Career Episode

A. Introduction

Duration:

Location:

Organization:

Field:

Title:

B. Background

CE 2.1

The project was undertaken as a partial fulfillment of the training module in order to complete the Industrial training. According to the university guidelines for the completion of the degree, the student has to complete a project based training from any recognized industry or Project based institute. Selection of the project is based on the training as well as the personal interest. As the automation and wireless technology is always fascinating for me during my engineering, I decided to work on the project based on the home automation. By using the Bluetooth, the wireless technology, command and file transfer is advanced in the last few years. So by using this technology for the verbal commands and human machine interfacing to enhance and provide comfort in human lifestyle.

CE 2.2

In the era, where smartphones and gadgets are the vital part of life. We can find people's clinging to their smartphones, hence with the help of that companion, trying to accomplish the household task by personifying the use of smartphone is lucrative. Interpreting the current smartphone market scenario, a large number of mobile users are opting for the Android smartphone. It became the second name of mobile phone in layman language. The objective of this project is to use the technology of android device collaboratively with a microcontroller

to control a number of home appliances like light, bulb, fan, and may more using the relay card. Providing the approach to comfortable life.

CE 2.3

As the project work in different phases, it is necessary in order to complete the project that while working on one phase the other phase of the project must me completed. Keeping this in mind I accompnied one more trainee with me to increase the efficency and ehance the capabilites of the project. Proper channel has to be formed for the information flow and proper guidelines, for this a proper hierarchy is formed which is show below to accompish the information channel
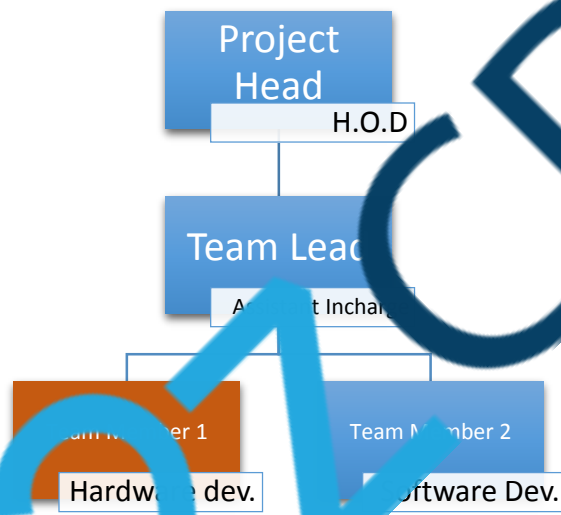
The organizational structure given above is the layout by which the information and feedback are conveyed to the team members during the design and development of the project.

My role in the Team Hierarchy is to take care about the project feasibility study, procurement of the components, hardware design and development and in the team hierarchy chart my position is shown as team Member 1.

CE 2.4

To achieve the milestones, it is necessary that you understand your duties and responsibilities. It only possible if you know the tasks you have to perform in a proper manner, and dividing the work in proper segments so that the work proceed in proper time limit.

