

News Bulletin using Smart TV and Raspberry pi

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ABSTRACT: Notice board is the common platform intended for the posting of various notice for example, to announce events provide information advertisement etc. In earlier days, corkboards as well as writing surfaces such as blackboards or whiteboards were used as notice boards.

In the modern world, were transformational power of digitalization is very clear maintaining such conventional methods of notice board are a difficult process.

Hence we put forward a digital news bulletin. This method enables a smart TV to be mounted to the wall at greater height than traditional notice board. The basic idea involved in development of this project is to take the digital news bulletin further by an android television and notices in form of images audios and videos and pdf along with some flash news in place of traditional rolling display.

This project consists of a server pc and a client both connected to the same network. LAN server is created at server end and uploaded contents are moved to LAN server using commands and are displayed at the client's end using webpages stored at the server using server's IP address.

CHAPTER 1

Introduction

Human have been constantly innovating since the dawn to make their lives easier and work efficiently. Over the last few decades wireless communication has changed human's live in unimaginable ways by enabling human to be able to communicate with other human as well as device. In modern world, a man can control cameras and change their view angles by click of a button on their cell phone using wireless network. Still there are many unexplored area is smart noticeboard system that can be programmed using a web-interface to display message, pdf and photo as well change them as needed with case. Messages to the noticeboard can also be sent using an user interface.

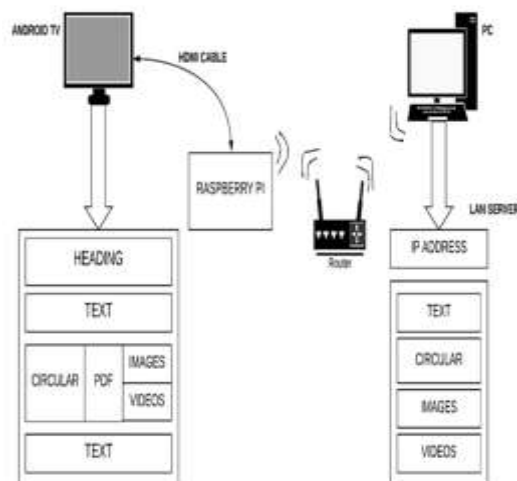
Existing news bulletin system consist of a smart TV that should be present in client side and programmed extensively. And thesesystem that can handle the interfaces and display the information in useful way on a noticeboard. Our approach is that it can handle by using the GUI and data will stored in the database using Xampp server. The information on smart TV can easy accessed on any phone or pc it should be connected to same network.

As our system is simple it can replace all non-digital systems in the public place, college notice board with low cost. Also, it will eliminate large labor force needed to maintain these noticeboards to replace a notice. These cost saving could help alleviate the initial system upgrade and installation fees and could result in long term cost saving for organizations.

Latest news about the organization or an institution can be uploaded using the interface created and the uploaded content is viewed on a webpage created and stored at the server using server's IP address at the client's end using raspberry pi connected to smart tv.

1.1 Block Diagram

Figure 1.1 Block Diagram



CHAPTER 2

HARDWARE REQUIREMENTS

2.1 Raspberry pi 3

The Raspberry Pi is a series of small single-board computers developed in the United Kingdom by the Raspberry Pi Foundation to promote teaching of basic computer science in schools and in developing countries. The original model became far more popular than anticipated, selling outside its target market for uses such as robotics. It now is widely used even in research projects, such as for weather monitoring, because of its low-cost and portability. It does not include peripherals (such as keyboards and mice) or cases. However, some accessories have been included in several official and unofficial bundles.

The organisation behind the Raspberry Pi consists of two arms. The first two models were developed by the Raspberry Pi Foundation. After the Pi Model B was released, the Foundation set up Raspberry Pi Trading, with Eben Upton as CEO, to develop the third model, the B+. Raspberry Pi Trading is responsible for developing the technology while the Foundation is an educational charity to promote the teaching of basic computer science in schools and in developing countries.



Figure 2.1 Raspberry pi 3

2.2 HDMI cable

HDMI (High-Definition Multimedia Interface) is a proprietary audio/video interface for transmitting uncompressed video data and compressed or uncompressed digital audio data from an HDMI-compliant source device, such as a display controller, to a compatible computer monitor, video projector, digital television, or digital audio device. HDMI is a digital replacement for analog video standards.

HDMI implements the EIA/CEA-861 standards, which define video formats and waveforms, transport of compressed and uncompressed LPCM

audio, auxiliary data, and implementations of the VESA EDID. CEA-861 signals carried by HDMI are electrically compatible with the CEA-861 signals used by the Digital Visual Interface (DVI). No signal conversion is necessary, nor is there a loss of video quality when a DVI-to-HDMI adapter is used. The CEC (Consumer Electronics Control) capability allows HDMI devices to control each other when necessary and allows the user to operate multiple devices with one handheld remote-control device.



