

GDCAD Great Developers CAD

Project Report

Synopsis
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1 Introduction To Organisation



Figure 1: Guru Nanak Dev Engineering College

I am having my Six Months Industrial Training at TCC-Testing And Consultancy Cell, GNDEC Ludhiana. Guru Nanak Dev Engineering College was established by the Nankana Sahib Education Trust Ludhiana. The Nankana Sahib Education Trust i.e NSET was founded in memory of the most sacred temple of Sri Nankana Sahib, birth place of Sri Guru Nanak Dev Ji. With the mission of Removal of Economic Backwardness through Technology Shiromani Gurudwara Parbandhak Committee i.e SGPC started a Poly technical was started in 1953 and Guru Nanak Dev Engineering College was established in 1956.

NSET resolved to uplift Rural areas by admitting 70of students from these rural areas ever year. This commitment was made to nation on 8th April, 1956, the day foundation stone of the college building was laid by Dr. Rajendra Prasad Ji, the First President of India. The College is now ISO 9001:2000 certified.

Guru Nanak Dev Engineering College campus is spread over 88 acres of prime land about 5 Km s from Bus Stand and 8 Km s from Ludhiana Railway Station on Ludhiana-Malerkotla Road. The college campus is well planned with beautifully laid out tree plantation, pathways, flowerbeds besides the well maintained sprawling lawns all around. It has beautiful building for College,Hostels,Swimming Pool,Sports and Gymnasium Hall Complex, Gurudwara Sahib, Bank, Dispensary, Post Office etc. There are two hostels for boys and one for girls with total accommodation of about 550 students. The main goal of this institute is:

- To build and promote teams of experts in the upcoming specialisations.
- To promote quality research and undertake research projects keeping in view their relevance to needs and requirements of technology in local industry.
- To achieve total financial independence.
- To start online transfer of knowledge in appropriate technology by means of establishing multipurpose resource centres.

1.1 Testing and Consutancy Cell

My Six Months Institutional Training was done by me at TCC i.e Testing And Consultancy Cell, GNDEC Ludhiana under the guidance of Dr. H.S.Rai Dean Testing and Consultancy Cell. Testing and Consultancy Cell was established in the year 1979 with a basic aim to produce quality service for technical problems at reasonable and affordable rates as a service to society in general and Engineering fraternity in particular.

Consultancy Services are being rendered by various Departments of the College to the industry,



Figure 2: Testing and Consultancy Cell

Sate Government Departments and Entrepreneurs and are extended in the form o5 expert advice in design, testing of materials & equipment, technical surveys, technical audit, calibration of instruments, preparation of technical feasibility reports etc. This consultancy cell of the college has given a new dimension to the development programmers of the College. Consultancy projects of over Rs. one crore are completed by the Consultancy cell during financial year 2009-10.

Ours is a pioneer institute providing Consultancy Services in the States of Punjab, Haryana, Himachal, J&K and Rajasthan. Various Major Clients of the Consultancy Cell are as under:

- Larson & Turbo.
- Multi National Companies like AFCON & PAULINGS.
- Power Grid Corporation of India.
- National Building Construction Co.
- Punjab State Electricity Board.
- Punjab Mandi Board.
- Punjab Police Housing Corporation.
- National Fertilizers Ltd.

2 Introduction



Figure 3: CAD

Computer-aided design (CAD) is the use of computer programs to create two- or three-dimensional (2D or 3D) graphical representations of physical objects. CAD software may be specialized for specific applications. CAD is widely used for computer animation and special effects in movies, advertising, and other applications where the graphic design itself is the finished product. CAD is also used to design physical products in a wide range of industries, where the software performs calculations for determining an optimum shape and size for a variety of product and industrial design applications.

Hundreds of thousands of professionals in (take a deep breath) architecture, construction, engineering, commercial interiors, light construction, landscape architecture, kitchen and bath design, urban planning, game design, film and stage, woodworking, and plenty of other fields use CAD softwares all the time, every day.

GDCAD is a such application that can tackle with 2-D and 3-D graphics. GDCAD is like a pencil with superpowers. Start by drawing lines and shapes. Push and pull surfaces to turn them into 3D forms. Stretch, copy, rotate and paint to make anything you like. GDCAD is as simple and as powerful as you want it to be.

