Chapter 1 ABOUT THE COMPANY

DUXES LABS PVT LTD

Duxes Labs Pvt. Ltd. has been established as an Electronics Company in Bangalore. The traditional business model is based on developing products as per the requirement of the Clients. Duxes nurtures the latest technologies. Over the years Duxes Labs fleshing out and prioritizing the products and services in various industries, practicing the fact that customers are the best key players for any perfect product outcome, Duxes takes careful measures to hear from customer requirements and make them happy with all aspects.

The Company aims at inventing new ways to use the current technology at a very nominal price. Innovation and Creativity have always been the soul of the Company. Based on the decision to diversify the business, the company stepped into the field of website development with a team of experience professionals 4 years ago. All models were praised and applaud by the clients and their customers.

The company's own product Robo-L has created a vibe for learning programming among students. With the hope of achieving a worldwide customer base , Robo-L version 2 is launched as Robol-Nex on 12th oct. 2016. The physical programming module is appraised as the most friendly robot by kids and parents all over India.

Duxes Moto: 'Here at DUXES Labs, we ensure that the clients get high-quality, original design and implementation for customer projects.'

The various departments in the company are:

1. Robotics
2. Automation
3. Software development
4. Embedded systems
5. Website development

Duxes Labs Pvt. Ltd. is led by Mr. Raju Chaluva (Co-Founder and CEO) has over 14+ years of rich and insightful experience in product development & management of embedded & safety critical systems & engineering software. Mr. Raju has worked with TCS for 12+ years in Avionics and Automotive domains in the area of design, development and SDLC of safety critical systems like Flight Control Systems, Auto-pilot, Flight Management Systems, Cockpit Displays, Flap/Slat Control Systems and Power-train Control Module and Battery Management Systems for the Electric Cars. He has vast experience in various aerospace and automotive standards prevailing in industry across India, US and European countries.

1.1 Services provided

1.1.1 Product engineering & development

Duxes offers creative Embedded and Software product development services. Duxes has unique product development life cycle to optimise product engineering effort and time, increasing time to market by selecting deterministic design path, cost effective product development by providing different product versions, proper analysis of customer and end user expectation. Achieving exact requirement of customer and end user through prototyping of product and pilot production of new products, Duxes will support for product manufacturing and maintenance throughout life time of product.

1.1.2 Electronic hardware design services

Duxes offers electronic hardware design solutions that include complete embedded product life cycle services starting from product design to prototype. Duxes has tremendous

experience in various electronics domains such as industrial systems, test and measurement systems and home automation systems. In electronic hardware design, Duxes provides circuit design, Cadence Orcad PCB tool based schematic diagram and multi layer PCB layout design, third party PCB manufacturing facility for prototyping and in house component assembly and testing.

1.1.3 Embedded firmware development services

In product companies and electronic design companies are facing big challenge of firmware development activity due to insufficient in house experienced development engineers on required domain, absence of other supporting firmware or hardware related departments. Duxes has new technology specialities in embedded programming using different languages like ALP, C, C++, Ada and familiar with popular embedded development IDE (Integrated Development Environment) tools like IAR, Mplab, Keil, CCS, and Eclipse.

Duxes is expertise in real time board level debugging tools. Duxes has enormous experience in firmware development process on 8bit/16bit/32bit microcontrollers/microprocessor of major vendors such as Atmel, NXP, Freescale, ARM, Microchip, Renesas and Ti. Duxes has good exposure on Embedded OS based firmware development such as FreeRTOS, VxWorks, and also Linux.

1.1.4 Software solutions

Duxes provides innovative solutions for small and large scale industries to boost the productivity while reducing the end to end product processing time as well as manpower. Duxes design stand alone products for industrial applications and retail consumer care industries. Duxes provide software solutions for educational institutions in order to smoothen the management process and provide remote accessing of the data. Duxes has vast experience in software application designing, developing and maintaining enterprise class products.

1.2 Product Development

- IOS development
- Android development
- Database Management
- Aerospace Testing
- Solar Power Installation
- Robol-Nex

The programming is made more and more interesting in Robo-L by combining cutting edge teaching technique vak (visual, auditory, kinesthetic) with state of the art technology as shown in fig 1.1 The company has taken screens away from the computers, replaced the keyboard with a slate-coin mechanism and simplified robotics programming to just 48 logical functions. Robo-L responses to light, sound and slate coin functions. Robo-L makes use of the 48 COINS and play the biggest board game you have ever played, design a task, command the Robot using the 48 LF (Logical Functions), sit back and get amazed as it Complies the task.

Fig 1.1 : Robo-Nex

Chapter 2

INTRODUCTION

Virtual labs provide a remotely operated lab environment for students to perform experiments. This can be useful in testing the equipments and devices remotely. The lab has various equipment that can be remotely started or stopped. The virtual lab can be defined as virtual studying and learning environment that stimulates the real lab. It provides the students with tools, materials and lab sets on computer in order to perform experiments subjectively or within a group at anywhere and anytime.

2.1 BLOCK DIAGRAM OF VIRTUAL ELECTRONICS LAB

The virtual electronics lab consists of three main blocks namely, circuit simulation tool, processing and controlling and hardware setup as shown in the fig 1.2. The circuit simulation tool functions at the client end. A client can login to the V-lab website from the remote place and access the tool to design the test circuit. At the server end, the circuit is rigged up in a smart way without any human intervention and output is made visible to the client with the help of video conferencing. This feature of testing and analyzing the circuits virtually, from the remote place is said to be virtual electronics lab.

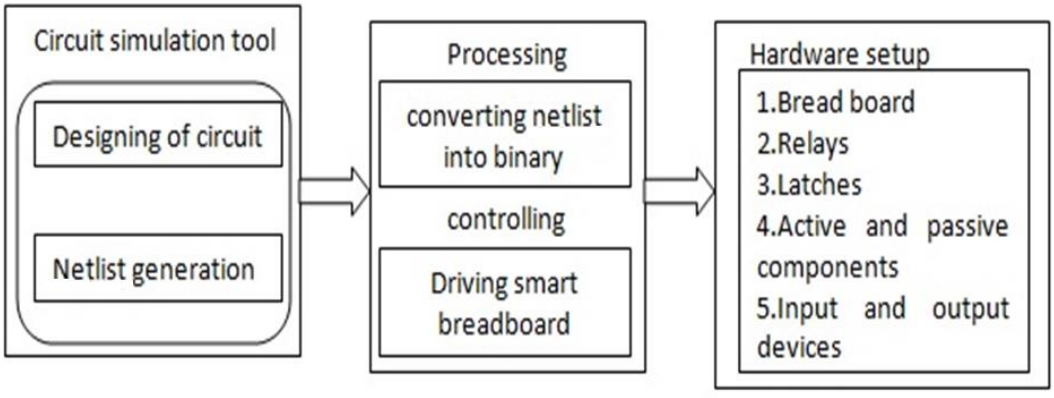


Fig 1.2 : Block diagram of Virtual electronics lab

2.2 Circuit designing tool

The circuits can be developed on a virtual bread board with the help of a circuit designing tool called as Multisim. In Multisim software there are wide range of active and passive components. These components can be interconnected to form a desired circuit as per the requirement as shown in the fig 1.3.

