

Career Episode

A. Introduction

Duration: July 2012 - December 2012

Location: ABC Nagar, DEF City

Organization: XYZ Engineering College, ABC

Field: Optical Communication under B. Tech ECE (7th Semester Major Project)

Title: Microcontroller based Data communication over Infra-Red rays.

B. Background

CE 1.1

The project was undertaken as a partial fulfillment during the four-year course for the award of the degree of Bachelors of Technology in Electronics and Communications as the part of the curriculum of Punjab Technical University according to the university guidelines for the completion of the degree. It has to submit a project based on the theoretical as well as the practical knowledge of their field. The project was completed in the supervision and guideline of our Head of Department Mr. Gurtej Singh (Assistant Professor) and the project supervisor, Kawaljeet Singh (Assistant Professor). The reason to adopt the project is due to my keen interest in electronics and data communication field. The project is entirely based upon the wireless data transmission using the microcontroller and the I.R. Transmitter and receiver.

The project requires a lot of assembling, testing and troubleshooting work in order to accomplish the final project.

CE 1.2

The target of this project is to build up a framework that transmits information starting with one end then onto the next end through remote means utilizing the microcontroller, IR transmitter and collector. The gadget comprises a transmitter and receiver on both side to convey the message. The primary goal of this project is to transmit the information in a

sheltered and simple way. As data communication, communication channel, wireless transmission, and microcontrollers were the main subjects which are considered by me in the last couple of semesters, which is the significant purpose behind me to adopt this project.

For fruition of the final project, the essential learning of segments like microcontroller is studied by me in the fifth and sixth semester of our engineering. The essential operational standard of data communication and wireless and optical data transmission are contemplated by me in the third and fourth semester of our engineering, that is the reason I as of now comprehend the general fundamental operation and theoretical standards which make it easier for me to understand the base of the project and go forward to accomplish the objective.

CE 1.3

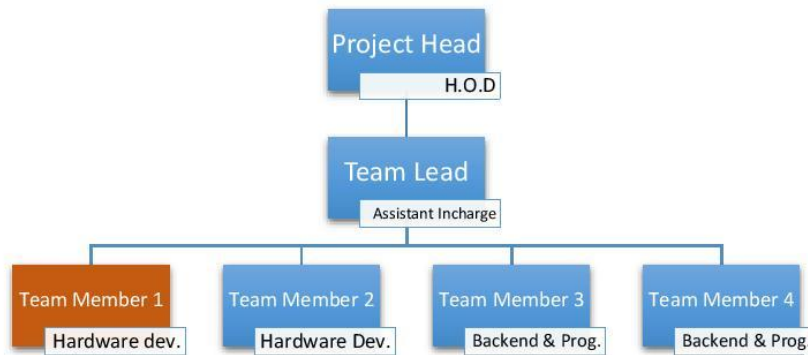
To accomplish long term objectives it is essential to work with a group driven philosophy. Additionally, as the necessity of the project, it is important that different people focus on the distinctive part of the project to hit the due date in time and in a simple way. Because of all of these reasons we accomplished a four-part group, allocating the distinctive obligations and responsibilities to all, so the work processes in a simple and manners way.

Keeping the team boosted and a constant correspondence between the team and the supervisor is likewise a vital part of the project which is accomplished in a superior way by the endeavors of all the members.

The leadership is always important in a team and as the project idea is developed by me, the team members collectively decided to assign me as the team leader of the project.

CE 1.4

The normal exchange of information becomes important in a team as well as at the individual level to ensure the overall work and up-to-date information. It becomes necessary that the data, as well as the information, flows in a precise and structured way.



The organizational structure given above is the layout by which the data and criticism are passed on to the team members during the design and development of the project.

My part in the Team Hierarchy was to deal with the project feasibility consideration, its segment resourcing, equipment outline and development and in the team hierarchy chart my position is shown as Team Member 1.

CE 1.5

Responsibilities and duties at individual level are distinctly essential to accomplish the objectives at the group level. Adopting the division of labor has been done on our project so that by hitting the little things the final project can be finished in time.

