CHAPTER -3

REQUIREMENTS

3.1 Platform requirement

3.1.1 Supportive operating systems

The supported Operating Systems for client include: Windows 2010, windows 2008, windows 2007. This project will follow the given responsibilities:

- Completing the tasks within the deadlines.
- Informing our internal and external guides regularly about students' performance.
- Maintaining the logbook.
- Implementing of project on well planned manner.
- Dividing the tasks among project equally.

3.2 Software requirement

The Software Requirements includes:

- Python
- Open CV framework
- SQLite server
- CSV file

Open CV (Open Source Computer Vision Library) is an open source computer vision and machine learning software library.

Open CV was built to provide a common infrastructure for computer vision applications. Being a BSD-licensed product, Open CV makes easy for businesses to utilize and modify the code.

Machine learning algorithms can be used to detect and recognize faces, identify objects, classify human actions in videos, track camera movements, track moving objects, extract 3D models of objects, produce 3D point clouds from stereo cameras, stitch together to produce a high resolution image of an entire scene.

Find similar images from an image database, removed eyes from images taken using flash, follow eye movements, recognize scenery and establish markers to overlay it with augmented reality, etc.

Open CV has more than 47 thousand people of user community and estimated number of downloads exceeding 7 million. The library is used extensively in companies, research groups and by governmental bodies. As an asynchronous event driven framework.

3.2.1 SQLite in python

SQLite is a software library that implements a self-contained, server less, zero-configuration, transactional SQL database engine. SQLite is the most widely deployed SQL database engine in the world. The source code for SQLite is in the public domain.

Install SQLite on Windows

Step 1: From SQLite download page, download precompiled binaries from Windows section.

Step 2: Download sqlite-shell-win32-*.zip and sqlite-dll-win32-*.zip .

Step 3: Create a folder C:\>sqlite and unzip above two zipped files in this folder, which will give you sqlite3.def, sqlite3.dll and sqlite3.exe files.

Step 4: Add C:\>sqlite in specific PATH environment variable and finally go to the command prompt and issue sqlite3 command.

3.2.1.1 Database requirement SQLite server

SQLite Server

Microsoft SQLite Server is a relational database management system developed by Microsoft. As a database server, it is a software product with the primary function of storing and retrieving data as requested by other software applications which may run either on the same computer or on another computer across a network (including the Internet).

Microsoft markets at least a dozen different editions of Microsoft SQLite Server, aimed at different audiences and for workloads ranging from small single machine applications to large Internet facing applications with many concurrent users.

The history of Microsoft SQLite Server begins with the first Microsoft SQLite Server product SQLite Server 1.0, a 16-bit server for the OS/2 operating system in 1989 and extends to the current day.

3.2.2 Python

Python is a general-purpose interpreted, interactive, object- oriented, and high-level programming language. It was created by Guido van Rossum during 1985- 1990. Like Perl, Python source code is also available under the GNU General Public License (GPL).

Python's syntax and dynamic typing with its interpreted nature, makes it an ideal language for scripting and rapid application development. Python supports multiple programming pattern, including the object oriented, imperative and functional or procedural programming styles. Python is not intended to work on special area such as web programming. That is why it is known as multipurpose because it can be used with web, enterprise, 3D CAD etc.

Python makes the development and debugging fast because there is no compilation step included in python development and edit-test-debug cycle is very fast.

3.2.2.1 Python GUI – tkinter

Python offers multiple options for developing GUI (Graphical User Interface). Out of all the GUI methods, tkinter is most commonly used method. It is a standard Python interface to the Tk GUI toolkit shipped with Python. Python with tkinter outputs the fastest and easiest way to create the GUI applications. Creating a GUI using tkinter is an easy task.

- Importing the module – tkinter
- Create the main window (container)
- Add any number of widgets to the main window
- Apply the event Trigger on the widgets.

Importing tkinter is same as importing any other module in the python code. Note that the name of the module in Python 2.x is 'Tkinter' and in Python 3.x is 'tkinter'.