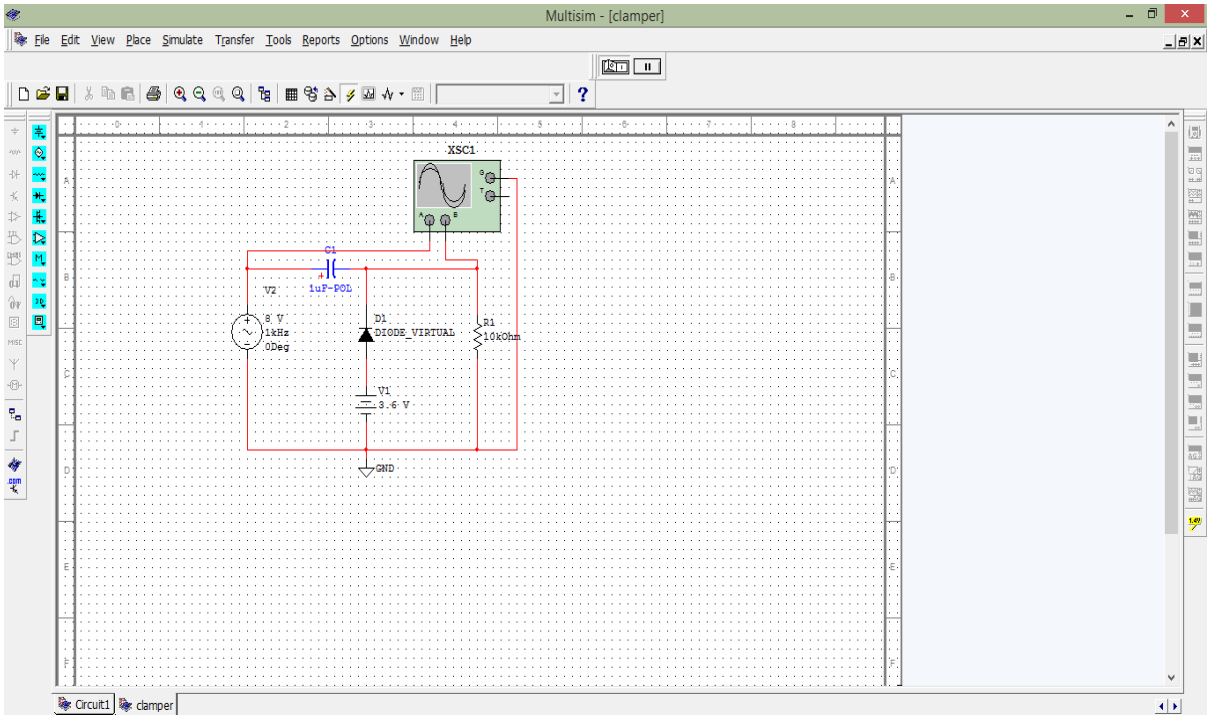
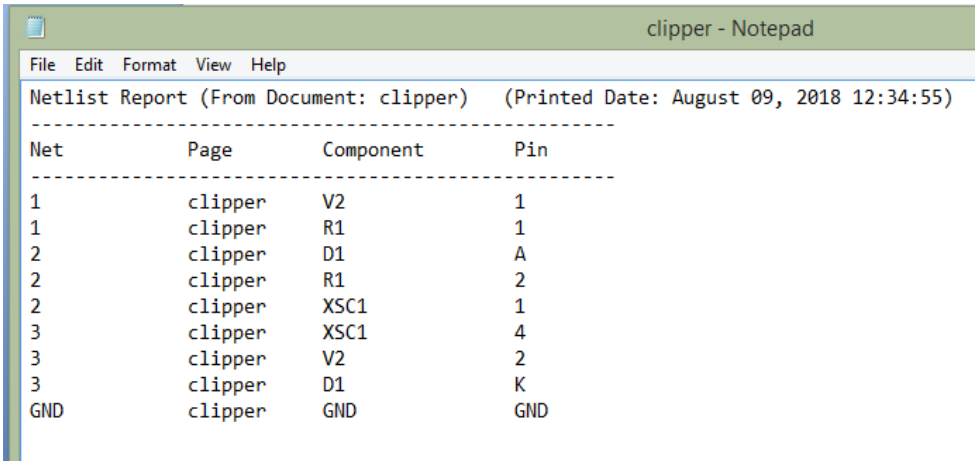


Fig 1.3 :Circuit designing Window

After assembling the required circuit the netlist should be generated in order to obtain the connection It contains information about the pins of components that are connected to specific nodes in the circuit.details among the components. The netlist is in .txt file format as shown in fig 1.4.


clipper - Notepad

File Edit Format View Help

Netlist Report (From Document: clipper) (Printed Date: August 09, 2018 12:34:55)

Net	Page	Component	Pin
1	clipper	V2	1
1	clipper	R1	1
2	clipper	D1	A
2	clipper	R1	2
2	clipper	XSC1	1
3	clipper	XSC1	4
3	clipper	V2	2
3	clipper	D1	K
GND	clipper	GND	GND

Fig 1.4 : Netlist report

2.3 Processing and controlling

After the generation of netlist, the particular netlist should be sent to the physical lab which contains PC, arduino, smart bread board setup. The PC is associated with physical lab. This PC receives netlist from the client. The received netlist is dumped to the Arduino board. Now, arduino reads the netlist through com port and processes it. A netlist is a text file that contains information about the circuit. All pins of all the components are connected to all the nodes. Arduino reads which pin is connected to which node. For example, pin 1 of resistor connected to node 1 is represented in the netlist file as net-1 and pin-1 as shown in the figure 1.4. The corresponding control signal to select the latch and data signal to energize the particular relay to establish the node-pin connection are given as input to the D-latch board.

2.4 Physical lab setup

The physical lab is equipped with relay, latch, bread board, active and passive electronic components, input and output devices. This entire setup is said to be smart bread board. The control signal generated from arduino selects the particular D-Latch through latch enable (LE) pin. The selected latch energizes the relay module connected to it.

The pin and node connection details in the netlist is given as an input to D-latch . The output of D-latch is given as an input to a 8- relay module, which activates one specific relay

among the eight relays. The 8-relay modules interfaced with bread board are shown in the fig 1.6 . This relay establishes connection between the particular pin of the component to a particular node as shown in fig 1.5 . The required components are placed on the bread board. All the pins of the components are connected to all the nodes on the nodeline board. A PCB containing node lines can be used for interfacing with relay.