Figure 2.2 HDMI Cable

2.3 SD card

A memory card or memory cartridge is an electronic data storage device used for storing digital information, typically using flash memory. These are commonly used in portable electronic devices, such as digital cameras, mobile phones, computers, tablets, PDAs, portable media players, video game consoles, synthesizers, electronic keyboards and digital pianos. Secure Digital, officially abbreviated as SD, is a proprietary non-volatile memory card format developed by the SD Card Association (SDA) for use in portable devices.



Figure 2.3 SD card

2.4 Smart TV

A Smart TV, also known as a connected TV (CTV), is a traditional television set with integrated Internet and interactive Web 2.0 features

which allows users to stream music and videos, browse the internet, and view photos. Smart TV is a technological convergence of computers, television sets and set-top boxes. Besides the traditional functions of television sets and set-top boxes provided through traditional broadcasting media, these devices can also provide Internet TV, online interactive media, over-the-top content (OTT), as well as on-demand streaming media, and home networking access. In smart TVs, the operating system is preloaded or is available through the set-top box. The software applications or "apps" can be preloaded into the device, or updated or installed on demand via an app store.



Figure 2.4 Smart TV

CHAPTER 3

Software Requirements

3.1 LTspice

LTspice is freeware computer software implementing a SPICE electronic circuit simulator, produced by semiconductor manufacturer Linear Technology, now part of Analog Devices. It is used in-house at Linear Technology for IC design, and the most widely distributed and used SPICE program in the industry.

We will use LTspiceXVII in the software lab for the Accelerator Power Electronics course. We have slightly modified the standard installation in order to include some parts that are not in the standard distribution. These instructions detail how to both install the standard distribution and how to modify it to include our additions.

3.1.1 Installation

The software is maintained by Linear Technology, Inc., and the software can be freely downloaded <http://www.linear.com/designtools/software/>

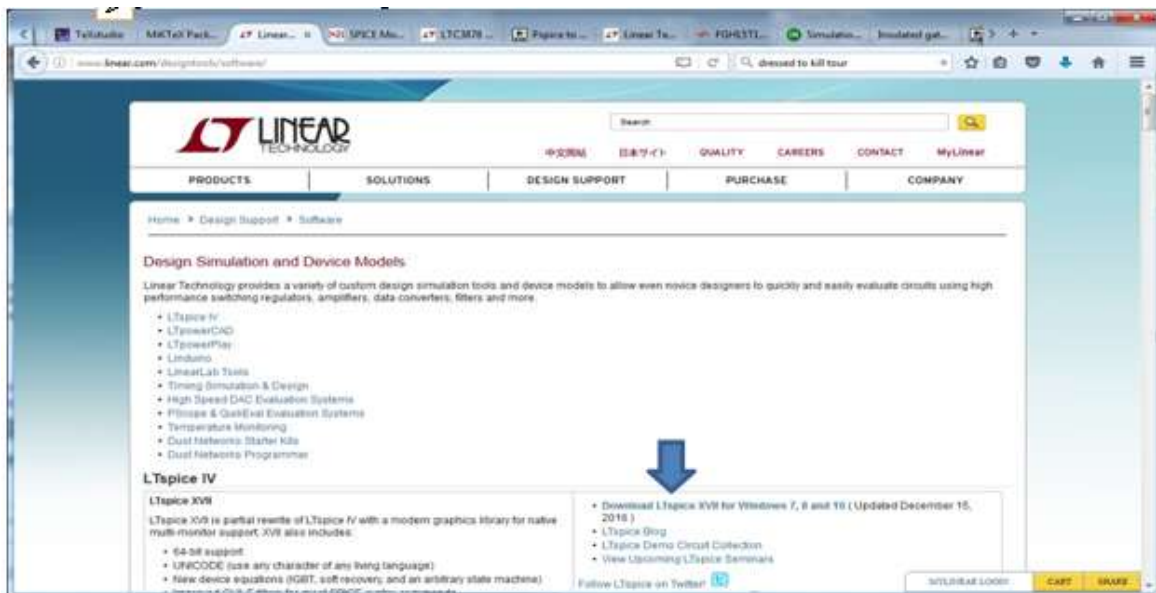


Figure 3.1 Installation of LTspice

Select Download LTspice XVII for Windows 7, 8 and 10. (You do not need to register for a MyLinear account. You can refuse this offer and just download the software.) You will be prompted to save the executable file LTspiceXVII.exe from <http://ltspice.linear-tech.com>. After the file is downloaded, select it to

run the installation program, agreeing to the standard Microsoft query about installing a file downloaded from the internet. (You may need administrative privileges to install the program.)