Duties and Responsibilities assigned to me during the project is given below:

- Development of requirement specifications of the problem to be solved during the project.
- Collecting the necessary and precise information and documentation required while working on the project.
- Selection of proper components and modules as per the schematic requirements of the project.
- Proper verification and simulations of components.
- Soldering and assembling of the components on actual Circuit.
- Testing of the project after burning the program in the microcontroller.
- Problem finding and troubleshooting.
- Providing the accurate data of all the components and principles for the final report.

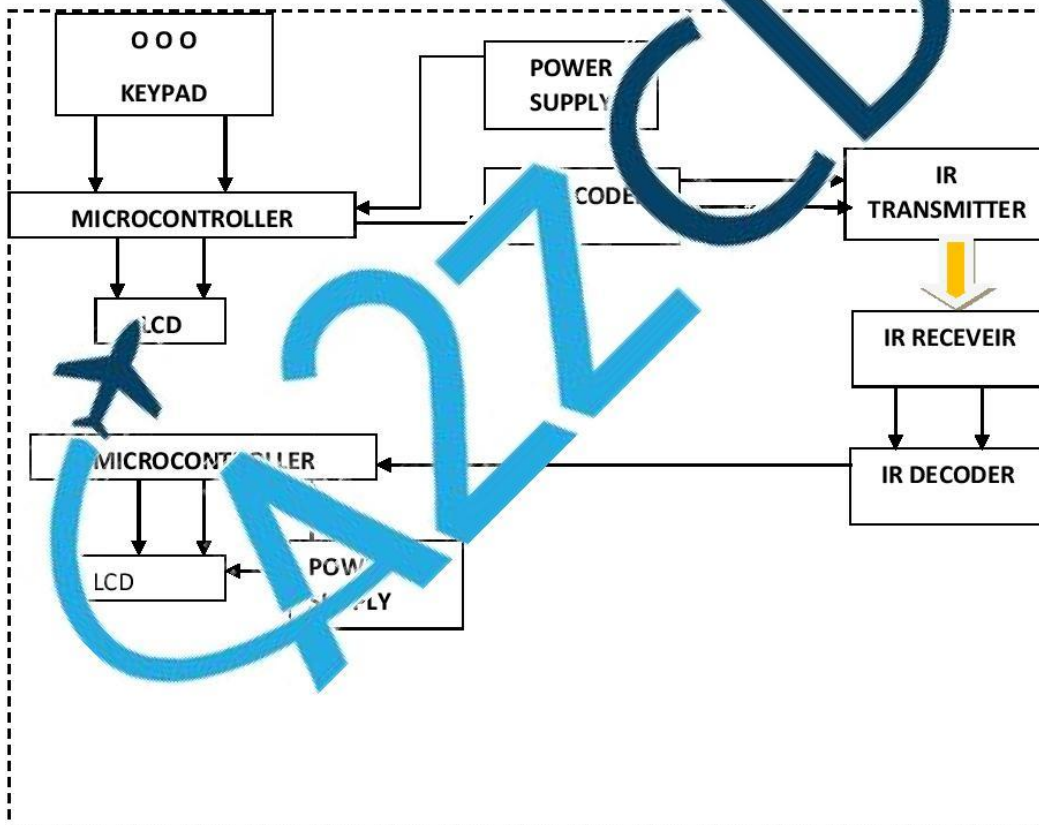
C. Personal Engineering Activity

CE 1.6

Problem Formulation

Problem Formulation is the most important part of any project as it characterizes the work must be accomplished for the fruitful consummation of the project work and the essential things required for the project. The task of problem formulation is done by me in the early phases of the project. After the definition of the problem, the next task is to check the project feasibility. The block diagram of project which is developed after the problem formulation is shown as beneath:

Block Diagram of Project



CE 1.7

Component Selection

As the electronics circuits and their components are the backbones of any electronics related project, so after the above steps the next step is to prepare the lists of the components required in the project. The main objective of the component selection is not only to define the components only but also checking the availability of the component in close-by market on suitable rates. The choice of components are done after the best possible simulation of the entire project and the market overview. The market study is finished by mostly gathering the data from various vendors and sites.