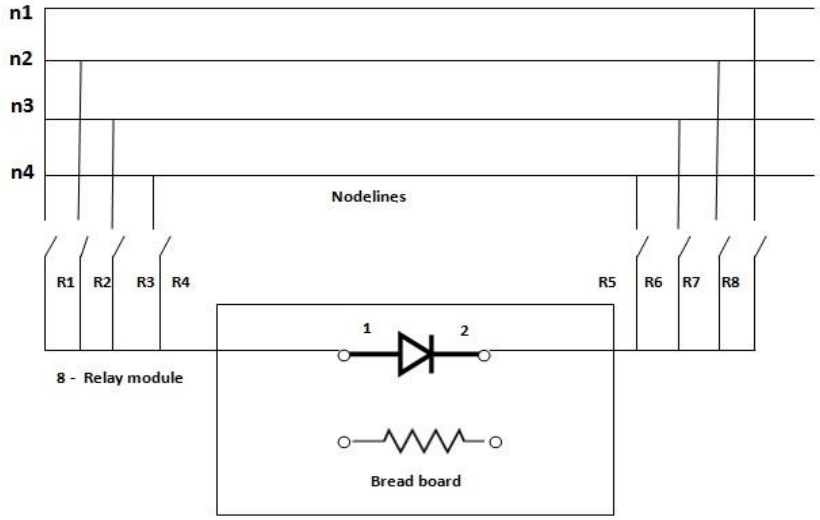


Fig 1.5 : Interfacing of pin and node through relay

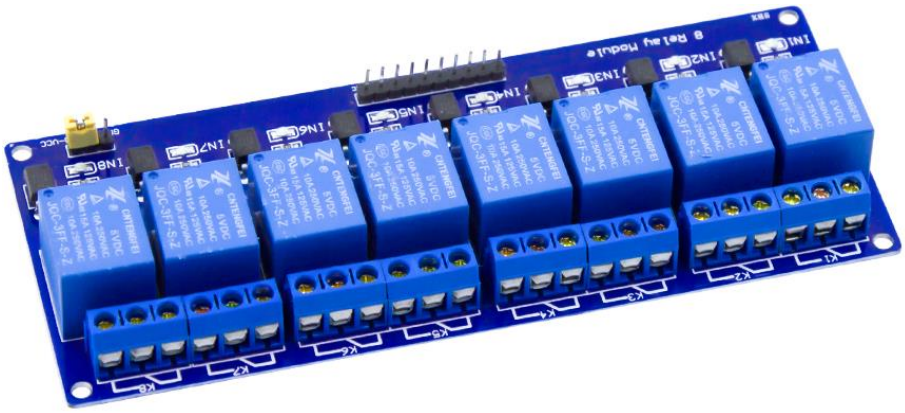


Fig 1.6 : 8-relay module

Chapter 3

METHODOLOGY

The whole idea of implementation of 'virtual electronic lab' is divided into modules. Each module has a set of specific task to perform that contributes to the project. All the modules are combined at the end to form a complete project. The entire project is segmented into the following modules:

- Development of API
- Circuit designing tool
- Server-Client communication
- Physical lab setup
- Smart breadboard
- Web development
- Database management

A client can login to the V-lab website from the remote place and access the tool to design the test circuit. At the server end, the circuit is rigged up in a smart way without any human intervention and output is made visible to the client with the help of video conferencing. This feature of testing and analyzing the circuits virtually, from the remote place is said to be virtual electronics lab. In order to draw the test circuits, a circuit drawing tool is to be developed. In this tool, the various electrical and electronic components should be dragged and dropped on to the drawing window. This tool has to be developed using python GUI tool.

The Working procedure of Virtual electronics lab involves designing of circuit in PC, dumping the context file to controller, switching of relays and connecting pin to node as shown in the fig 1.7.

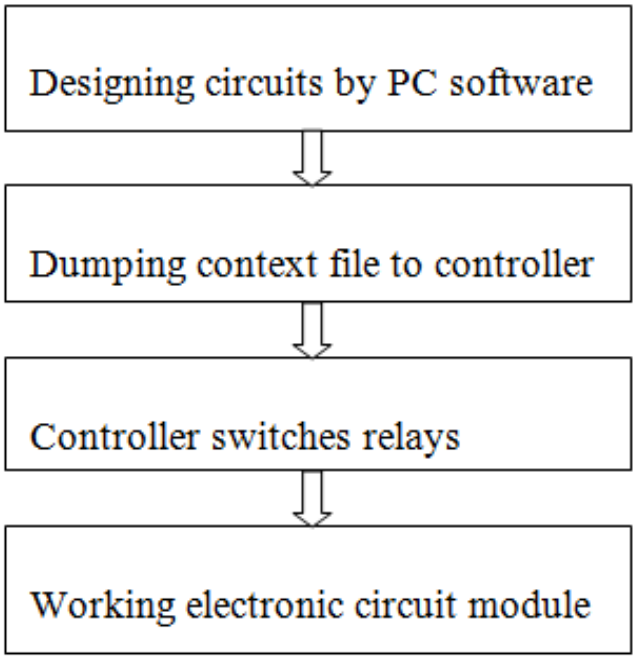


Fig 1.7 : Working procedure of Virtual electronics lab

The project is carried out by using python programming language. Python software PYTHON 3.7 is downloaded and installed on 64 bit windows 8.1 operating system. The basics of python are studied. As the software couldn't support some packages , other python software JETBRAINS PYCHARM VERSION 4.0.5 is downloaded and installed as shown in fig 1.8.

Fig 1.8: Installation of Pycharm

The various packages are installed by typing the commands in command prompt. These are:

- PIP
- MATPLOTLIB
- NUMPY
- PYQT5
- TKINTER
- URLLIB
- PILLOW
- SCHEMDRAW
- QTGUI
- REQUESTS
- MIMEMULTIPART
- SKIDL
- WHEEL

The python programming is learnt by referring websites like Datacamp, Tutorialspoint, Pythonspot, stackoverflow, Guru99 and Geeks for geeks, mobile applications like Progate and Coding E-books and also by watching Youtube tutorials. The selected programs are executed and practiced in Pycharm software. Some of them are:

- Appending two lists
- Conditional and looping statements
- Creating a file and writing to file
- Opening a file and reading the contents of the file
- Accessing the contents of webpage
- Accessing the youtube video
- Downloading an image from the internet
- Sending mail over python
- Sending email attachment over python

- Drawing graphs
- Searching for an item in the list
- Sorting and reversing the items in the list
- Adding , modifying and removing items from the list
- Length of the list
- Finding the area of a triangle
- Finding the largest and smallest element
- Simple calculator
- Slicing of list
- Slicing of 1D,2D,3D lists.
- Nested lists

3.1 File operations

File is a named location on disk to store related information. It is used to permanently store data in a non-volatile memory (e.g. hard disk).Since, random access memory (RAM) is volatile which loses its data when computer is turned off, the files are used for future requirement of the data. When read from or write to a file operation is to be done, the file needs to be opened first. Once the operations are done, the file needs to be closed, so that resources that are tied with the file are freed. Hence, in Python, a file operation takes place in the following order.

- Open a file
- Read or write (perform operation)
- Close the file

Python file modes are:

Mode	Description
'r'	Open a file for reading. (default)
'w'	Open a file for writing. Creates a new file if it does not exist or truncates the file if it exists.
'x'	Open a file for exclusive creation. If the file already exists, the operation fails.
'a'	Open for appending at the end of the file without truncating it. Creates a new file if it does not exist.
't'	Open in text mode. (default)
'b'	Open in binary mode.
'+'	Open a file for updating (reading and writing)

Python has a built-in function open() to open a file. This function returns a file object, also called a handle, as it is used to read or modify the file accordingly. The mode is to be specified while opening a file. The mode specifies whether user wants to read 'r', write 'w' or append 'a' to file. When the operations to the file are performed, the file has to be closed properly. Closing a file will free up the resources that were tied with the file and is done using Python close() method. Python has a garbage collector to clean up unreferenced objects but, users must not rely on it to close the file.