Responsibilities assigned to me during the project is given below:
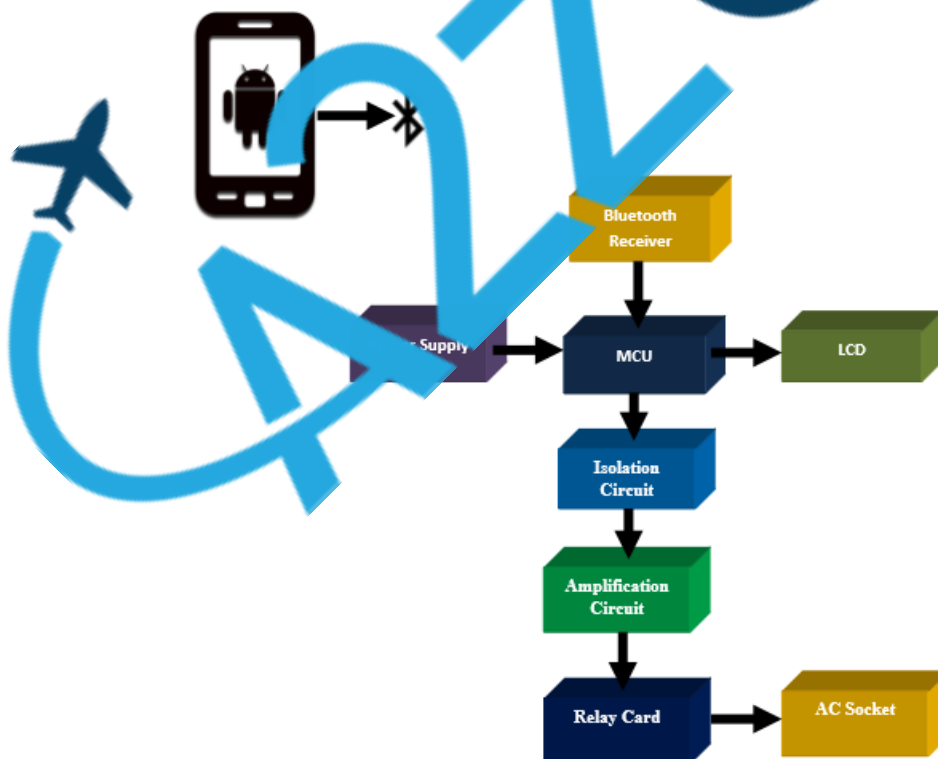
- The formulation of the actual problem had to be solved during the training.
- Procurement of the Components required in the project.
- Testing and interfacing the different modules.
- Testing the whole project working.
-

C. Personal Engineering Activity

CE 2.5

Problem Formulation

In early stages of the development, it is important to have a clear picture of the requirement and the problem which has to be solved. For that instance, a problem has to be formulated to adumbrate the overall structure of the project. The aim of the project which has been formulated is to control the home appliances using the Android device. The block diagram of the project is as follows:

CE 2.6

Division of Work

After the formulation of the problem, it is the time to prepare the roadmap to achieve the required results. In order to accomplish the final project, a clear vision of work and the steps has to be followed. So for this, the project is divided into number of small modules, so that by achieving the small milestones, the final goal can be accomplished easily.

The steps of modules are as follows:
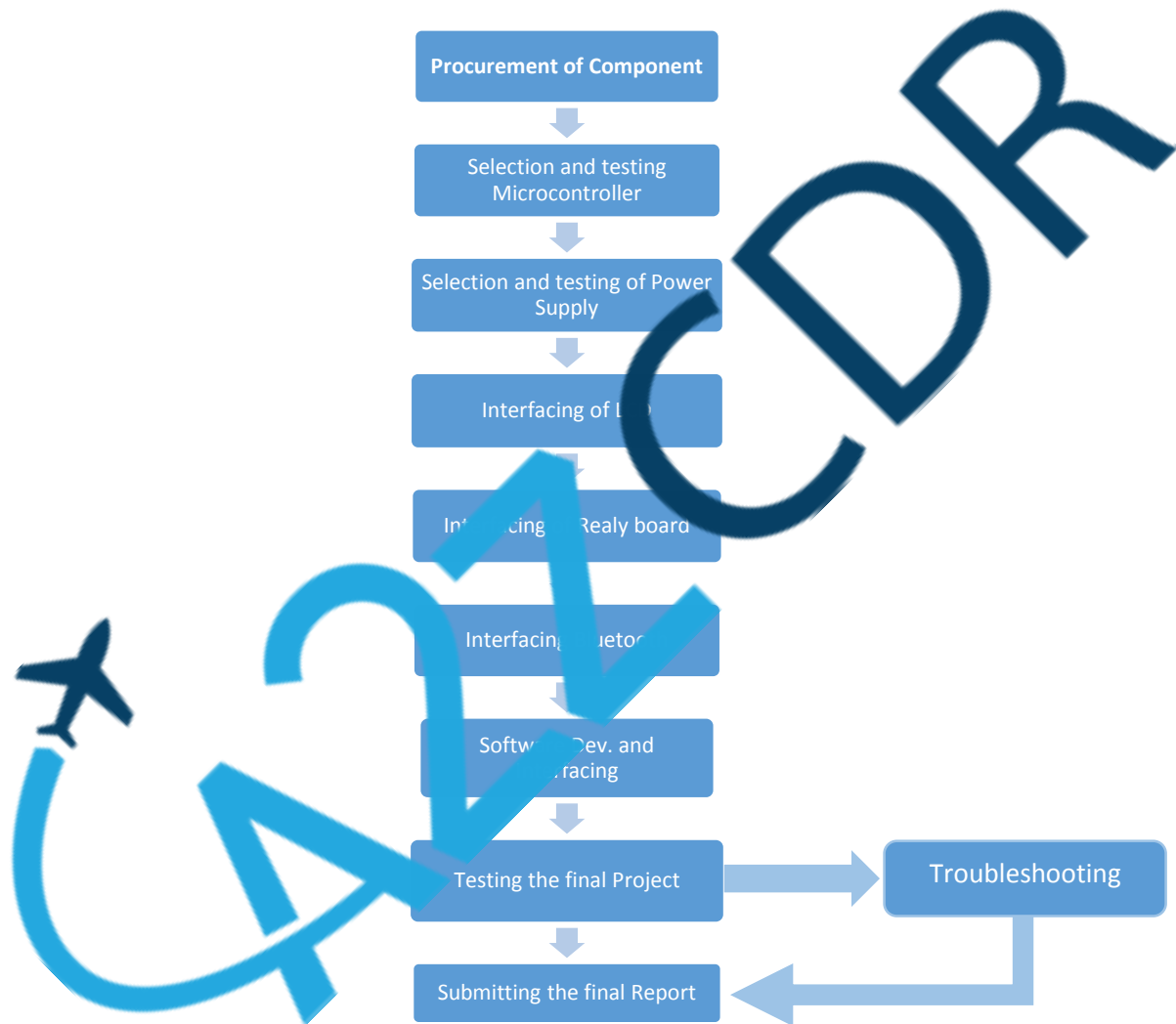
CE 2.7