CE 1.8

Component Simulation

For the simulation of the project components, PROTEUS software developed by Labcenter electronics was used. After all these simulations and market survey, I purchased the project kit and component from different vendors and websites.

CE 1.9

Soldering and Assembly

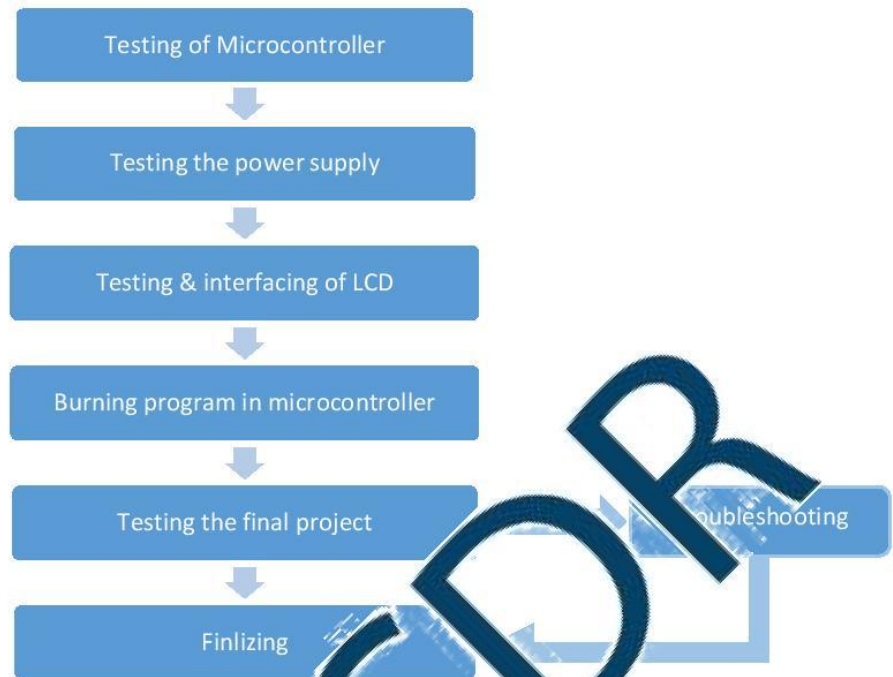
After the purchase of component, the next task is to assemble those components on the actual board with the help of solder. The problem encountered during this task is that I am not all that ace in soldering due to which the final result of soldering done is not so clean. For that, I have to learn the tips and tricks of the soldering, i.e. how to hold the soldering iron, how to move forward holding the wire and soldering iron. These tips and tricks brought about a perfect and appropriate soldering on the board.

CE 1.10

Division of Work

For the further headway and legitimate work, I as the project leader divided the whole projects in different modules so that the testing can be done easily at different modules level as well as the overall projects.

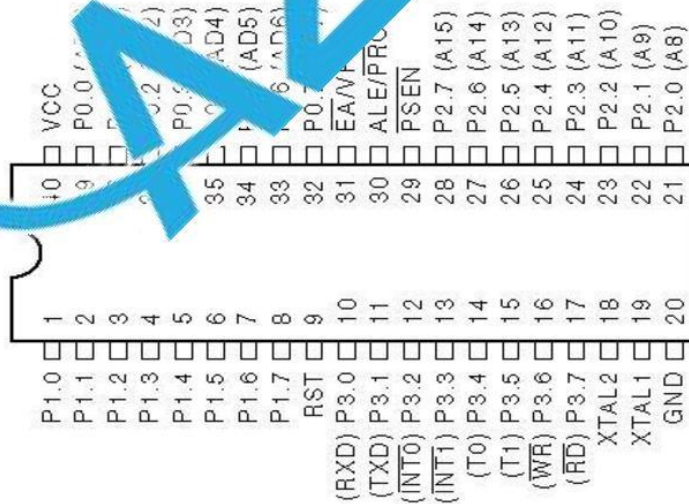
The steps of modules are as follows:



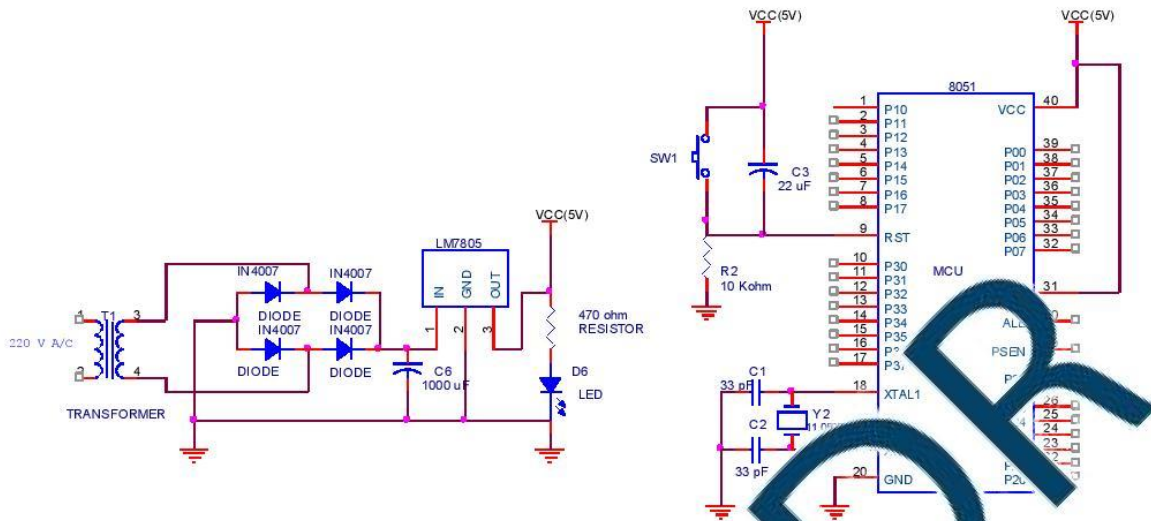
CE 1.11

Testing of Microcontroller

In the first module, the task is to test the microcontroller whether it is in working condition. The microcontroller used in this project is 8051, an 8-bit microcontroller developed by Intel Corporation. The pin diagram of the microcontroller is as follows:



And the circuit of the 8051 microcontrollers is as follows

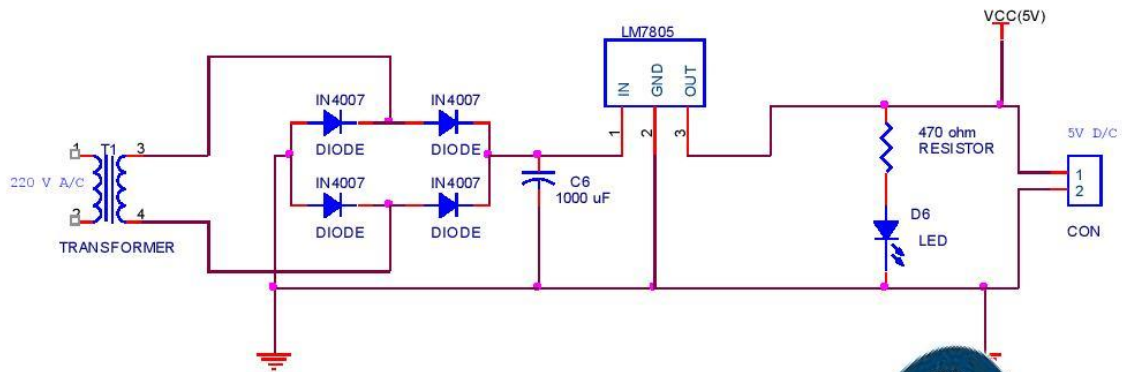


I done the testing after the selection of the microcontroller. Testing it using both the power supply as well as the software.