Once the netlist file is received at the server end, the contents have to be read and copied to a desired location for further processing of data. The reading of data from the received file clipper.txt and copying contents to other desired file can be achieved as shown in fig 1.9 . The newly created file, test_clipper.txt to which the data is copied and saved for further processing is shown in fig 2.0.

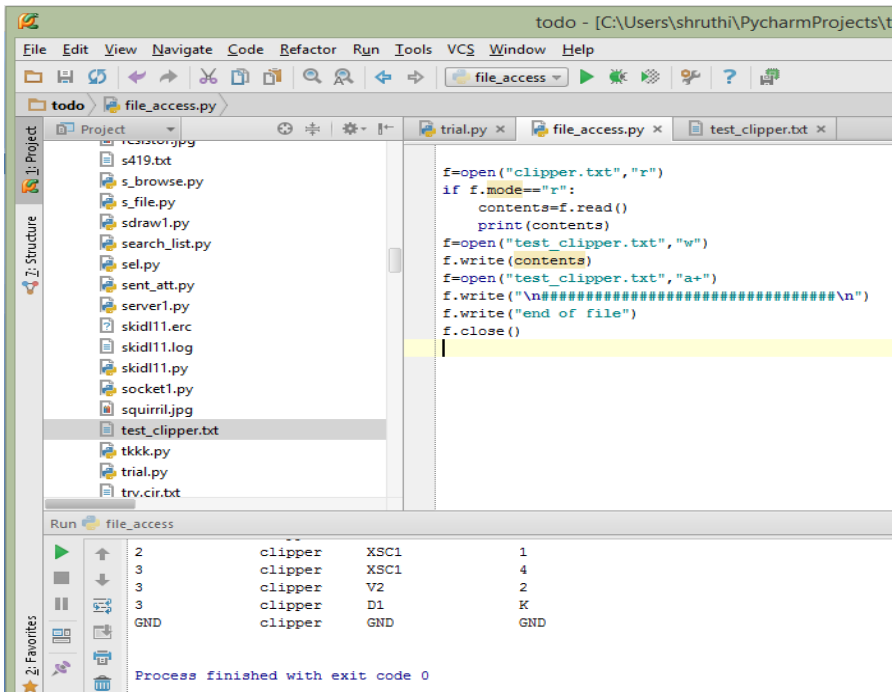


Fig 1.9 : Reading data from the netlist file and copying contents to desired location

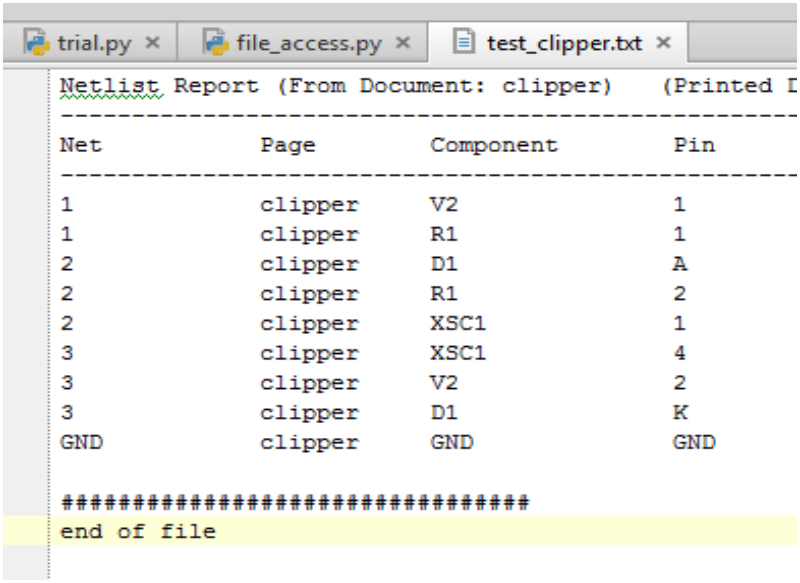


Fig 2.0 : A newly created desired file for further processing

3.2 Development of API

An application programming interface (API) is a set of subroutine definitions, communication protocols, and tools for building software. In general terms, it is a set of clearly defined methods of communication between various components. A good API makes it easier to develop a computer program by providing all the building blocks, which are then put together by the programmer.

The practical knowlegde on graphical user interface (GUI) is essential in order to develop any API. Python programming is used to implement this project. The task of developing simple interface using GUI tools of python is assigned.

Software installed: Pycharm

Packages : tkinter, pyqt5

The basic GUI tools of python language are referred from Google and watched various Youtube tutorials that are related. The conceptual logic behind the GUI programming is understood and worked in Pycharm software. The trial and error method is adopted to make changes in the code in order to meet the requirements of the project.

The GUI tools that are worked on are:

- TKINTER
- PYQT5

The tasks performed are:

- Creation of window
- Pop up message box
- Pop up notification box
- Creating a push button
- Creating menubar
- Separation of options under the menu tab
- Setup of spin box
- Adding an icon with window title.

3.3 Graphical user interface

The graphical user interface is a type of user interface that allows users to interact with electronic devices through graphical icons and visual indicators such as secondary notation, instead of text-based user interfaces, typed command labels or text navigation.

Tkinter is the standard GUI library for Python. Python when combined with Tkinter provides a fast and easy way to create GUI applications as shown in figure 3.3. Tkinter provides a powerful object-oriented interface to the Tk GUI toolkit.

Creation a GUI application using Tkinter :

- Import the Tkinter module.
- Create the GUI application main window.
- Add one or more of the above-mentioned widgets to the GUI application.
- Enter the main event loop to take action against each event triggered by the user.

The widgets of Tkinter are:

- Button : The buttons can display text or images that convey the purpose of the buttons. It is possible to attach a function or a method to a button which is called automatically on clicking the button as shown in the fig 2.1.
- Canvas: The Canvas widget is used to draw shapes, such as lines, ovals, polygons and rectangles, in the application.
- Checkbutton : The Checkbutton widget is used to display a number of options as checkboxes. The user can select multiple options at a time as shown the fig 2.4.
- Label : The Label widget is used to provide a single-line caption for other widgets. It can also contain images.
- Menubutton : The Menubutton widget is used to display menus in application as shown in the figure 2.1. The Menu widget is used to provide various commands to a user. These commands are contained inside Menubutton.
- Radiobutton : The Radiobutton widget is used to display a number of options as radio buttons. The user can select only one option at a time as shown the fig 2.3.
- Spinbox: The Spinbox widget is a variant of the standard Tkinter entry widget, which can be used to select from a fixed number of values as shown the fig 2.3.
- tkMessageBox : The tkMessageBox module is used to display message boxes in applications. This module provides a number of functions that can be used to display an appropriate message as shown in the fig 2.2.

