



Synopsis: Microcontroller (MC) Lab

Batch: 1

Mini-project: Alcohol Detector with Buzzer Indicator

Group Details-

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Abstract (Problem Statement):

Alcoholism is a serious problem that affects many individuals and communities around the world, including the student community at MIT Manipal. MIT Manipal is a prestigious university in India that is known for its rigorous academic programs and vibrant student life. However, like many universities, our institution is also home to a significant number of students who struggle with alcohol addiction.

All this can have a negative impact on students' physical and mental health, academic performance, and personal relationships. It can also lead to other harmful behaviours such as drug use, risky sexual behaviour, and violence. Despite the many negative consequences of alcoholism, it can be difficult for students to seek help and overcome their addiction due to social stigma and a lack of access to resources.

An Alcohol Detector can help mitigate the problem of alcoholism in our college by detecting alcohol consumption and preventing individuals from engaging in harmful behaviours.

Aim:

To monitor Alcohol and give alcohol consumption indication with the help of Buzzer. LCD interface to message.

Introduction:

Microcontroller based Alcohol detection system using MQ6 (Alcohol gas) Sensor with Buzzer indication has applications in various areas including Industrial Application, Domestic Application. This system has advance safety standard and most importantly, this helps prevent accident occurred because driving while drinking, thus useful in protecting human life, wealth and property.

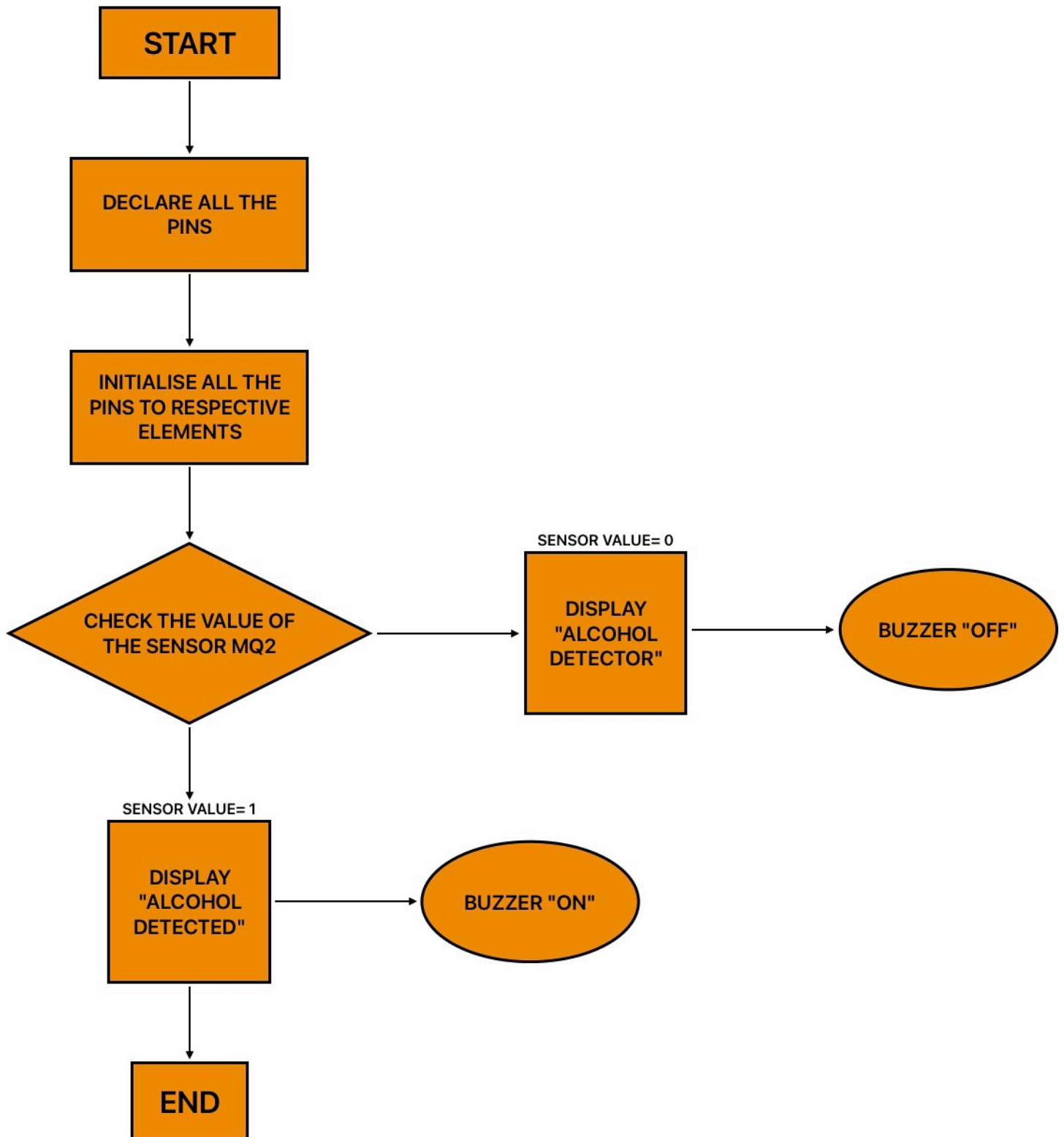
Theory and Fundamentals (Working Principle):