Procurement of components

Electronic components are the main part of any electronics project and by undergoing technology advancements, component becoming advance in performance and size. So method of selecting

advance and smart component becoming "an art" to be acquired for any project. An error made during the component selection can cause serious damage up to an extent of thrashing and disqualifying the entire design and the product. So, utmost attention and cautions are advisable while performing this activity. Mere selecting the correct component is simply not enough for development but to understand every component's specifications throughout the supply chain and the product's life cycle is also significant. Keeping all the above things in mind and the present availability factors, the selection of component is done during the period of project development.

CE 2.8

Microcontroller

In the first module, the circuit design of the PIC microcontroller has to be done. PIC stands for the Peripheral Interface Controller, developed by Microchip. As compared to the microcontroller like 8051, it has the cutting-edge due to its fast performance and ease of programming. The pin diagram of PIC microcontroller is as follows:
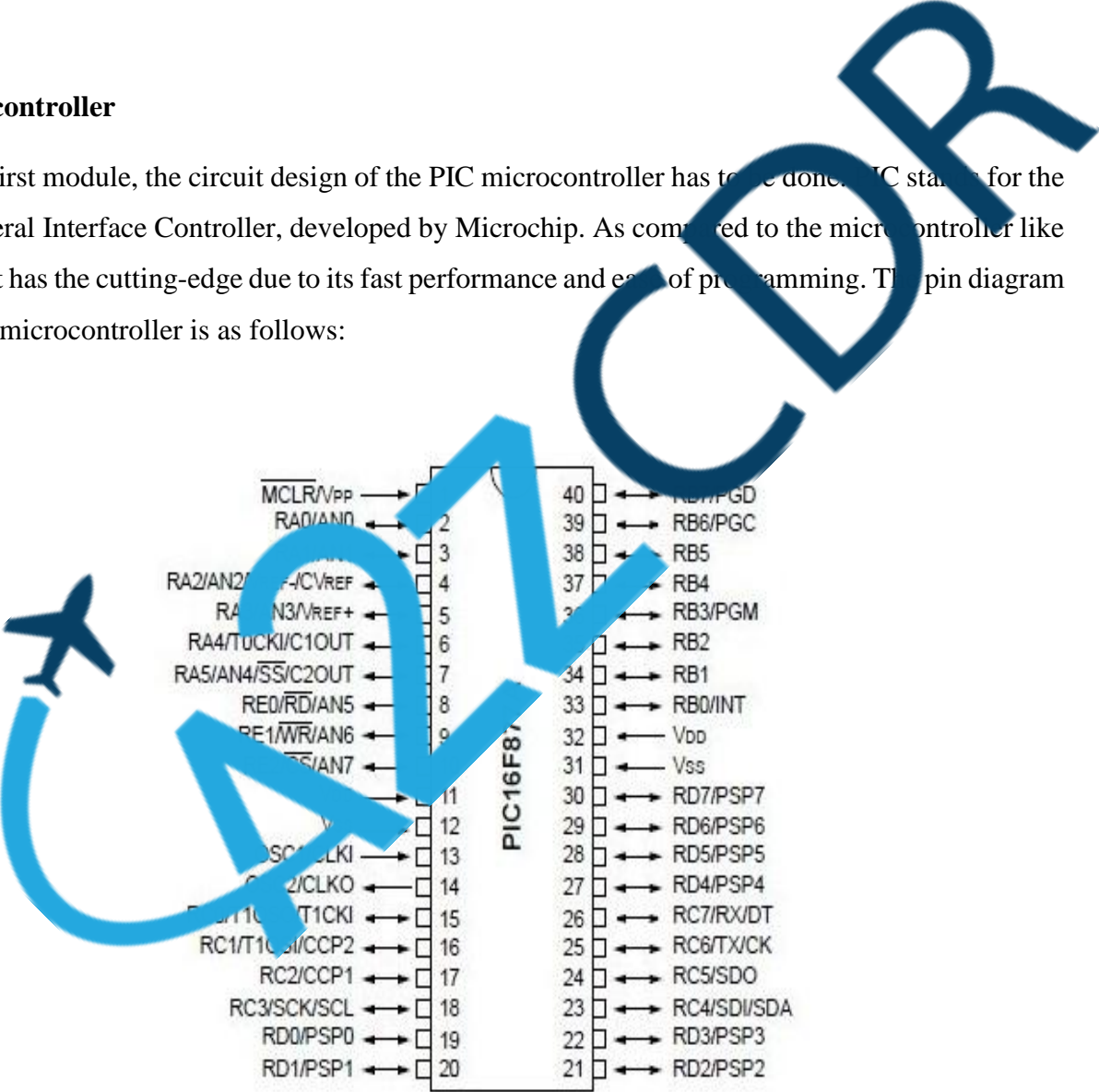
PIC has 5 ports which also support the protocol like SPI, CAN and UART for interfacing with other peripheral. The task is to check the working condition of the controller and Selection of adequate I/O pins for connecting the general and special purpose modules. The simple Circuitry of PIC microcontroller is as follows:
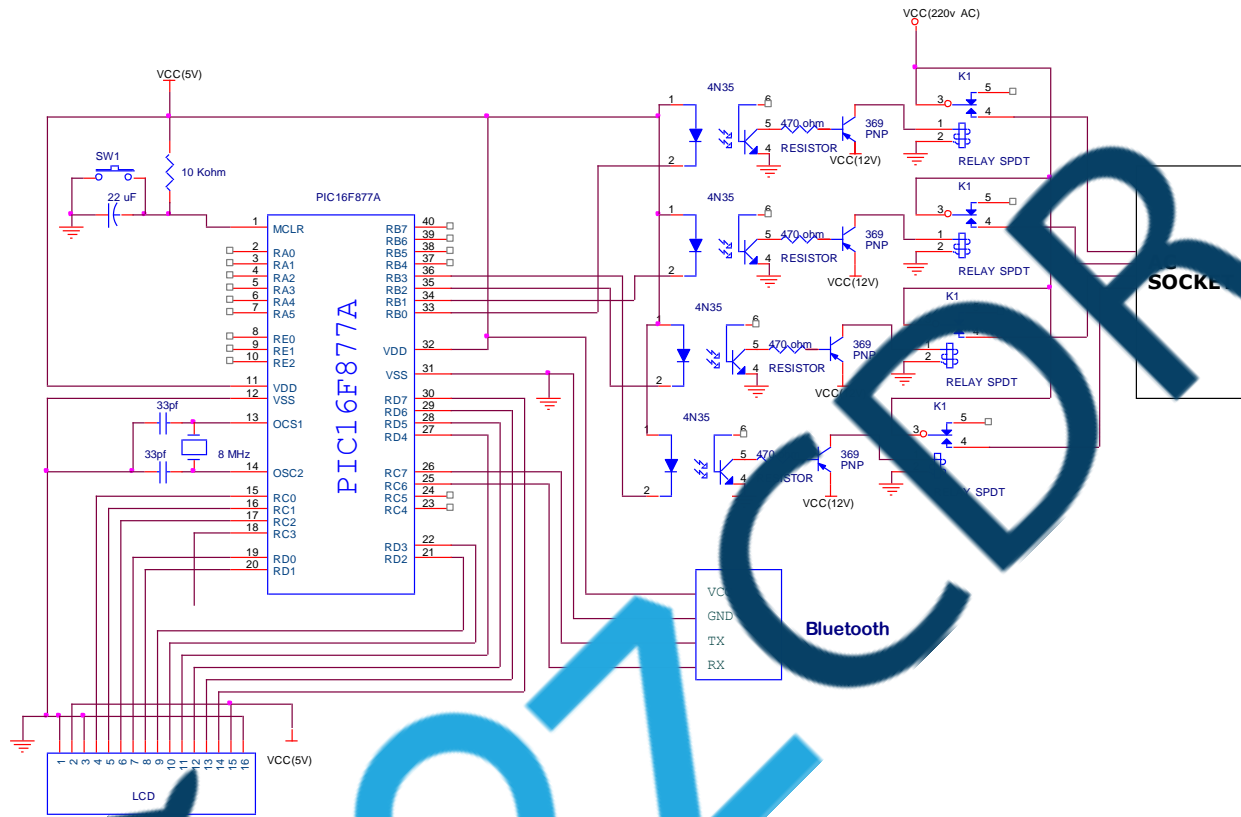