The Installation Directory

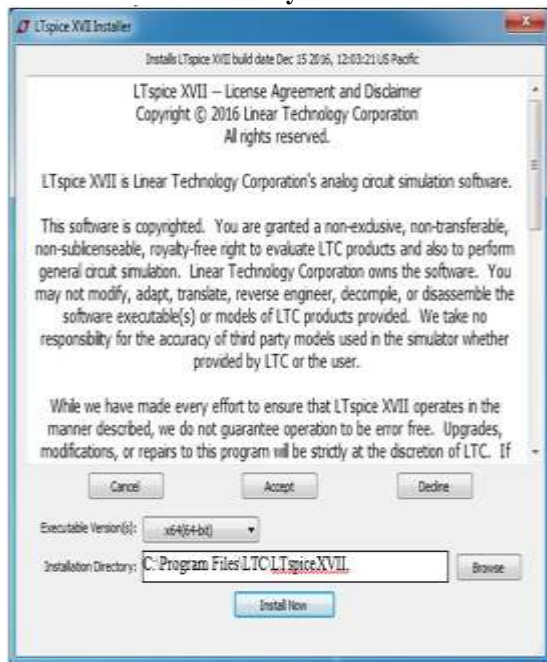


Figure 3.2 Installation directory

Maintain the default installation directory C:\Program Files\LTC\LTspiceXVII, accept the license agreement, and then Install Now

3.2 Pycharm community edition

PyCharm is an integrated development environment used in computer programming, specifically for the Python language. It is developed by the Czech company JetBrains.

3.2.1 Installation PyCharm

PyCharm is a cross-platform IDE that provides consistent experience on the Windows, macOS, and Linux operating systems. PyCharm is available in three editions: Professional, Community, and Edu. The Community and Edu editions are open-source projects and they are free, but they have less features. PyCharm Edu provides courses and helps you learn programming with Python. The Professional edition is commercial, and provides an outstanding set of tools and features. For details, see the [editions comparison matrix](#).

System requirements

Requirement	Minimum	Recommended
RAM	4 GB of free RAM	8 GB of total system RAM
Disk space	2.5 GB and another 1 GB for caches	SSD drive with at least 5 GB of free space
Monitor resolution	1024x768	1920x1080
Operating system	Officially released 64-bit versions of the following: <ul style="list-style-type: none"> Microsoft Windows 7 SP1 or later 	Latest 64-bit version of Windows, macOS, or Linux (for example, Debian, Ubuntu, or RHEL)

You do not need to install Java to run PyCharm, because JetBrains Runtime is bundled with the IDE (based on JRE 11).

- **Python 2:** version 2.7
- **Python 3:** from the version 3.5 up to the version.

Installation

1. Download the installer.exe.

To verify the integrity of the installer, use the SHA checksum linked from the [download page](#).

2. Run the installer and follow the wizard steps.

Mind the following options in the installation wizard

- 64-bit launcher: Adds a launching icon to the Desktop.
- Open Folder as Project: Adds an option to the folder context menu that will allow opening the selected directory as a PyCharm project.

- .py: Establishes an association with Python files to open them in PyCharm.
- Add launchers dir to the PATH: Allows running this PyCharm instance from the Console without specifying the path to it.

When you run PyCharm for the first time, or after you have upgraded it from a previous version, some steps are required to complete the installation, customize your instance and start working with the IDE.

3.3 Python 3.8

Python is an interpreted, high-level, general-purpose programming language. Created by Guido van Rossum and first released in 1991, Python's design philosophy emphasizes code readability with its notable use of significant whitespace. Its language constructs and object-oriented approach aim to help programmers write

clear, logical code for small and large-scale projects.

Python is dynamically typed and garbage-collected. It supports multiple programming paradigms, including structured (particularly, procedural,) object-oriented, and functional programming. Python is often described as a "batteries included" language due to its comprehensive standard library.

3.3.1 Tkinter module

The Tkinter module ("Tk interface") is the standard Python interface to the Tk GUI toolkit. Both Tk and Tkinter are available on most Unix platforms, as well as on Windows systems. Tkinter (Tk) is a Python default GUI and comes with the Python

installation on Linux, Mac, and Windows. Since Tk comes with most Python installations.

3.3.2 PyInstaller module

PyInstaller bundles a Python application and all its dependencies into a single package. The user can run the packaged app without installing a Python interpreter or any modules.

