




# Arduino Leonardo (Olimex)

Features of Micro Controller:

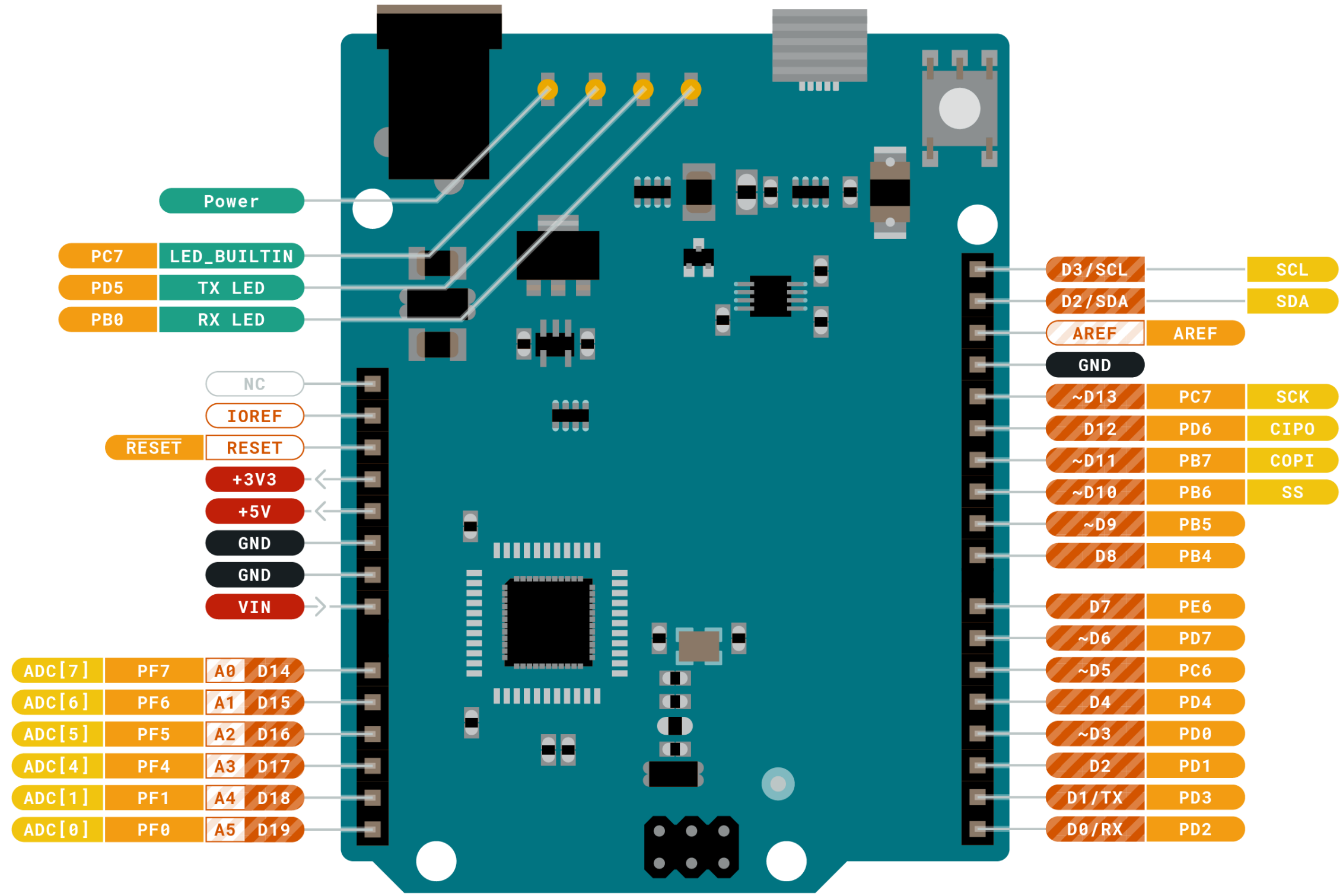
- High Performance, Low Power AVR<sup>®</sup> 8-Bit Microcontroller
- Advanced RISC Architecture
  - 135 Powerful Instructions
  - Most Single Clock Cycle Execution
  - 32×8 General Purpose Working Registers
  - Fully Static Operation
  - Up to 16 MIPS Throughput at 16 MHz
  - On-Chip 2-cycle Multiplier