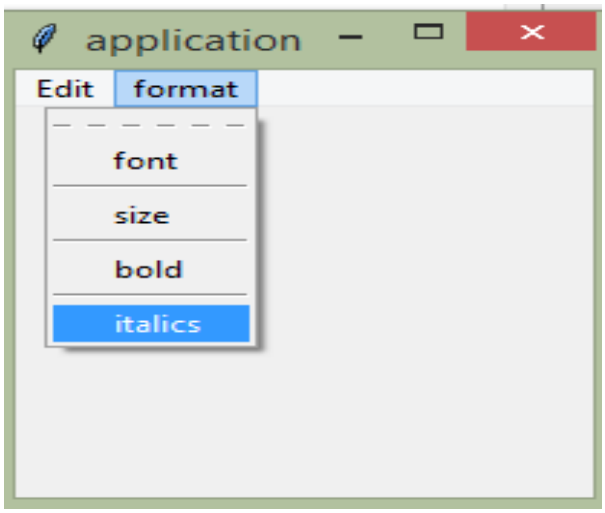


Fig 2.1 : Menubar using Tkinter

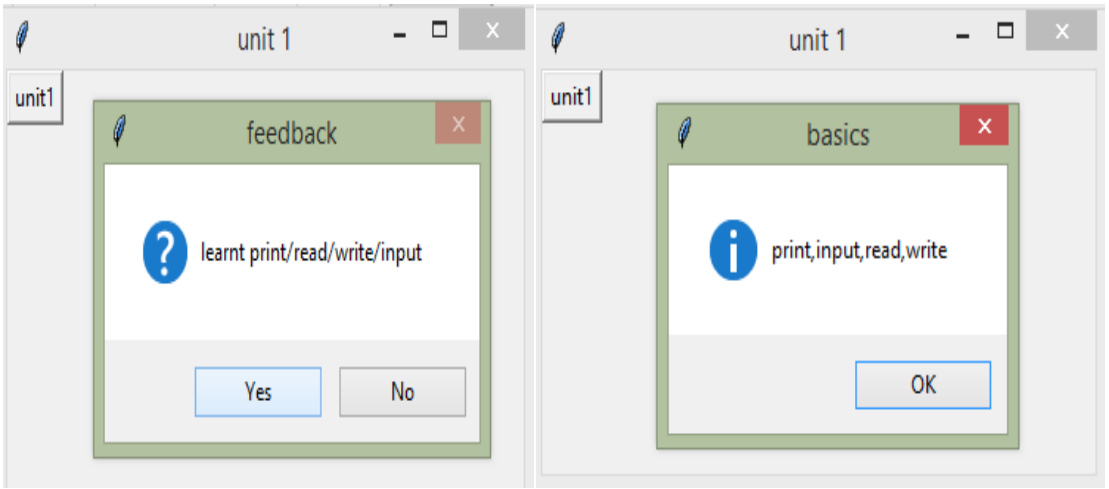


Fig 2.2 : Message box using Tkinter

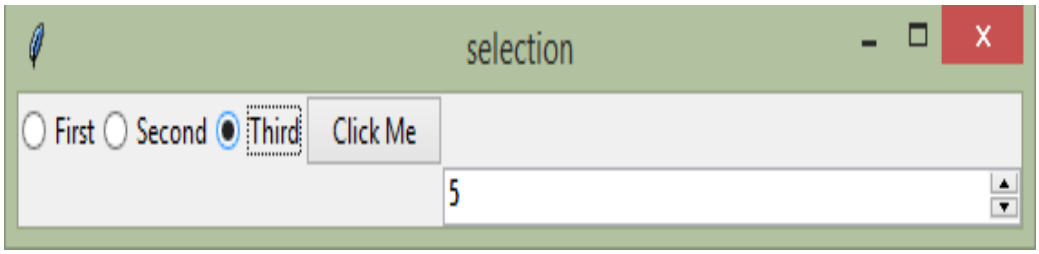


Fig 2.3 Radio button and spin box

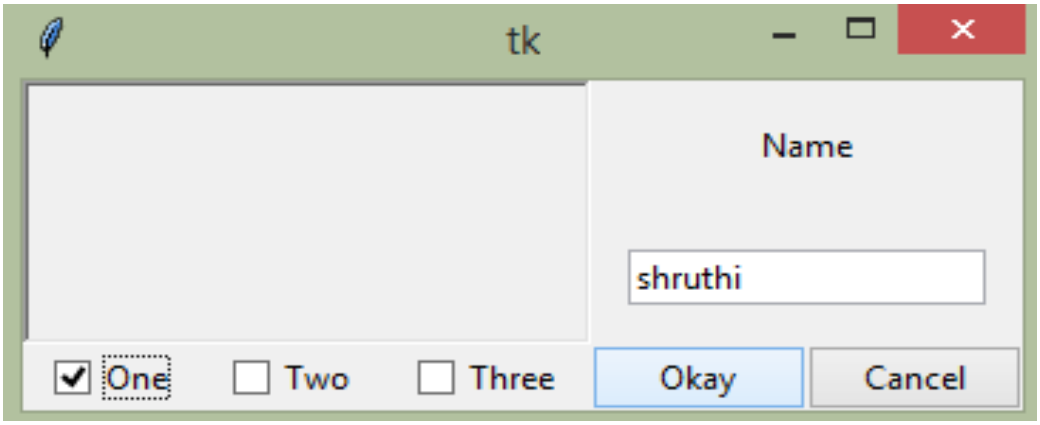


Fig 2.4: Checkbutton and text widget

3.4 PyQt5 GUI classes

Using PyQt5 GUI classes a simple push button is created , dragged and dropped onto the window panel. The conceptual logic behind the code is analysed and worked in the Pycharm software. The classes of PyQt5 that are helpful in meeting the requirements of the project are being studied and worked on as shown in figure 3.5. The classes of PYQT5 that contribute to drag and drop feature are:

- QDRAG
- QEvent.DragEnter
- QEvent.DragLeave
- QEvent.DragMove
- QEvent.Drop
- MousePressEvent
- MouseReleaseEvent
- MouseDoubleClickEvent
- MouseMoveEvent
- QWidget
- QApplication
- QtGui

- QtCore
- QMimeData
- Qtcopy
- Qtmove

3.5 Drag and drop feature

Using GUI tools in python, a drawing canvas is developed in the form of a grid ,where, the electronic and electrical components can be dragged from the toolbars and dropped onto a drawing canvas that acts as a breadboard. The connections are made among the components. Upon saving the circuit design, a context file is generated and is dumped to a microcontroller or Arduino board through RS232 ,that drives the physical smart breadboard.

Software installed: Pycharm, Multisim

Packages installed: Tkinter, PyQt5

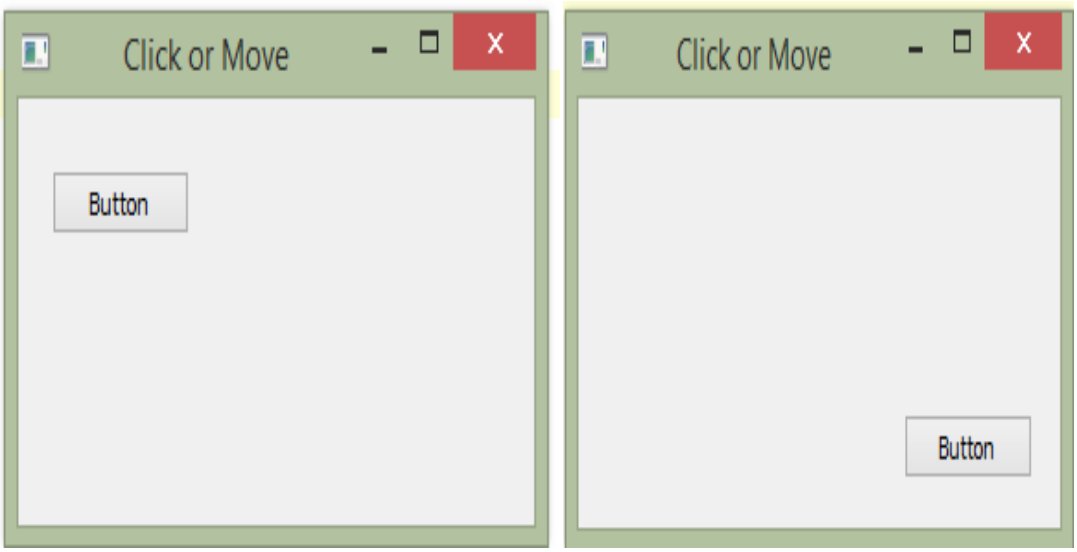


Fig 2.5 : Drag and drop button

The clients need to draw the circuits by dragging the components from toolbar and dropping them onto the canvas and then generate the netlist consisting of connection details

among the components. The task of implementation of dragging and dropping feature is shown in figure 2.5 .