CE 1.12

Testing of power Supply

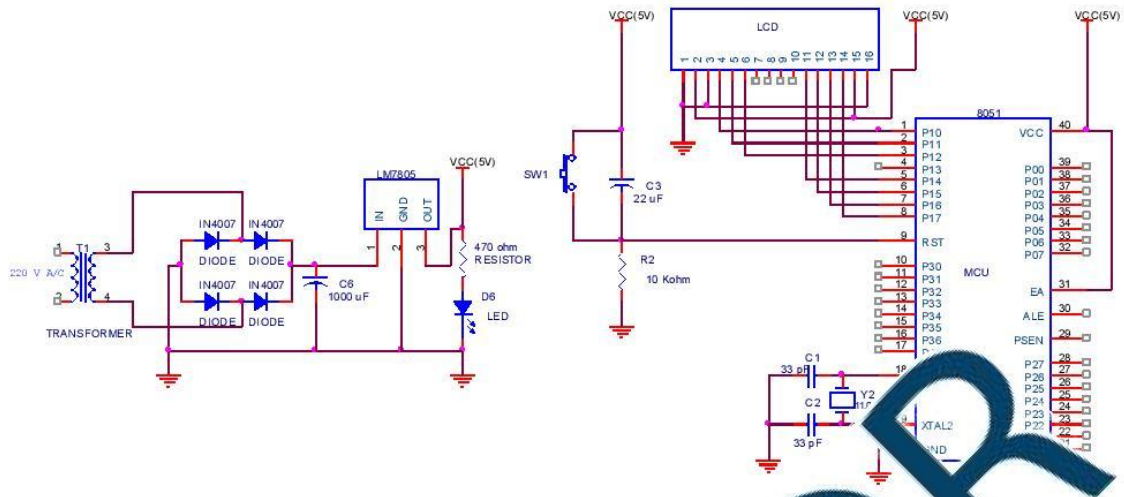
Every time we talk about the electronic projects we always talk about the power supply. The power supply is designed to convert the high voltage coming from AC mains to a suitable low voltage DC supply. In the next module the task is to test the power supply. In this project, the power supply is used to power the microcontroller as well as the other parts of the project. A regulated power supply circuit is required to power the microcontroller. After the power input, I have to do the testing, for microcontroller testing, the testing of different pins is done for the required voltage according to the datasheet of the microcontroller. Also, the other parts of the project are tested according to their behavior and requirement of power. The circuit diagram I have used to develop the power supply is given below:



CE 1.13

LCD Interfacing

To display the data in this project we require an LCD on both sides. The next module is to test and install the LCD to display the data inserted and the system on both sides. 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 a 8-bit data bus (D0-D7), which are extended ASCII. Three pins are used as control lines these are Read/Write pin, Enable pin and Register select pin. Two pins are used for Backlight power supply voltage, another two pins are for Backlight & LCD ground and one pin is used to control contrast change. While the interfacing of microcontroller with LCD display in 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", 1.6ms for all other commands) and also the application software is simpler, it also frees up a number of pins for other uses. Different LCD execute 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 to do the testing of LCD by displaying the “HE” message on the LCD screen. The LCD responded as expected, so the project moved to the next module.

CE 1.14

Burning of the program in Microcontroller

In the next step, the program developed in the programming language C++ is burned in the flash memory of the microcontroller so that the program get permanently stored in the memory of the microcontroller. The program is developed by the team members working on the back-end of the project. In expectation to respond the project perfectly as the different module testing responded well in the previous steps, but the final project is not working as expected. The receiver not receiving the signal due to the reason we have to adopt the troubleshooting step and find out the reason for the problem facing at this level.

CE 1.15

Troubleshooting

In the troubleshooting steps, I found some dry soldering at some points on the circuit, I thought it would result in the proper working, but the result is the same and again the receiver hasn't received the signal. After few discussions of me and our project supervisor, they suggested testing the IR transmitter using the mobile camera as it is not visible by naked eyes. After testing the IR transmitter working condition using the mobile camera, I found that IR

transmitter LED is not working. So replacement of the Transmitter portion is done with a new one and the problem is solved after this. The overall project starts working smoothly.

CE 1.16

Final Working of the Project

In order to transmit the data entered from one side to another side, there is a keypad present on one side to enter the numeric information. The entered information will be appeared on LCD. The microcontroller gets the information in the parallel frame that information is provided by the encoder which changes one type of code to the other. That code is transmitted by the transmitter in the form of IR rays. On the other end, the receiver receives the signal in the form of IR rays and the decoder decode the set of converted code into the actual set of codes. That code is received by the microcontroller from the decoder and get displayed on the LCD screen in the form of numeric character.