PyInstaller reads a Python script written by you. It analyzes your code to discover every other to execute. Then it collects copies of all those files including the active Python interpreter and puts them with your script in a single folder, or optionally in a single executable file.

pyInstaller is installed using the following command – **pip install pyInstaller**

```
C:\Users\winay s>pip install pyInstaller
Processing c:\users\winay s\appdata\local\pip\cache\wheels\62\fe\62\4c0f196d1e0dd689e097449bc81d7d585a7de7dd86b081b80b\p
yinstaller-3.6-cp38-none-any.whl
Requirement already satisfied: pefile>=2017.8.1 in c:\users\winay s\appdata\local\programs\python\python38\lib\site-pack
ages (from pyInstaller) (2019.4.18)
Requirement already satisfied: setuptools in c:\users\winay s\appdata\local\programs\python\python38\lib\site-packages (
from pyInstaller) (41.2.0)
Requirement already satisfied: pywin32-ctypes>=0.2.0 in c:\users\winay s\appdata\local\programs\python\python38\lib\site
-packages (from pyInstaller) (0.2.0)
Requirement already satisfied: altgraph in c:\users\winay s\appdata\local\programs\python\python38\lib\site-packages (fr
om pyInstaller) (0.17)
Requirement already satisfied: future in c:\users\winay s\appdata\local\programs\python\python38\lib\site-packages (from
pefile>=2017.8.1->pyInstaller) (0.18.2)
Installing collected packages: pyInstaller
Successfully installed pyInstaller-3.6
```

Figure 3.3 Installing pyInstaller

3.3.3 Pillow module

Python Imaging Library is a free library for the Python programming language that adds support for opening, manipulating, and saving

many different image file formats. It is available for Windows, Mac OS X and Linux.

Pillow can be installed using the command – **pip install Pillow**

```
~/G/p/section8 $ sudo pip install Pillow
Password:
The directory '/Users/williamfiset/Library/Caches/pip/http' or its parent direct
ory is not owned by the current user and the cache has been disabled. Please che
ck the permissions and owner of that directory. If executing pip with sudo, you
may want sudo's -H flag.
The directory '/Users/williamfiset/Library/Caches/pip' or its parent directory i
s not owned by the current user and caching wheels has been disabled. check the
permissions and owner of that directory. If executing pip with sudo, you may wa
nt sudo's -H flag.
Collecting Pillow
  Downloading Pillow-3.2.0-cp35-cp35m-macosx_10_6_intel.macosx_10_9_intel.macosx
_10_9_x86_64.macosx_10_10_intel.macosx_10_10_x86_64.whl (3.0MB)
    100% |#####| 3.0MB 387kB/s
Installing collected packages: Pillow
Successfully installed Pillow-3.2.0
~/G/p/section8 $ pip list
```

Figure 3.4 Installing Pillow

3.4 HTML

Hypertext Markup Language (HTML) is the standard markup language for documents designed to be displayed in a web browser. It can be assisted by technologies such as Cascading Style Sheets (CSS) and scripting languages such as JavaScript.

Web browsers receive HTML documents from a web server or from local storage and render the documents into multimedia web pages. HTML describes the structure of a web page semantically and originally included cues for the appearance of the document.

3.5 PHP

PHP is a popular general-purpose scripting language that is especially suited to web development

PHP code is usually processed on a web server by a PHP interpreter implemented as a module, a daemon or as a Common Gateway Interface (CGI) executable. On a web server, the result of the interpreted and executed PHP code – which may be any type of data, such as generated HTML or binary image data – would form the whole or part of a HTTP response.

3.6 SQLite 3

SQLite is a relational database management system contained in a C library. In contrast to many other database management systems, SQLite is not a client–server database engine. Rather, it is embedded into the end program. SQLite is a popular choice as embedded database software for local/client storage in application software such as web browsers. It is arguably the most widely deployed database engine, as it is used today by several widespread browsers, operating systems, and embedded systems

3.7 CSS

Cascading Style Sheets (CSS) is a style sheet language used for describing the presentation of a document written in a markup language like HTML. CSS is a cornerstone technology of the World Wide Web, alongside HTML and JavaScript.

CSS is designed to enable the separation of presentation and content, including layout, colors, and fonts.