3.6 Multisim Software

The clients need to draw the circuits by dragging the components from toolbar and dropping them onto the canvas and then generate the netlist consisting of connection details among the components. The task of drawing the circuits and generating the netlist is assigned.

Software installed: Multisim

Multisim is industry-standard SPICE simulation and circuit design software for analog, digital, and power electronics in education and research. In the NI Multisim circuit simulator tool there are lot of analog and digital components which are separately placed in the tool box, which helps the designer to select the specific component and place them on to the drawing canvas. The parameters like frequency, voltage, resistance etc can be changed from default to required value.

Multisim is developed with educators, Multisim™ for education to help the students to easily visualize and understand the behavior of electronics with 30+ intuitive simulated instruments, 20+ easy-to-configure analyses, and interactive components that are proven to reinforce theory and prepare students for authentic design challenges.

A number of sample circuits are drawn by dragging the components from the toolbar and dropping them onto a canvas as shown in fig 2.6. Then a netlist is generated in text format. This netlist can be copied to an excel sheet as well as saved in .cir spicenetlist format.

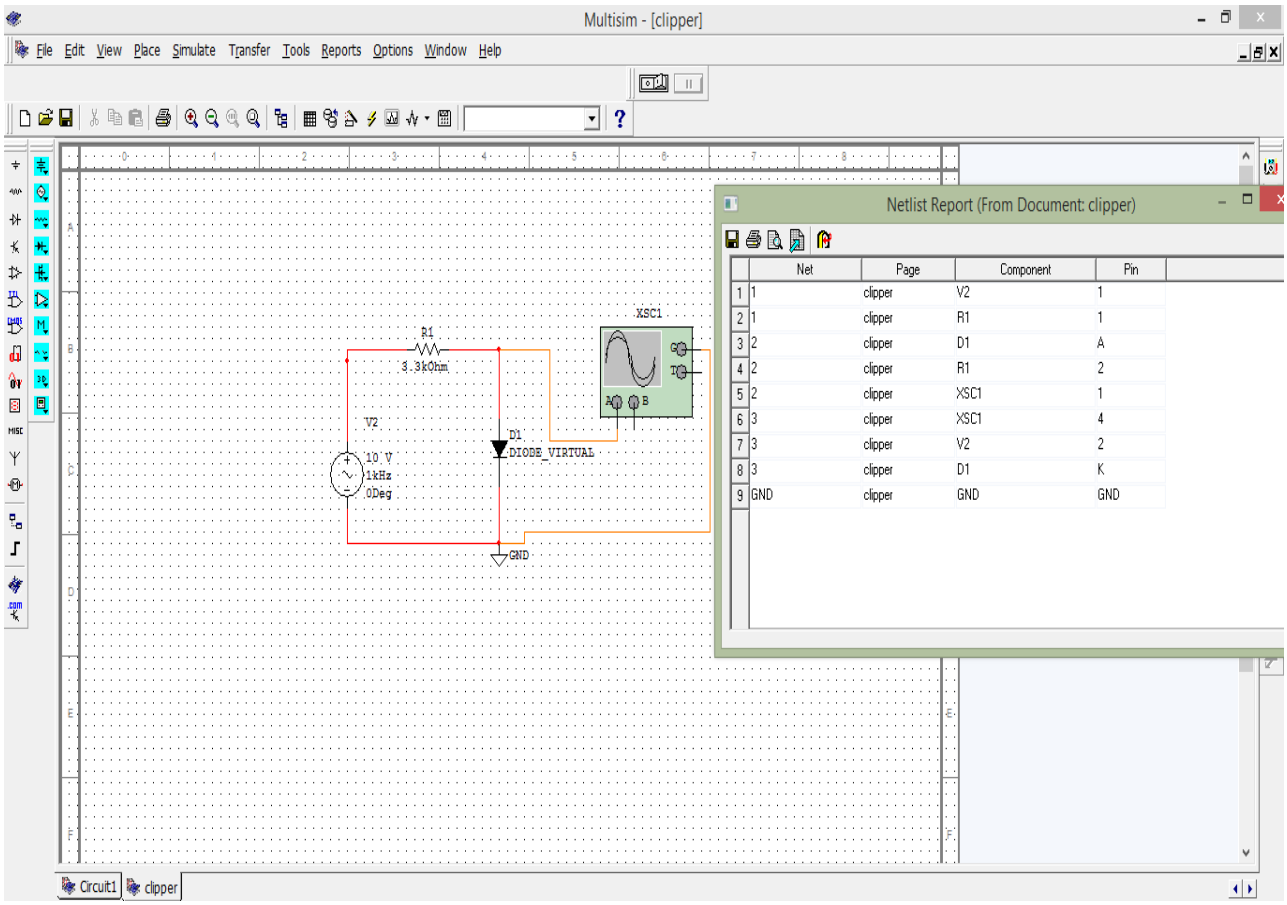


Fig 2.6: Netlist generation

Chapter 4

HARDWARE SETUP

The physical lab is equipped with relay, latch, bread board, active and passive electronic components, input and output devices. This entire setup is said to be smart bread board. The control signal generated from arduino selects the particular D-Latch through latch enable (LE) pin. The selected latch energizes the relay module connected to it.

4.1 Working procedure of smart bread board

The pin and node connection details in the netlist is given as an input to D-latch from the arduino . The output of D-latch is given as an input to a 8- relay module, which activates one specific relay among the eight relays. The 8-relay modules are interfaced with bread board. These relays establish connection between the particular pin of the component to a particular node. The required components are placed on the bread board. All the pins of the components are connected to all the nodes on the nodeline board. A PCB containing node lines can be used for interfacing with relay. The flow diagram of smart bread board is shown in the fig 2.7.