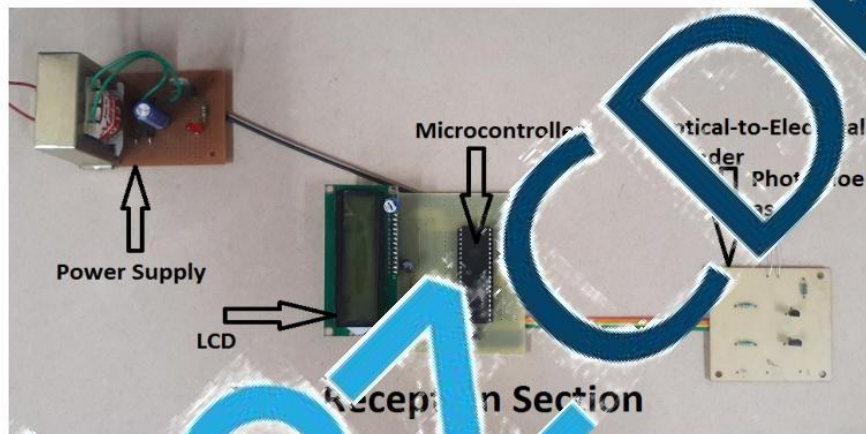
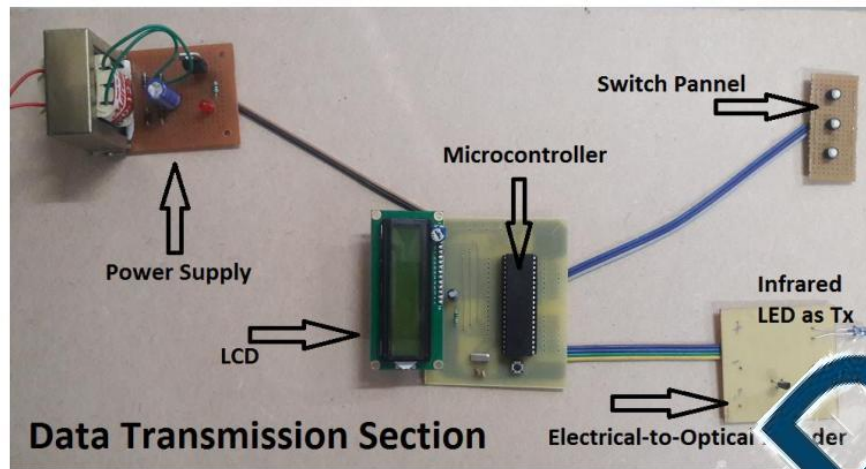
CE 1.17

Actual Outcome and Learnings

The project is not only a crafting and development of a device, but also a profound learning procedure of various parts of the equipment and programming part of the device. I as an individual took in a ton of things from this project work. The project helped me for addition in my practical as well as the theoretical knowledge. Understanding the importance of the different parts is the major aspect of the project. The addition of the software part helped me to work with the real-time approach used in the industry and its actual practices.

I learned how to handle the development problems related to the hardware, occurred during the work and how the approach should be to solve that problem. This is my first experience to work with a team, and the enthusiastic members proved that it would be easy and amazing to collaborate with a team. Sharing ideas in a team and working and discussing the same idea is always joyful.

The pic of finalized project submitted to our supervisor



D. Summary

CE 118

Technological innovation is indeed important to economic growth and the enhancement of human possibilities. As defined by Aloen Kass, defines the actual need of engineering and technology in the growth of a society or nation. As this is generally expected from an engineer, so to excel our technical skills and to practically implement the theoretical concepts studied during our engineering studies, we developed a prototype of wireless communication over the optical source that is Infra-Red light for the data communication in our project.

Development in the field of Embedded Systems and their use in wireless data communication is one of the most evolving concepts in almost every sphere of life, so we took a step forward to learn this technology and understand the field of communication. We achieved all the objectives those were under consideration in the initial proposal of this project.

The collective efforts of the engineers may lead to a better world and this project was an initiative by us, to enhance our practical skills those are required for the overall advancement and growth of a budding engineer.

