EE322: Embedded Systems Design - Project

GAS LEAKAGE / SMOKE DETECTOR

Project Progress Report

GROUP G26

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GAS LEAKAGE / SMOKE DETECTOR

Progress from 25/06/2021 **to** 09/07/2021

Overall percentage progress

0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100

Introduction

We were asked to do an embedded system project in EE 322 as a group using PIC Microcontroller. So, we decided make an embedded system for a day today application.

In this project we decided to make a system to detect domestic, industrial smoke or gas leakage. It can be also used to detect combustible gas leakage. To make our project a success we decided to use PIC16F877A microcontroller to fulfill our tasks. Decision was made to use PIC16F877A microcontroller, because it has quite a bit more I/O than PIC16F84A and has about more RAM & FLASH.

Mainly this project can also introduce as a fire alarm system. In here what we do is, we detect a smoke or gas leakage using sensor and simply display it on a LED screen. (Can use an additional buzzer to make a noise).

Brief of past progress (up to from date of this progress report)

After we have given the project proposal, we started to do our project by finding information regarding the project. As we were told to do the project by using assembly language, we have started to learn assembly. We have decided to use PIC16F877A microcontroller so we have started to study the its datasheet. In the other hand we have quite some issues regarding the components needed for the project. The biggest issue is with the suitable PIC kit and PIC microcontroller. We have visited local electronic shops but we weren't able to find both. So, we have to order them online or we have to consider whether to buy a PIC kit or build one as its cost some money. We have designed the circuit diagrams they may change or not**.** So mainly now we are now focused on the programming part and simulation part because hardware part is based on components and there is an issue with the project component at the moment.

Progress for the period from 25/06/2021 **to** 09/07/2021

Progress was planned to do according to the timeline. Initial step was to buy the components required. Due to the pandemic situation of the country the shops were not open in the first week, hence we had to wait for the restrictions to be lifted for buying components. The PIC microcontroller was not available in local market & had to order it. Online shops were not as efficient as they used to be in these days. Therefore, timeline is shifted to next two weeks to buy all the components.

As a group we have paid more attention on assembly coding techniques and the schematic designing of the basic circuit in this period. With the experience on the lab session and some tutorial guidelines in the internet, group had worked to get familiar with assembly. Data sheet for the PIC16F877A was downloaded online & worked on the information on that.

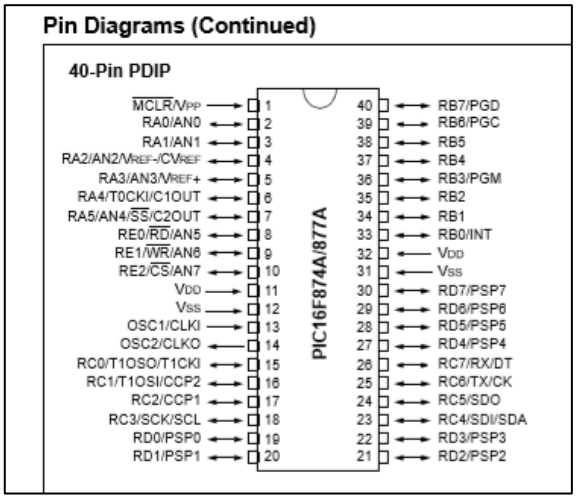

Figure 1: Pin configuration of the PIC16F877A taken from the data sheet downloaded

According to the basic design, the schematic design was built using Proteus simulation software. Design was made with the intention of the hardware design. The libraries for the Gas Sensor had to be pre - installed to the software for our design.