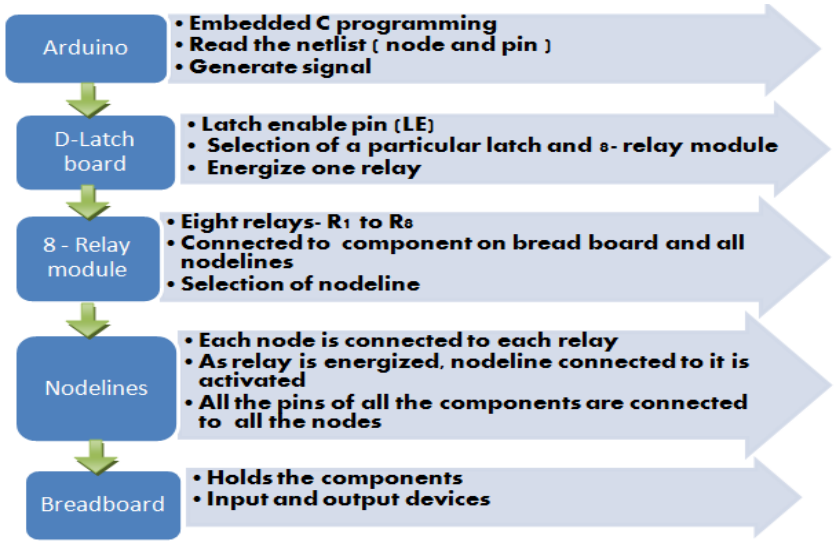


Fig 2.7 : Flow diagram of smart bread board

4.2 D-Latch

Latches are available as integrated circuits, usually with multiple latches per chip. SN74LS373N is a 20 pin DIP IC. The output Q follows the D input when latch enable LE is High. So, this latch is said to be transparent. The pin configuration of D-latch SN74LS373N is shown in the fig 2.8.

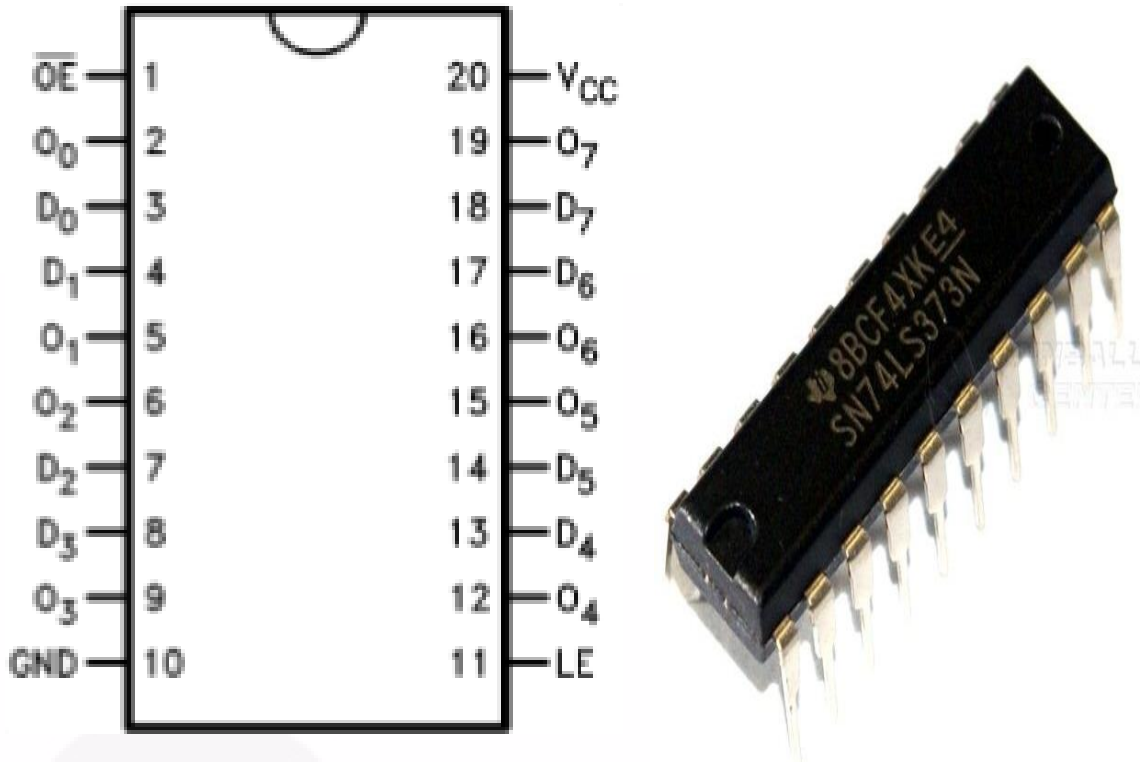


Fig 2.8 : D-latch SN74LS373N

Multiple D-latches are placed on the PCB. The input D1s of all the latches are shorted, similarly, D1-D7 of all the latches are shorted. The output O1s of all the latches are shorted. similarly, O1-O7 of all the latches are shorted. The latch operates at the voltage of 5 volts. There are six D-latches on the PCB, corresponding to six LE pins, eight data input pins and eight data output pins for each latch as shown in the fig 2.9.

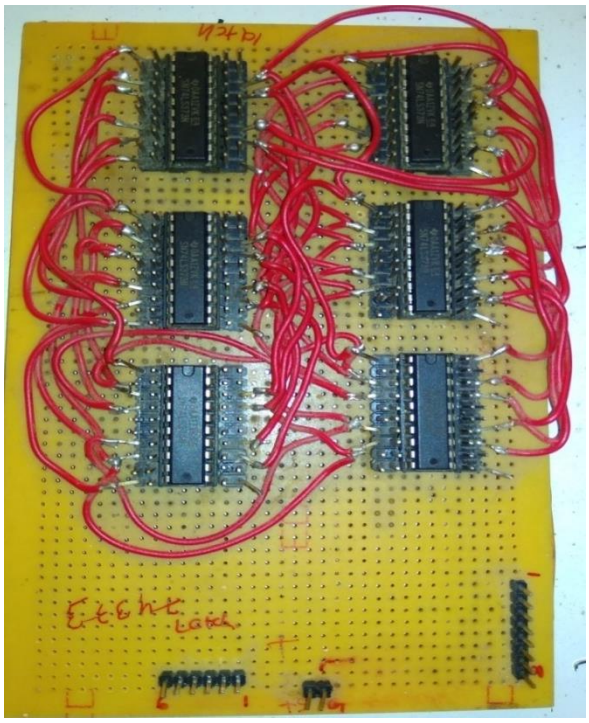


Fig 2.9 : D-latches on PCB

The control signal signal from the arduino for the selection of a D-latch is given at LE pins. The control signal data is shown in the fig 3.0.

Latch	Control signal to select latch
1	100000
2	010000
3	001000
4	000100
5	000010
6	000001

Fig 3.0 : Control signal to select latch

Once the latch is selected, an eight bit input is to be given to the latch because, this latch is connected to an eight relay module, which consists of eight relays. The input signal given to latch to energize the relay is shown in the fig 3.1. As it is D-latch, the input D given appears at output O.

Relay	Input to latch / output from latch
1	10000000
2	01000000
3	00100000
4	00010000
5	00001000
6	00000100
7	00000010
8	00000001

Fig 3.1 : Output signal of latch

4.3 Relay module

An 8-relay module consists of eight relays. There are such six relays in the smart bread board setup. The signal received from one side of the device controls the switching operation on the other side. So relay is a switch which controls (open and close) circuits electromechanically. The main operation of this device is to make or break contact with the help of a signal without any human involvement in order to switch it on or off. It is mainly used to control a high powered circuit using a low power signal. Generally a DC signal is used to control circuit which is driven by high voltage like controlling AC home appliances with DC signals from microcontrollers. A relay establishes the connection between the pin of a component to the node on the node line. The output of D-latch is given as an input to relay module. The input signal to

select the relay is shown in the fig 3.1. This energizes a relay. Every relay connects a pin of component to node. In this way, all the components are connected between the nodes and the entire circuit is built up. A bread board holds the components. All the components are connected to different relays as shown in the fig 3.2.