After drafting the actual microcontroller circuit and the microcontroller testing, I am ready to burn the required program in the microcontroller.

CE 2.9

Testing of power Supply

Every piece of equipment requires power to perform their each and every task, while the controller plays the role of brain, the power supply plays the role of veins of any electronics project. Supplying the proper voltage and current is become very compulsory as it may lead to the serious damage of the whole design and the project. A regulated 5V power is required for the microcontroller. After connecting the power supply to the circuit, a require safety check is performed by me in order to keep the project running.
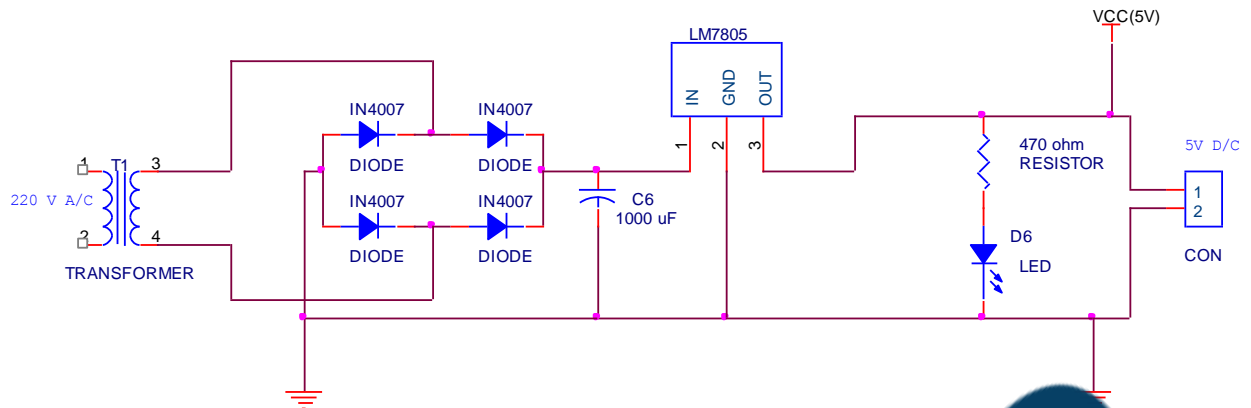
CE 2.10