# Arduino Leonardo PinOut



ARDUINO  
LEONARDO



Ground	Internal Pin	Digital Pin	Microcontroller's Port
Power	SWD Pin	Analog Pin	
LED	Other Pin	Default	

ARDUINO.CC



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# MQ-135 Gas Sensor

## Introduction:

MQ-135 Module sensor has lower conductivity in clean air. When the target combustible gas exists, the sensor's conductivity is higher along with the gas concentration rising. Convert the change of conductivity to the corresponding output signal of gas concentration. MQ135 gas sensor has a high sensitivity to Ammonia, Sulphide, and Benzene steam, also sensitive to smoke and other harmful gases. It is low-cost and suitable for different applications such as harmful gases/smoke detection.

## Features

- Wide detecting scope
- Fast response and High sensitivity
- Stable and long-life Simple drive circuit
- Used in air quality control equipment for buildings/offices, is suitable for detecting NH<sub>3</sub>, NO<sub>x</sub>, alcohol, Benzene, smoke, CO<sub>2</sub>, etc.
- Size: 35mm x 22mm x 23mm (length x width x height)
- Working voltage: DC 5 V
- Signal output instruction.
- Dual signal output (analogue output, and high/low digital output)
- ~ 4.2V analogue output voltage, the higher the concentration the higher the voltage.