- MQ6 (Alcohol Gas) Sensor is used to detect Alcohol detection. It has a quick response time.
- Output of MQ6 sensor is given to Comparator, and output of Comparator IC is given to Microcontroller (AT89C51ED2).
- Liquid Crystal Display (LM016L)- LCD display shows a message when MQ6 crosses threshold level.
- Buzzer is turned on to give Alert indication. A Potentiometer is also used to vary the threshold level of comparator which decides the threshold level of leakage condition.

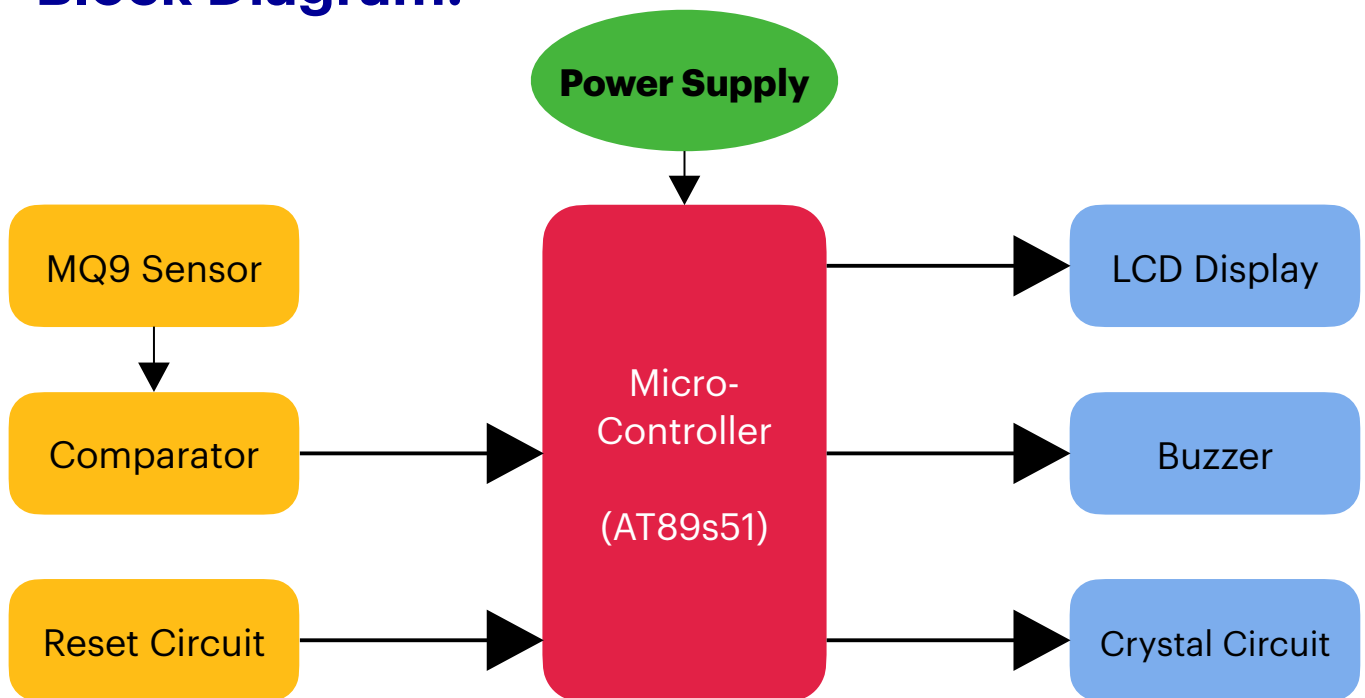
Components Used:

<i>Microcontroller- AT89s51</i>	<i>LCD Display- LM016L</i>
<i>Voltage Regulator- 7805</i>	<i>Alcohol Sensor- MQ9</i>
<i>OpAMP- LM358</i>	<i>Crystal Module</i>
<i>Transistor- BC547</i>	<i>LED</i>
<i>Transformer</i>	<i>Buzzer Module</i>
<i>Capacitor</i>	<i>Potentiometer (POT)</i>
<i>Diodes- 1N4007</i>	<i>LCD and General Connectors</i>
<i>Resistors</i>	<i>IC Sockets</i>

Flowchart:

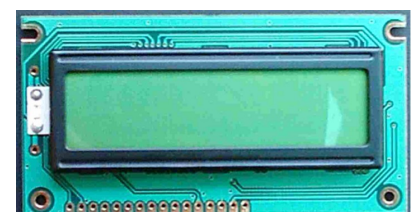
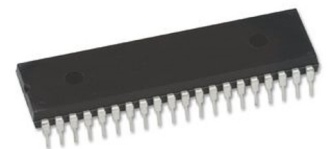


Block Diagram:

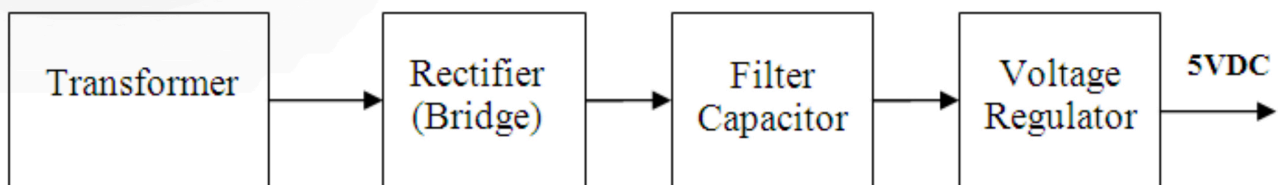


Block Diagram Description:

- **Alcohol Gas Sensor (MQ9)**- Alcohol sensor is the sensor that measures the amount of gas in the surrounding environment. It gives voltage output.
- **Microcontroller IC (AT89s51)**- It is the major part of the system. The 8051 has one serial port that receives and transmits data. Transmission and Reception can take place simultaneously. It is the heart of the system which controls all the inputs and the controlling action to be taken at the output.
- **LCD Display**- Liquid Crystal Display which is commonly known as LCD is an Alphanumeric Display. The only disadvantage of LCD over seven segment is that seven segment is robust display and be visualised from a longer distance as compared to LCD. Here we have used 16 x 2 Alphanumeric Display which means on this display we can display two lines with maximum of 16 characters in one line.



- **Comparator-** The output voltage from sensor and voltage divider is given to the comparator. This comparator compares the voltage from sensor and gives output to the Microcontroller.
- **Buzzer-** We have used a Piezoelectric buzzer in our project. It is used for alert indication. The buzzer will be turned on when sensor value goes above the desired value.
- **Crystal Module-** It is used for frequency control. It provides a stable clock signal for digital integrated circuits, which helps to stabilize frequencies for radio transmitters and receivers.
- **Power Supply Module-** It gives a +5v supply to the circuit. It consists of four stages namely transformer, rectifier, filter, and regulator.