LCD Interfacing

An LCD is required to display the data as well as the connection confirmation in the project. The next module is to test and install the LCD to display the information as well as the connection of Bluetooth device. LCD used as a display in this system is LMB162A. The main features of this LCD are: 16*2 display, intelligent LCD, used for alphanumeric characters & based on ASCII codes. This LCD contains 16 pins, in which 8 pins are used as 8-bit data I/O, which are extended ASCII. Three pins are used as control pins these are Read/Write pin, Enable pin and Register select pin. Two pins are used for Backlight and LCD voltage, another two pins are for Backlight & LCD ground and one pin is used to contrast change. While the interfacing of microcontroller with LCD display most of the cases "R/W" line is grounded and just wait the maximum amount of time for each instruction (4.1ms for clearing the display or moving the cursor display to the "home position", 160µs for all other commands) and also the application software is simpler, it also frees up a microcontroller pin for other uses. Different LCD executes instructions at different rates and to avoid problems later on (such as if the LCD changes to a slower unit). Before sending commands or data to the LCD module, the Module must be initialized. Once the initialization is complete, the LCD can be written to with data or instructions as required. Each character to display is written like the control bytes, except that the "RS" line is set. During initialization, by setting the "S/C" bit during the "Move Cursor/Shift Display" command, after each character is sent to the LCD, the cursor built into the LCD will increment to the next position (either right or left). Normally, the "S/C" bit is set (equal to "1"). The actual Circuit of the LCD interfacing is as shown below:
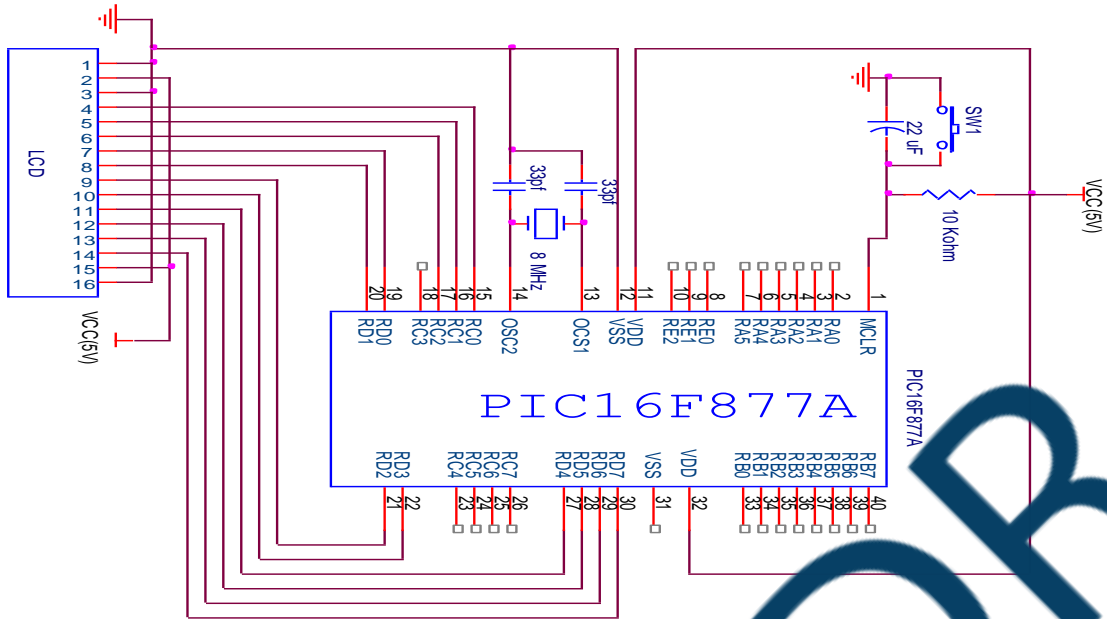
After the interfacing, I have done the testing of LCD by displaying the "HELLO" message on the LCD screen. The LCD responded as expected, so the project moved to the next module.