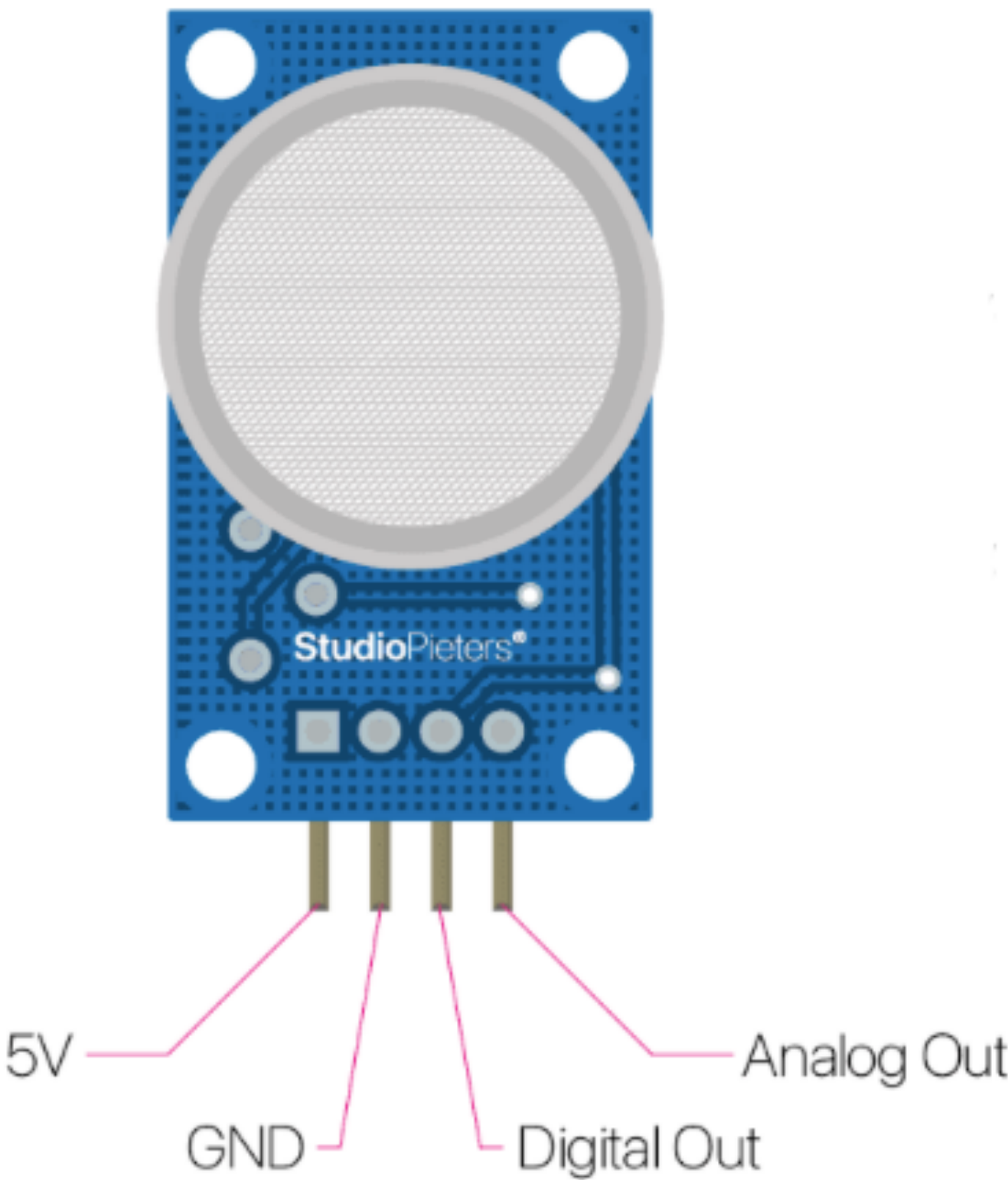
# MQ-135 Gas Sensor

## Working Mechanism:

The MQ-135 alcohol sensor consists of tin dioxide (SnO<sub>2</sub>), a perspective layer inside aluminium oxide microtubes (measuring electrodes), and a heating element inside a tubular casing. The end face of the sensor is enclosed by a stainless steel net and the backside holds the connection terminals. Ethyl alcohol present in the breath is oxidized into acetic acid passing through the heating element. With the ethyl alcohol cascade on the tin dioxide sensing layer, the resistance decreases. By using the external load resistance the resistance variation is converted into a suitable voltage variation.

### Pin Configuration:

Pin No:	Pin Name:	Description
For Module		
1	Vcc	Used to power the sensor, Generally the operating voltage is +5V.
2	Ground	Used to connect the module to system ground.
3	Digital Out	You can also use this sensor to get digital output from this pin, by setting a threshold value using the potentiometer.
4	Analog Out	This pin outputs 0-5V analog voltage based on the intensity of the gas.