3.8 Bootstrap

Bootstrap is a free and open-source CSS framework directed at responsive, mobile-first front-end web development. It contains CSS- and

(optionally) JavaScript-based design templates for typography, forms, buttons, navigation, and other interface components

3.8.1 Features

- Bootstrap is a web framework that focuses on simplifying the development of informative web pages (as opposed to web apps). The primary purpose of adding it to a web project is to apply Bootstrap's choices of color, size, font and layout to that project. As such, the primary factor is whether the developers in charge find those choices to their liking. Once added to a project, Bootstrap provides basic style definitions for all HTML elements. The result is a uniform appearance for prose, tables and form elements across web browsers.
- In addition, developers can take advantage of CSS classes defined in Bootstrap to further customize the appearance of their contents. For example, Bootstrap has provisioned for light- and dark-colored tables, page headings, more prominent pull quotes, and text with a highlight.
- Bootstrap also comes with several JavaScript components in the form of jQuery plugins. They provide additional user interface elements such as dialog boxes, tooltips, and carousels. Each Bootstrap component consists of an HTML structure, CSS declarations, and in some cases accompanying JavaScript code. They also extend the functionality of some existing interface elements, including for example an auto-complete function for input fields.

CHAPTER 4

SOFTWARE IMPLEMENTATION

Graphical user interface to upload latest news is implemented using Python and sqlite3 database. Xampp apache server is used to connect to the client using server IP-address and notice and circular are displayed at client's end using webpage created using HTML, PHP and sqlite3 database.

4.1 Server side implementation

4.1.1 Graphical user interface:

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

To create a tkinter app:

- 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.

Graphical user interface created using Python consists of a home screen having option to login which is redirected to the login page which is integrated a database containing user details. This provides security as no one can add fake news related to an organisation. The detailed flow of the interface is as shown below

Flow diagram for graphical user interface [GUI] :

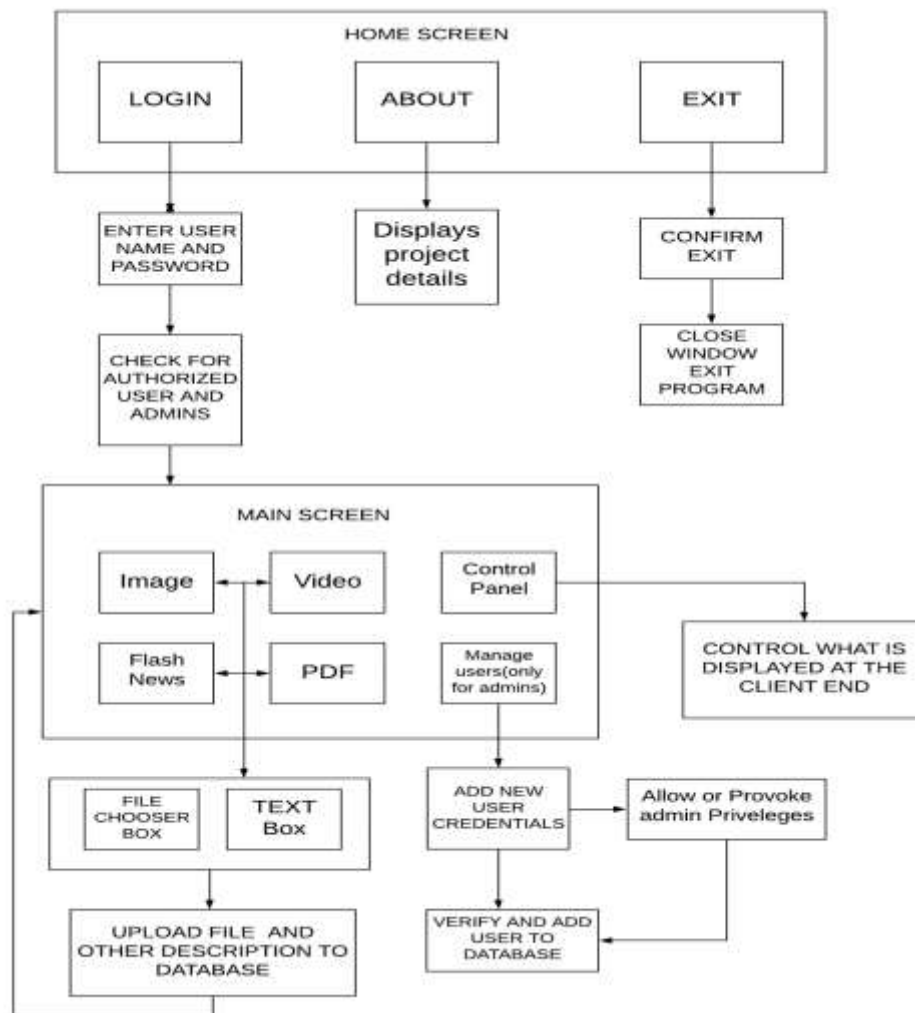


Figure 4.1 Flow diagram of GUI

Working of User interface:

- The user interface consists of homepage in where registered users can login to upload latest news about the institution
- Admins are present and only admins can add new members and revoke admin rights of other admins except a default account which is created at the beginning. This provides additional security to the project
- The main screen consists of option to add images, videos, Circular, and some flash news
- Content uploading screen has a file chooser option to select files and the name of the selected file and the contents are displayed automatically, the user can add description to respective content and the description is also shown at the client’s end
- Once user submits the image and the respective description is uploaded to the database and image is moved to the LAN server using python commands.