CE 2.11

Relay Interfacing

Relay is an electromagnetic switch operated by a relatively small current. You can assume as a kind of electric lever, which can be switched with tiny current and it switches another appliance using a much bigger current. The main purpose of using relay circuit in this project is to switch the devices when a command is executed from the android app.
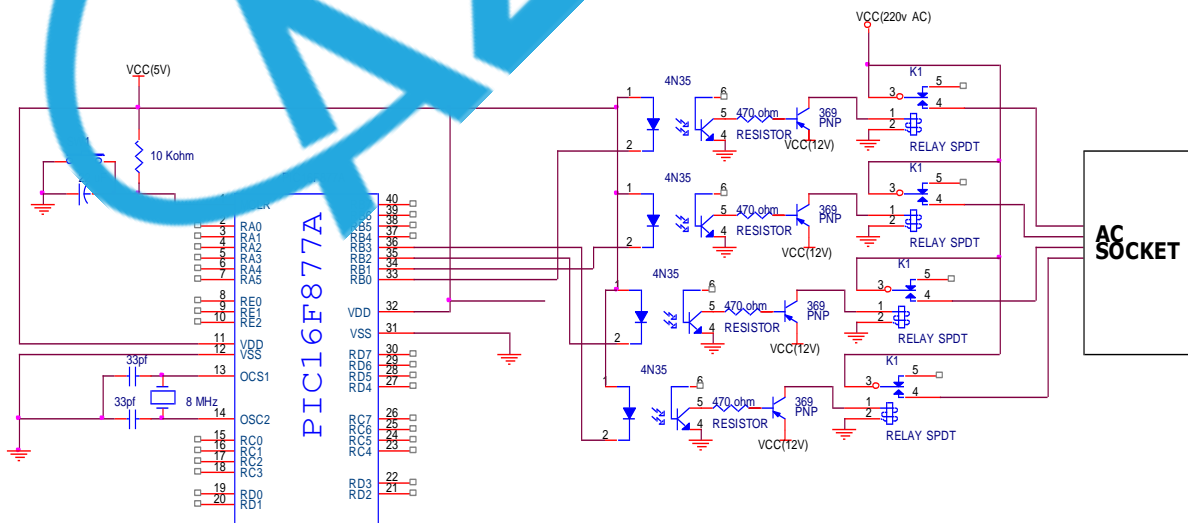
CE 2.12

Bluetooth interfacing

The module I am using for the interfacing between of the hardware with the android mobile, is HC-05. It is an easy to use Bluetooth Serial Port Protocol (SPP), designed for transparent wireless serial connection setup. It act as a communication channel between the hardware and the android mobile. The receiver port of Bluetooth device is connected to the transmission end of the microcontroller. So the hardware create the proper channel between the microprocessor and the Bluetooth device. The actual circuitry is shown below:
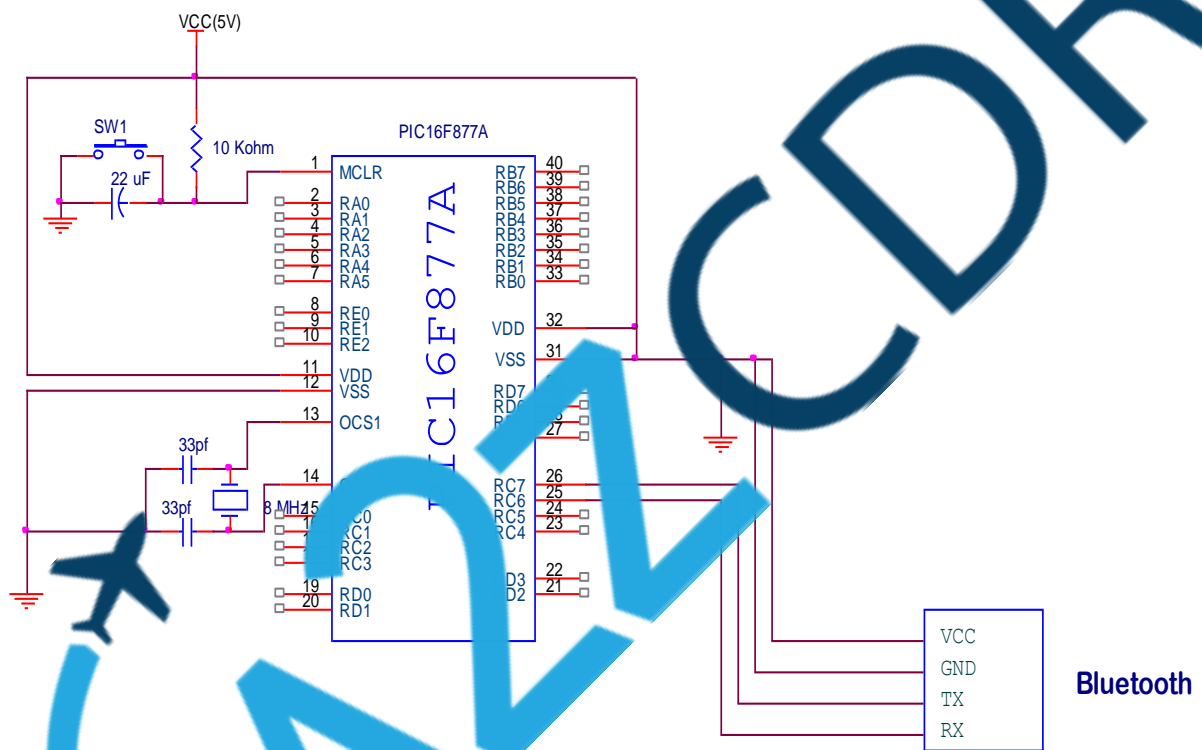
CE 2.13