A. **Transformer:** Step-down transformer takes 230v AC input & gives 15v at output secondary.

B. **Bridge rectifier:** It consists of four diodes & rectifies this 15v AC supply and converts the AC wave into Fully Rectified Wave.

C. **Filter capacitor:** It converts the fully rectified wave into the DC wave with some ripple.

D. **Voltage Regulator:** It is the last stage. It removes the entire ripple and gives pure DC. The LED is connected to indicate that power supply is ON.

Software Used in Project:

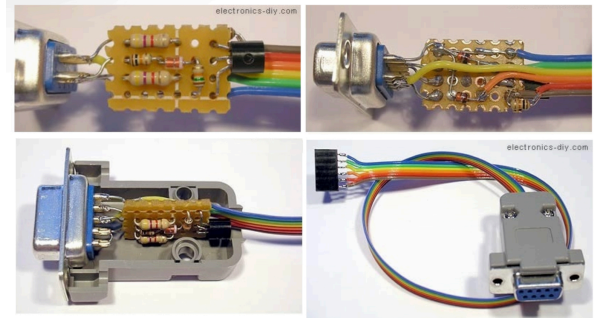
- **EAGLE Software-** It is used for PCB design, it includes Schematic Capture, Board Layout and Auto-router. EAGLE has following 2 sections:

A. **Schematic Capture-** For designing circuit diagrams. Parts can be placed on many sheets and connected together through ports.

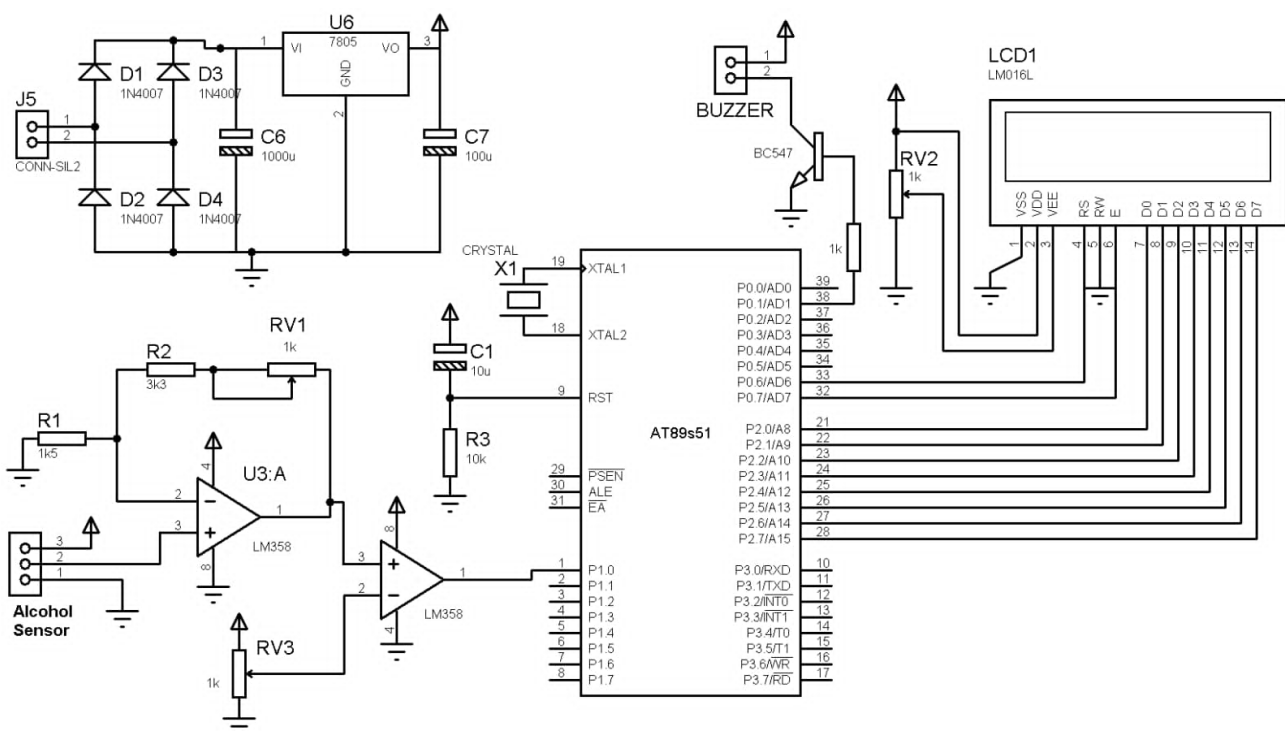
B. **PCB Layout-** It allows auto-routing to automatically connect traces based on the connections defined in the schematic.