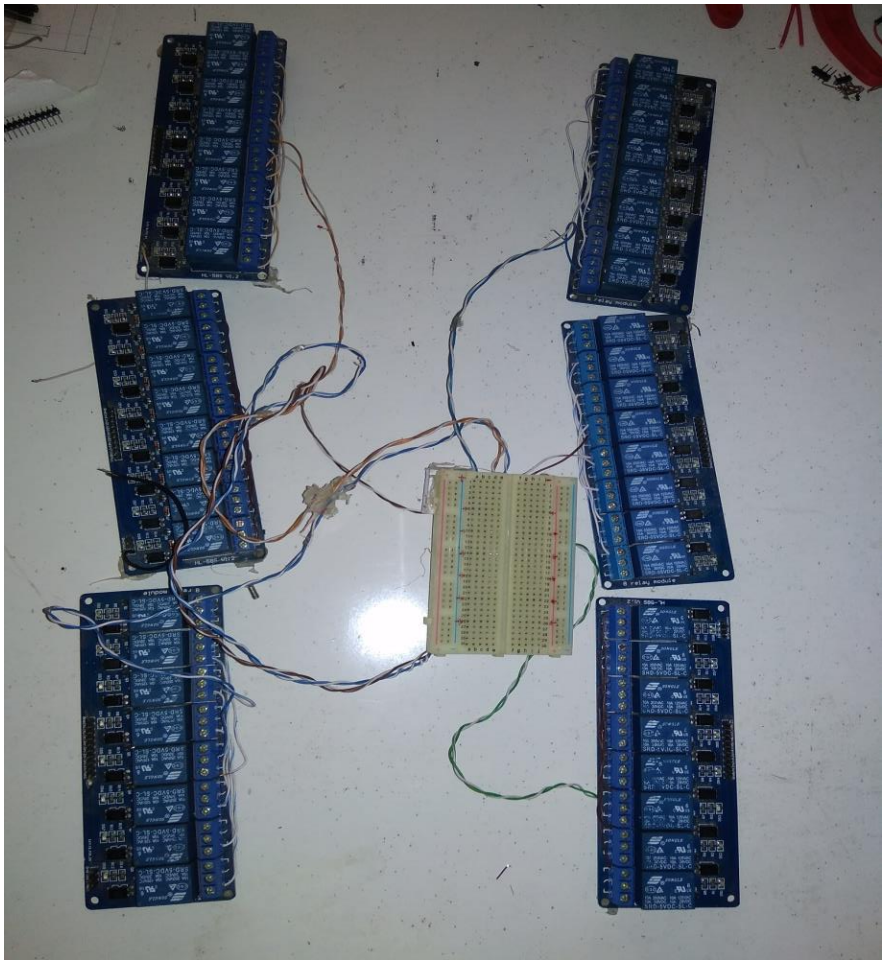


Fig 3.2 : Interfacing of relays to bread board.

Chapter 5

ADVANTAGES AND APPLICATIONS

- The virtual labs are considered to be the main support in electronic learning in the scientific & applied field.
- This is through using different electronic programs that simulate the experiments on computer by using different pictures and drawings, which express the experiment to be performed.
- Simplicity in making circuits as it saves time due to easy rig up in PC
- The virtual lab can be operated from the remote place
- Small scale R&D industries can use virtual lab to avoid time and cost
- The smart bread board can be used as rapid prototyping of circuits
- The smart bread board can be used as test rig for complex circuits with cost effective.
- The virtual lab can be used to analyze circuits for distance education.
- Virtual laboratories are popping up in schools and online learning curriculum across the country and making it easier and less expensive for students to do experiments remotely.
- The experiments, which are difficult to be performed in the traditional lab due to its danger and high cost can be performed with virtual lab.
- The virtual lab reduces the learning time spent in the traditional lab.
- Education in the virtual lab depends on varied resources & multimedia.

Chapter 6

CONCLUSION

The circuits that are to be tested for R&D purpose and educational purpose can be designed using multisim circuit drawing tool. A netlist is generated, which consists of connection details among the components. It contains information about the pins of components that are connected to specific nodes in the circuit. After the generation of netlist, the particular netlist is sent to the physical lab which contains PC, arduino, smart bread board setup. The PC is associated with physical lab. This PC receives netlist from the client. The received netlist is dumped to the Arduino board. Now, arduino reads the netlist through com port and processes it.

The physical lab is equipped with relay, latch, bread board, active and passive electronic components, input and output devices. This entire setup is said to be smart bread board. The control signal generated from arduino selects the particular D-Latch through latch enable (LE) pin. The selected latch energizes the relay module connected to it. Every relay connects a pin of component to node. In this way, all the components are connected between the nodes and the entire circuit is built up.

At the server end, the circuit is rigged up in a smart way without any human intervention and output is made visible to the client with the help of video conferencing. This feature of testing and analyzing the circuits virtually, from the remote place is said to be virtual electronics lab.

Chapter 7

REFLECTION NOTES

The virtual electronic lab project introduced the hint of virtual world where the experiments are performed remotely, that is by sitting in home itself, it is possible to perform the experiments. The project paved the way for learning Python, which is the hot cake for the current IT world.

The working with python is a great experience of understanding and analyzing the optimization of code length and simplicity in programming. The python library has an abundant collection of packages that comes with cluster of classes supporting a huge range of applications.

An API plays a vital role in any application development. It plays as an interface between the user and the software. GUI tools of python are very much helpful in developing an application programming interface. Learning and working with GUI tools such as creating an interface window and adding various attributes to make it user friendly enriched the practical knowledge on application development.

The strategy of segmentation of a majestic task into a number of countable modules led to work in an organized way. This approach helped to reach the goal step by step through consistent efforts. The methodology followed to perform the task is as follows:

- The understanding of requirements
- Analysis of resources
- The study on different approaches
- Selection of more suitable approach
- To learn and work on that method
- The estimation of obtained results
- Trial and error for betterment
- Choose the best and most approximate output.

The whole process helped to improve the interpersonal skills like time management. Each task is focused for a specific period of time, if the method being followed failed to satisfy the requirement then a quest for alternative method would begin and worked on. This gave an idea of doing the things in different way. Thus paved the way for enrichment of innovative skills.

The co-operation and co-ordination among the employees in the company taught the flow of team work and how to be a team worker. The other employee's suggestions and guidance towards the work on encountering difficulties definitely helped and enhanced the problem solving skills.

As a professional, it is very important to focus on the work and do justice to the work besides distractions, personal problems and other mental pressures of life. The work is not limited to workplace and within specified timings, but beyond that. The self interest has to be shown and soul and heart has to be put into the work in order to gain the good results and satisfaction that leads to real happiness.

The working with employees of the organization helped to be social and move out of comfort zone and communicate with different people. This communication led not only to know about people but also the various jobs, skill development courses and job oriented courses that could be taken up to grow as an independent and responsible individual after completing education in this society.

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