Pin Description MQ-135



# Connection Diagram

**LCD Pins 1, 3, 5, 16 — — — GND**

LCD Pins **2, 15** — — — — — **VCC (+5V)**

LCD Pin **4** — — — — — — — Arduino pin **D7**

LCD Pin **6** — — — — — — — Arduino pin **D6**

LCD Pin **11** — — — — — Arduino pin **D5**

LCD Pin **12** — — — — — Arduino pin **D4**

LCD Pin **13** — — — — — Arduino pin **D3**

LCD Pin **14** — — — — — Arduino pin **D2**

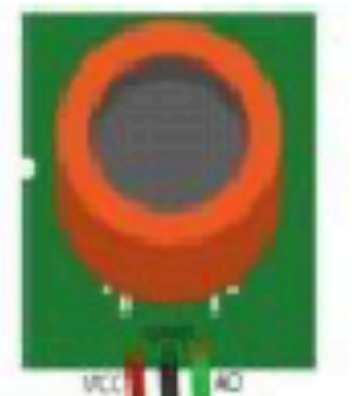
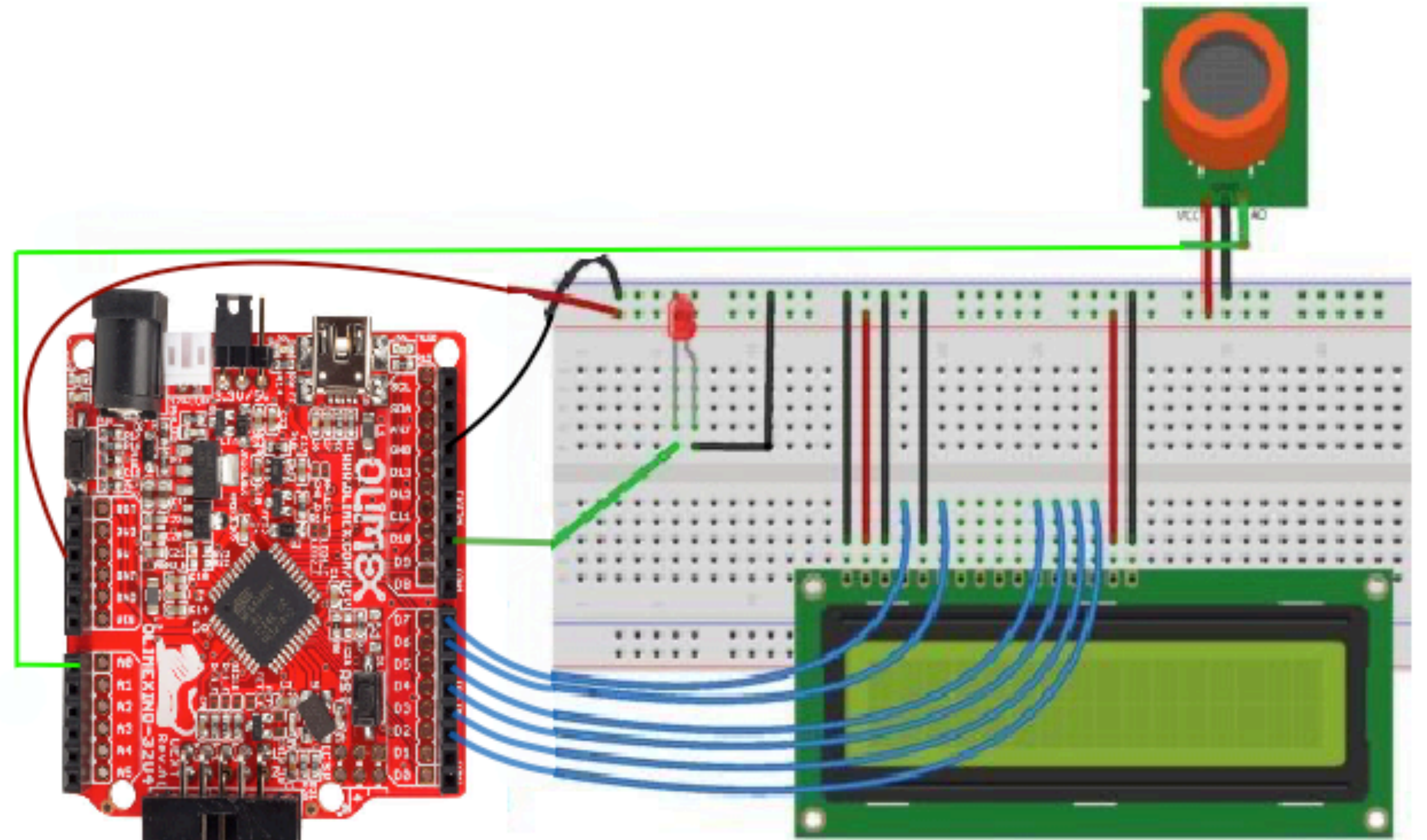
MQ-135 Module Pin -GND — — GND

MQ-135 Module Pin +VCC — — VCC

# MQ-135 Module Pin **A0** — Arduino Pin **A0**

LED Pin +ve end — — — — Arduino Pin **D10**

LED Pin -ve end — — — —-GND





# Working of the Project

- First of all, a power supply is given to the setup. It can be provided by either connecting a 5V battery to the breadboard or directly to the Arduino board using its Micro-USB port.
- Then the MQ-135 Sensor is allowed to heat up initially for about 60-90 seconds. By doing this the sensor becomes active and calibrated.
- Though the actual calibration of the sensor may require much time which depends on how much time the sensor is not used.
- When the Alcohol Fumes are brought near the Sensor, the fumes react with the Tin dioxide Layer (present inside) and with the help of heating elements, these get converted to voltage variation.
- The variations are read by Arduino and it compares them with the threshold values and outputs the result on the LCD Display connected.

# Results

After developing our project, we worked on the testing of the final product. For our testing cases, we used different types of drinking spirits which contained a different percentages of Alcohol content in them. So below are some mentioned cases on which we have tested our Alcohol Breathalyzer.



S. No.	Alcohol by percentage in given Liquor	Breathalyzer's Reading
1.	0-5%	<100
2.	5-10%	>100 and 170<
3.	10-20%	>170 and <250
4.	21-35%	>250 and <350
5.	35% and above	>350