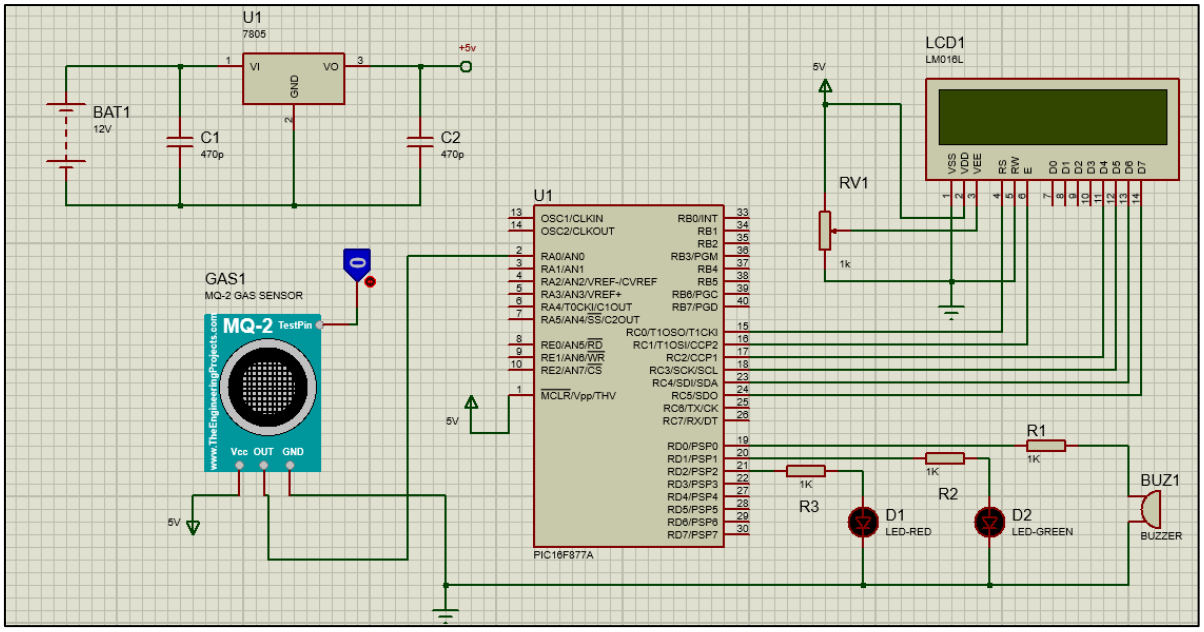

Figure 2: Circuit designed using Proteus Simulation Software

In the circuit design outputs were added accordingly & they may change as needed in the future steps. A potentiometer is added to control the voltage on the LCD display. Resistors of 1K are designed in to the LEDs & the buzzer. Crystal oscillator may use in the hardware implementation process accordingly. An external power supply is designed using a 12V battery, a voltage regulator and capacitors of 470 pF (This power supply is decided to use in hardware implementation).

As the Proteus designing was done, Group members worked mainly on programming the hex file using the assembly language. Before the hardware implementation we decided to spend more time as possible to build the correct program for the implementation. As assembly is a unfamiliar language, it was assumed that to take about four weeks for the programming part.
Basic steps to build or either buy the PIC programmer was also done during this progress period. Corresponding components were not available during the first week. Therefore, buying the programmer kit is currently in progress.

Cost Analysis

Task	Budgeted cost (Rs.)	Expenses up to 25/06/2021 (Rs.)	Expenses from 25/06/2021 to 09/07/2021 (Rs.)	comments
Buying PIC16F877A microcontroller	520.00	-	-	PIC was not available in the local market & ordered via an Electronic shop. Purchasable within 1 / 2 weeks.
Buying the Gas Sensor	300.00	-	415.00	-
Buying other circuit components 1. Resistors -10.00 2. LEDs & Buzzer - 50.00 3. LCD Display -600.00 4. Breadboard – 250.00 5. Wires / Cables -160.00	1070.00	-	950.00	Less than the budgeted cost. LCD display – 480.00
Buying components for the PIC programmer & other components required for circuit	1100.00	-	-	PIC kit was not available in the local market & ordered via an Electronic shop. Components for the hardware implementation (Batteries, potentiometer, Crystal oscillator, voltage regulator etc.) were decided to buy in future according to the progress.

Table1 : Cost Analysis

Time line (Gantt chart)

Planned execution time of the task as of the initial proposal
Actual execution time of the task due to delays etc.

Task		Week										
		1	2	3	4	5	6	7	8	9	10	11
1ST Discussion among group members	Identify a problem											
	Find a solution & Decide a Project title											
Project proposal												
Buy & Order materials online												
Basic project design												
Working on assembly programming part												
Modify the basic schematic design according to the design												
Circuit Implementation & Troubleshooting												
Hardware design & testing												
Finalization & report												

Table 2 : Gantt Chart

REFERENCES

1. Data sheet for the PIC16F877A Micro controller. https://datasheet.octopart.com/PIC16F877A-I/PT-Microchip-datasheet-3796.pdf

2. Gas sensor library for Proteus implementation. https://www.theengineeringprojects.com/2016/05/gas-sensor-library-proteus.html