- Control Panel is used to navigate to different webpages which contain images, videos, and altogether.
- An admin can add user by adding a username and a password, all the username must be unique or there will be an error and password should not be blank.
- Once the user is added to database, the user can login with the registered credentials
- If the entered credentials at the login screen are wrong then an error is displayed

4.1.3 Converting Python file to windows executable

Python files can be converted to windows executable using Pyinstaller, python module

PyInstaller runs in Windows XP or newer. It can create graphical windowed apps (apps that do not need a command window). Pyinstaller is installed using the command- **pip install pyinstaller**

To create executable files move to the directory of python file using command prompt and execute set of instructions as shown below:

- Create spec file **pyi-makespec --onedir filename.py -w** as shown in figure 6.16
- Edit the spec file for adding icon and adding assets required for the interface as shown in the Figure 6.17.
- Create executable file using the command – **pyinstallerfilename.spec**, creates an executable file within a folder containing required assets and python executable files as shown in the Figure 6.18 and Figure 6.19

```
F:\major_project\GUI\V2>pyi-makespec --onedir temp.py -w
wrote F:\major_project\GUI\V2\temp.spec
now run pyinstaller.py to build the executable

F:\major_project\GUI\V2>
```

Figure 4.9 Creating spec file

```
# -*- mode: python ; coding: utf-8 -*-

block_cipher = None

a = Analysis(['temp.py'],
            pathex=['F:\\major_project\\GUI\\V2'],
            binaries=[],
            datas=[('Assets/logo.ico', 'Assets'), ('Assets/image.png', 'Assets')],
            hiddenimports=[],
            hookspath=[],
            runtime_hooks=[],
            excludes=[],
            win_no_prefer_redirects=False,
            win_private_assemblies=False,
            cipher=block_cipher,
            noarchive=False)
pyz = PYZ(a.pure, a.zipped_data,
         cipher=block_cipher)
exe = EXE(pyz,
         a.scripts,
         [],
         exclude_binaries=True,
         name='News Bulletin',
         debug=False,
         bootloader_ignore_signals=False,
         strip=False,
         upx=True,
         icon='Assets/logo.ico',
         console=False )
coll = COLLECT(exe,
               a.binaries,
               a.zipfiles,
               a.datas,
               strip=False,
               upx=True,
               upx_exclude=[],
               name='News Bulletin')
```

Figure 4.10 Editing spec file


```
F:\major_project\GUI\W2\pyinstaller temp.spec
75 INFO: PyInstaller: 3.6
75 INFO: Python: 3.8.0
76 INFO: Platform: Windows-10-10.0.18362-SP0
78 INFO: UPX is not available.
80 INFO: Extending PYTHONPATH with paths
['F:\major_project\GUI\W2', 'F:\major_project\GUI\W2']
80 INFO: checking Analysis
81 INFO: Building Analysis because Analysis-00.toc is now existent
81 INFO: Initializing module dependency graph...
83 INFO: Caching module graph hooks...
89 INFO: Analyzing base_library.zip ...
1990 INFO: Caching module dependency graph...
4094 INFO: running Analysis Analysis-00.toc
4097 INFO: Adding Microsoft.Windows.Common-Controls to dependent assemblies of final executable
required by c:\users\vinay s\appdata\local\programs\python\python38\python.exe
4171 INFO: Analyzing temp.py
4500 INFO: Processing pre-find module path hook distutils
4512 INFO: distutils: retargeting to non-voxx dir 'c:\\users\\vinay s\\appdata\\local\\program\\python\\python38\\lib'
5434 INFO: Processing pre-find module path hook site
5436 INFO: site: retargeting to fake-dir 'c:\\users\\vinay s\\appdata\\local\\program\\python\\python38\\lib\\site-packages\\PyInstaller\\fake-modules'
6647 INFO: Processing pre-safe import module hook setuptools.extern.six.moves
9034 INFO: Processing module hooks...
9038 INFO: Loading module hook 'hook-distutils.py'...
9039 INFO: Loading module hook 'hook-encodings.py'...
9130 INFO: Loading module hook 'hook-lib2to3.py'...
9134 INFO: Loading module hook 'hook-mumpy.core.py'...
9331 INFO: Loading module hook 'hook-mumpy.py'...
9332 INFO: Loading module hook 'hook-PIL.Image.py'...
9634 INFO: Loading module hook 'hook-PIL.py'...
9637 INFO: Excluding import 'PIL'.
```