3.2.3 Comma-separated values (CSV file)

In computing, a comma-separated values file is a delimited text file that uses a comma to separate values. A CSV file stores tabular data in plain text. Each line of the file is a data record. Each record consists of one or more fields, separated by commas.

CSV is a simple file format used to store tabular data, such as a spreadsheet or database. Files in the CSV format can be imported to and exported from programs that store data in tables, such as Microsoft Excel or Open Office Calc. CSV stands for "comma-separated values".

A CSV file can be opened in any program, however, for most users, a CSV file is best viewed through a spread sheet program such as Microsoft Excel, Open Office Calc or Google Docs.

3.3 Hardware requirement

The most common set of requirements defined by any operating system or software application is the physical computer resources, also known as hardware.

A hardware requirements list is often accompanied by a hardware compatibility list (HCL), especially in case of operating systems. Table 3.1 Hardware Requirement list the complete requirement of the project.

Components	**Minimum**	**Recommended**
Processor	Intel Core i3-2100 2nd Generation	Intel Core i7 5th generation
RAM	4GB	8GB
Camera	HD 720p Webcam	Full HD 1080p Webcam
Disk	128 GB	512 GB

Table 3.1 Hardware Requirement

3.3.1 Webcam

A webcam short for a web camera is a digital camera that is connected to a computer. It can send live pictures from where ever it is sited to another location by means of the internet. May desktop computer screens and laptops come with a built in camera and microphone, There are various types. Some are plugged into computers through USB ports, but others are wireless (Wi-Fi).

Figure 3.2 Webcam

It’s important to realize that there are hundreds of different types and brands of web cams and they all have slightly different installation instructions. Figure 3.2 shows the webcam structure.

Instructions to install a webcam

Step 1: Webcams come in all shapes and sizes, and vary from basic models to more complicated ones that come with extra gadgets such as motion detectors. Prices vary a lot, too. Make sure that the camera has a built-in microphone if in case of requirement to use webcam for chatting to friends and relatives.

Step 2: Complete installation of webcam. The webcam should come with a USB cable that will connect it to computer.

Step 3: The webcam package includes a CD containing important software. Insert this into computer CD drive. The set-up program should run on the CD.

Step 4: Install the drivers that allow computer to communicate with the webcam. It may be important to plug in the webcam in a certain order with other cables and equipment, so only plug it in when prompted to do so.

Step 5: Attach the camera securely to the top of laptop screen pointing at frontal face. Adjust it so that face can be detected.

Step 6: After completing the set-up, double- click on webcam program will open up.

3.4 Technology used

3.4.1 Internet of Things

The Internet of things is the network of devices such as vehicles, and home appliances that contain electronics, software, sensors, actuators, and connectivity which allows these things to connect, interact and exchange data.

Need to use IoT

When something is connected to the internet, that means that it can send information or receive information, or both. This ability to send and/or receive information makes things smart, and smart is good.

For eg. with use of IoT, songs can be played through internet.

Eg, Google Music

In the Internet of Things, all the things that are being connected to the internet can be put into three categories:

1. Things that collect information and then send it.
2. Things that receive information and then act on it.
3. Things that do both.

3.4.1.1 Collecting and sending information

In this project information collection starting from webcam to remote system

- A digital or analog camera (black-and-white or color) with suitable optics for acquiring images
- Camera interface for digitizing images (widely known as a frame grabber)
- A digital signal processor (DSP), often a PC or embedded processor. (Often all of the above are combined within a single device, sometimes called a smart camera).
- Suitable light source(s) (ambient light, LED illuminators, fluorescent or halogen lamps etc.)
- Input/Output hardware or communication links (e.g. firewire, network connection or RS-232)
- Camera will capture the image of the student and send the image to the system to process the recognition of student.

3.4.1.2 Receiving and acting on information

Administrator system will process the images, which are collected from the camera through the Internet.

3.4.1.3 Doing both

Administrator system act both of the above techniques for capturing student image (Receiving information) also to process the image of the student. And information of attendance is sent to the corresponding student or professor (Sending information).