- **KEIL software-** It used for Microcontroller Programming Software. It has compiler designed specifically for the 8051 microcontroller. It converts a High Level Language source code (written in assembly language or C language) into its object code. Then a linker is used to create an absolute object module suitable for your circuit.

- **Microcontroller Programmer Module and Software-** It transfers hex programs to Microcontroller. It has in-circuit serial programmer & small PCB. You can connect it to microcontroller and program it. Programmer software shows progress status bar.



Circuit Diagram: (*current circuit only, subject to changes)



Division of Work and Citations:

- Gautam, K., & Meher, S. (n.d.). Component Details, Pictures. ElectronicsDIY. Retrieved March 5, 2023, from <http://electronicsdiy.com/>
- Gautam, K. (2021, September 29). Eagle software for Circuit Visualization. Autodesk. Retrieved March 1, 2023, from <https://www.autodesk.in/products/eagle/free-download>
- Kamath, A., Churiwal, B., & Tripathi, G. M. (2023, Feb 26). Component Buying and Outsourcing. Robocraze. Retrieved March 2, 2023, from https://robocraze.com/products/basic-component-kit-for-projects?currency=INR&variant=40194059075737&utm_medium=ppc&utm_source=google&utm_campaign=Google+Shopping&https%3A%2F%2Frobocraze.com%2F%3Futm_source=googleads&gclid=CjwKCAiAu5agBhBzEiwAdiR5tCTAHR7NyIVKEMdSSCtUZQjMCo1JI1FfoSyfoI0lsARRhyllHE1RCRoC78AQAvD_BwE
- Gautam, K. (2023, March 4). PCB Manufacturing. Robu.in. Retrieved March 7, 2023, from https://robu.in/product/online-pcb-manufacturing-service/?gclid=CjwKCAiAu5agBhBzEiwAdiR5tM40r8iKhosV1ENcBLRP5CYPugbgfsTfV52Up_UIHFirOouk3S1vQBoCc5MQAvD_BwE

Project Cost  **Estimated ₹2500-₹3000.**

Individual Contribution:

Snehashree Meher	Kreshn Gautam	Akshay C Kamath	Gaurang Mani Tripathi	Biswas Churiwal
<ul style="list-style-type: none"> Wrote the .c code and Debugged it in Kiel Software in accordance with to the devised Circuit Diagram. Assisted Akshay in Hardware Assembly. Helped Kreshn during Simulation of Circuit on Proteus Software. 	<ul style="list-style-type: none"> Oversaw the Project Execution & Work Distribution. Designed the Circuit Diagram & Simulated it in Proteus Software. Responsible for Final Report & Documentation. 	<ul style="list-style-type: none"> Responsible for Hardware Assembly & Component Purchase. Helped Snehashree in the writing & debugging of the .c Code. Helped Gaurang in deciding the pathway for Working Principle Model. 	<ul style="list-style-type: none"> Devised a Working Principle Model for the team to follow and create the project. Responsible for the Initial Documentation of Group's Progress (Synopsis). Helped Snehashree in the writing & debugging of the .c Code. 	<ul style="list-style-type: none"> Researched on the Component Requirement allowing the team to stick to budget. Helped Kreshn during Simulation of Circuit on Proteus Software. Assisted Akshay in Hardware Assembly.