Figure 4.11 Creating exe file using spec file

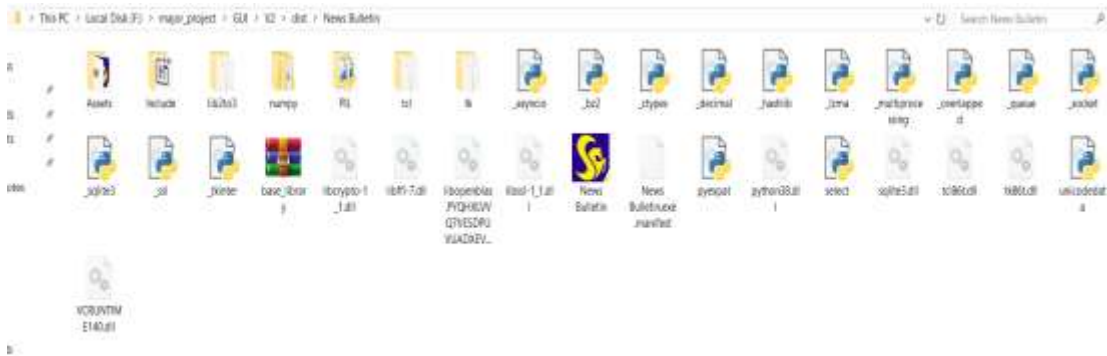


Figure 4.12 Created exe file along with required assets and python executable files

4.1.4 Creating webpages to display Uploaded content

Webpages are created using HTML, PHP and SQLite3 database along with CSS to add some styling

Hypertext Markup Language (HTML) is the standard markup language for documents designed to be displayed in a web browser. It can be assisted by technologies such as Cascading Style Sheets (CSS) and scripting languages such as JavaScript.

Web browsers receive HTML documents from a web server or from local storage and render the documents into multimedia web pages. HTML describes the structure of a web page semantically and originally included cues for the appearance of the document.

PHP is used to compute and extract the uploaded content from the database and display them using HTML

Bootstrap is a free and open-source CSS framework directed at responsive, mobile-first front-end web development. It contains CSS- and (optionally) JavaScript-based design templates for

typography, forms, buttons, navigation, and other interface components

Cascading Style Sheets (CSS) is a style sheet language used for describing the presentation of a document written in a markup language like HTML. CSS is a cornerstone technology of the World Wide Web, alongside HTML and JavaScript.

CSS is designed to enable the separation of presentation and content, including layout, colours, and fonts.

The webpages created are stored in the Lan server and can be accessed at the client's end using Server's IP address.

Working of the webpage

- At every refresh of the webpage the PHP code is executed to get the updated contents of the database.
- The webpage is redirected to the appropriate page as set at the server end using Header command in PHP

- It extracts the updated contents on displays in appropriate designed places using HTML and Bootstrap
- Every webpage is set to auto refresh at 180 seconds, the refresh time can be varied according to the user requirements.
- Latency in updating information can be reduced by decreasing the auto refresh duration of the webpage
- Detailed Flow chart is shown in the Figure 6.20