GDCAD uses set of toolbuttons and menu options to capture the CAD functionality. It has various toolbuttons to capture the implementation of various entities such as line, circle, point, ellipse etc. It has a drawing area with in which the entities are painted. The click of any toolbutton such as point button or other captures and stores the mouse positions, such that along that points things get painted. Also the mouse movements in the drawing area are captured and shown in the status bar. We can repaint the same entity again without having the need to click that button again. The signal from the same button remains active until and unless another button is clicked. Along with toolbuttons the menu also has the options to provide the painting of things. The shortcuts for each action are also implemented.

GDCAD also provides with the functionality of zooming in and out with the mouse scroll and same is also provided in the menu options. It can also open, load and display an image with .jpg and .png format as sometimes the architectures and other need to have an idea by looking into the image. So no need to load it externally, GDCAD exhibits this feature. You can even select the entities or the area you want.

GDCAD is also designed to play nice with other software. So if you need to send your work to someone who needs a CAD file, you can use it to export pages as DWG and DXF files. It also exports multi-page PDFs also.

Every document you create has a physical paper size that you specify at the very beginning of your project. Because of this, all you need to do to print a plan view of your model at an exact scale is insert and set up a model viewport, and choose File then Print. Its literally a two minute process.

Also, this project is completely open source and is made using Qt as IDE, that uses the Qt libraries and the Qtwidgets with C++ and with OpenGL functionality, the entire code is available to the user as and when required. The project is governed by the GNU General Public License v3.0 i.e GNU-GPLv3.0.

Various tools used to develop the project are:

- Qt version 4.7 or higher
- C++

2.1 Limitations of Existing System

The existing system that we are referring is to is a 2D CAD application. It cannot render 3D graphics.

2.2 Design of Solution



Figure 4: Qt Logo

- Qt is a cross-platform application framework that is widely used for developing application software with a graphical user interface (GUI) (in which cases Qt is classified as a widget toolkit), and also used for developing non-GUI programs such as command-line tools and consoles for servers. Qt uses standard C++ but makes extensive use of a special code generator (called the Meta Object Compiler, or moc) together with several macros to enrich the language.

Qt can also be used in several other programming languages via language bindings. It runs on the major desktop platforms and some of the mobile platforms. It has extensive internationalization support. Non-GUI features include SQL database access, XML parsing, thread management, network support, and a unified cross-platform application programming interface (API) for file handling.

Qt is available under a commercial license, GPL v3 and LGPL v2. All editions support many compilers, including the GCC C++ compiler. Haavard Nord and Eirik Chambe-Eng (the original developers of Qt and the CEO and President, respectively, of Trolltech) began development of "Qt" in 1991, three years before the company was incorporated as Quasar Technologies, then changed the name to Troll Tech and then to Trolltech. The toolkit was called Qt because the letter Q looked appealing in Haavard's Emacs typeface, and "t" was inspired by Xt, the X toolkit.

The first two versions of Qt had only two flavors: Qt/X11 for Unix and Qt/Windows for Windows. The Windows platform was only available under a proprietary license, which meant free/open source applications written in Qt for X11 could not be ported to Windows without purchasing the proprietary edition.

Qt 5.2 provides several improvements, including a new Scene graph renderer that has much better performance for drawing vector objects by using an OpenGL backend and minimizing GPU overdraws. Benchmarks of development versions shows significant improvements in speed and a visible decrease in CPU usage, because of the better usage of GPU rendering. The vision is to have game-like performance for the drawing canvas and QML renderer.

- QtWidgets is a library of C++ -based UI controls that provide native look-and-feel on all desktop platforms and are normally used for creating large-scale desktop user interfaces. With our Qt Creator IDE drag-and-drop UI tool, Qt Designer, your UI layout is easily created. All the platform-level details have been taken care of for you along with easy-to-use controls, dynamic layout managers and native dialogs. You can completely customize, easily extend and style Qt widgets into all kinds of desired look-and-feels. Also, if your application needs to manage large amounts of data, mechanisms are already in place to facilitate your data-driven application. The Qt Widgets Module provides a set of UI elements to create classic desktop-style user interfaces. Widgets are the primary elements for creating user interfaces in Qt. Widgets can display data and status information, receive user input, and provide a container for other widgets that should be grouped together. A widget that is not embedded in a parent widget is called a window.