Software Development and interfacing

The next task I have to perform is to burn the program and installing of the required android app in the mobile. While working on the hardware section, I done the programing part of the microcontroller whereas the android app is created by the other team member. After installing the app and burning the program in microcontroller, I have tested the whole project.

CE 2.14

Final Working of the Project

The device is based on the communication between the android app and the Bluetooth module connected with the microcontroller. When the Android mobile is get connected with the Bluetooth module connected with the microcontroller, it display the message of connection on the LCD screen. After the connection, I can control the device connected to the AC socket, which can be switched with the help of the relay board. The relay switch the individual sockets in order to change the current status of the appliances connected to the socket.

CE 2.15

Actual Outcome and Learnings

Developing and crafting a project is always helpful when it comes to learning, during this project development, I understood the interfacing of the different modules of the project like Bluetooth, LCD and more others. How the overall system work upon such a small device like microcontroller is enjoy to learn. While the coding and software part enhanced my knowledge out of the box, the hardware part increase my knowledge about components. I learned a lot while the training period and perfectly implement this during the project development.

The pic of finalized project submitted to our supervisor.
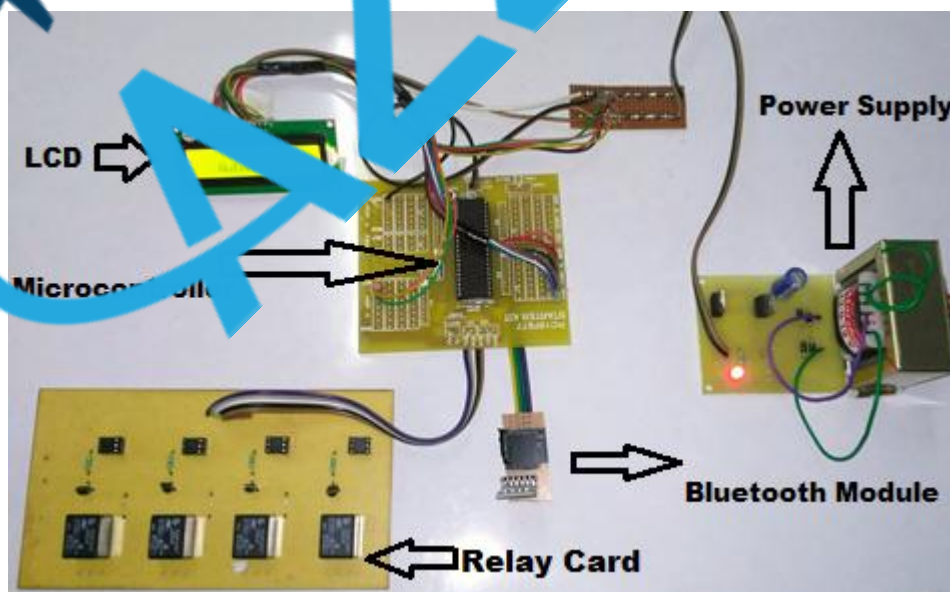
D. Summary

CE 2.16

After the completion of the task, I can say that learning is only a process, but the actual implementation of the learned objective is amazing to perform. After the completion of the project I understood the importance of the technical as well as the practical knowledge. The efforts inserted during the project development enhanced my overall knowledge and taught me the importance of the collective efforts toward any approach to any project or task.