The QWidget class provides the basic capability to render to the screen, and to handle user input events. All UI elements that Qt provides are either subclasses of QWidget, or are used in connection with a QWidget subclass. Creating custom widgets is done by subclassing QWidget or a suitable subclass and reimplementing the virtual event handlers.

- C++ is a general purpose programming language. It has imperative, object-oriented and generic programming features, while also providing the facilities for low level memory manipulation. It is designed with a bias for systems programming (e.g. embedded systems, operating system kernels), with performance, efficiency and flexibility of use as its design requirements. C++ has also been found useful in many other contexts, including desktop applications, servers (e.g. e-commerce, web search, SQL), performance critical applications

(e.g. telephone switches, space probes) and entertainment software, such as video games.

It is a compiled language, with implementations of it available on many platforms. Various organizations provide them, including the FSF, LLVM, Microsoft and Intel. C++ supports memory management. Static storage duration objects are created before `main()` is entered and destroyed in reverse order of creation after `main()` exits. The exact order of creation is not specified by the standard (though there are some rules defined below) to allow implementations some freedom in how to organize their implementation.

3 Problem Formulation

As defined earlier, we are trying to improve and enhance the functionalities of the existing CAD software such as LibreCAD as it does not provide the support for the 3D views. It does not even allow rendering of the objects.

3.1 Scope and Objectives

- To provide the support for 3D graphics.
- To allow rendering of the objects.
- To implement the DXF library for importing them into .dxf file.
- To embed it in GDCAD to allow to have analysis.

4 Project Work

4.1 Feasibility Study

- **Technical Feasibility** As this whole project is based on Qt and C++ as programming language, technical feasibility of this project revolves around the technical boundaries and limitations of the Qt and C++. These languages are perfect to design the software under this project.
- **Economic Feasibility** Almost all the softwares used in this project are Open source and the software released under this project are Open source too and are released under GNU GPLv3 (General Public Licence). So this project is fully economic feasible.
- **Operational Feasibility** This project is also operationalally feasible which not only saves time but also saves money as mast the work done by this software.

4.2 System Design

Based on the user requirements and the detailed analysis of a new system, the new system must be designed. This is the phase of system designing normally, the design proceeds in two stages:-

- Preliminary or general design.
- Structure or detailed design.

Preliminary or general design

In the preliminary or general design, the features of the new system are specified.

Structure or Detailed design

In the detailed design stage, computer oriented work begins in earnest. Input, output and processing specifications are drawn up in detail.

There are several tools and techniques used for designing

- Data flow diagram (DFDs).
- ER Diagram.

Design is the first step into the development phase for any engineered product or system. Design is a creative process. A good design is the key to effective system. The term "design" is defined as "the process of applying various techniques and principles for the purpose of defining a process or a system in sufficient detail to permit its physical realization". It may be defined as a process of applying various techniques and principles for the purpose of defining a device, a process or a system in sufficient detail to permit its physical realization. Software design is the technical kernel of the software engineering process and is applied regardless of the development paradigm that is used. The system design develops the architectural detail required to build a system or product. As in the case of any systematic approach, this software too has undergone the best possible design phase fine tuning all efficiency, performance and accuracy levels.

5 Methodology/Planning of Working

- Researching the needs of the students and organisations and finding out the facilities required to develop project.
- Documenting the needs and then preparing the layout for the project, and deciding the various modules to be included in the software.
- DFDs will be prepared showing various interactions between users and the system.
- Selecting the technology for developing the project and installing the required tools for developing the project. We will install Qt-IDE and C++ compiler.
- Developing the UI(frontend) The interface through which user can interact will be developed.
- Developing the kernel(backend) It can said as database for GDCAD where the storage is done.
- Testing the system by running it

6 Facilities for Proposed Work

6.1 Software Requirements

- Operating System: Linux/Windows
- IDE: Qt version 4.7 or higher
- Programming Language:C++

6.2 Hardware Requirements

Hardware requirement of this project is any Desktop or Laptop machine for local use or a Server with minimum available configuration to make Project globally available. Hardware specifications of the machine used depends upon the hardware requirements of the Operating System installed on it. As such there are no special hardware requirements of this project.

7 Bibliography

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