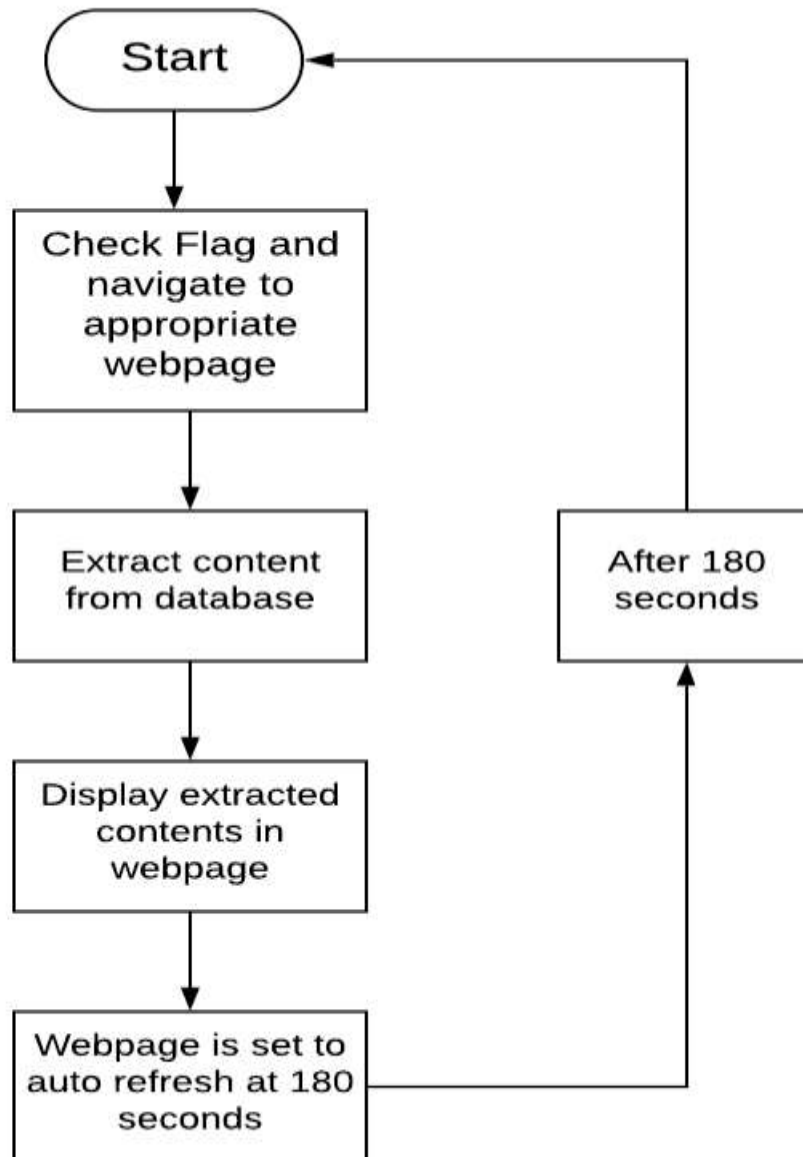


Figure 4.13 Flow chart of designed webpage

CHAPTER 5

RESULTS

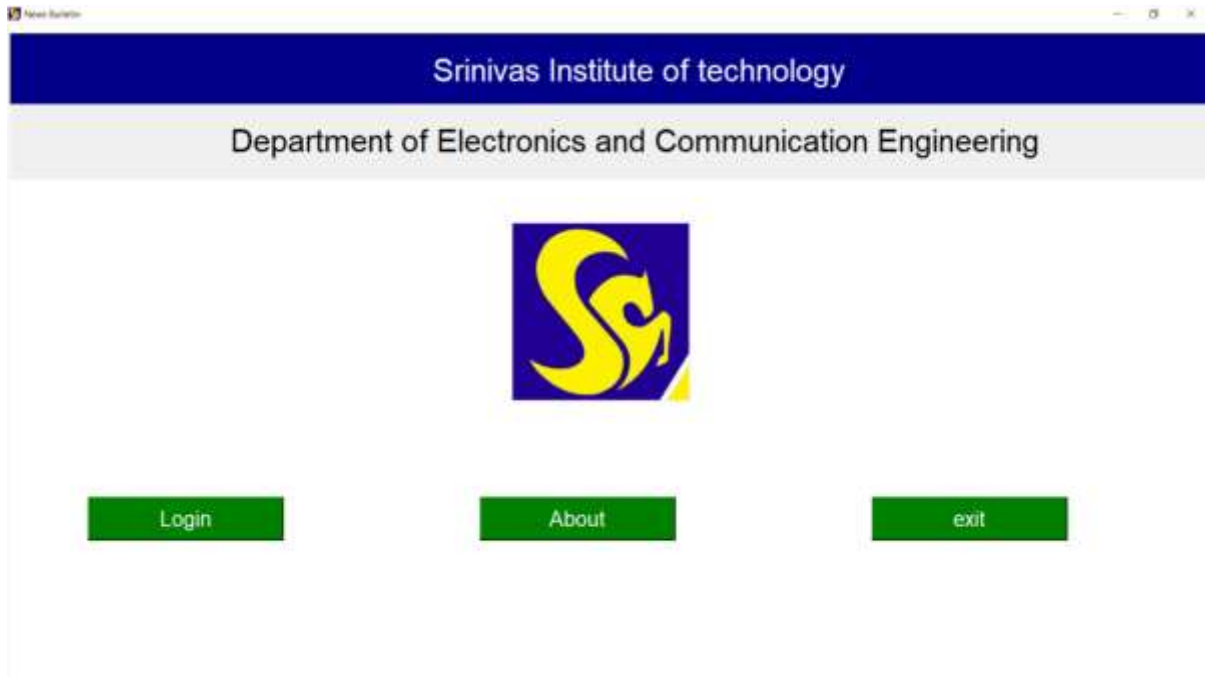


Figure 5.1 Home screen

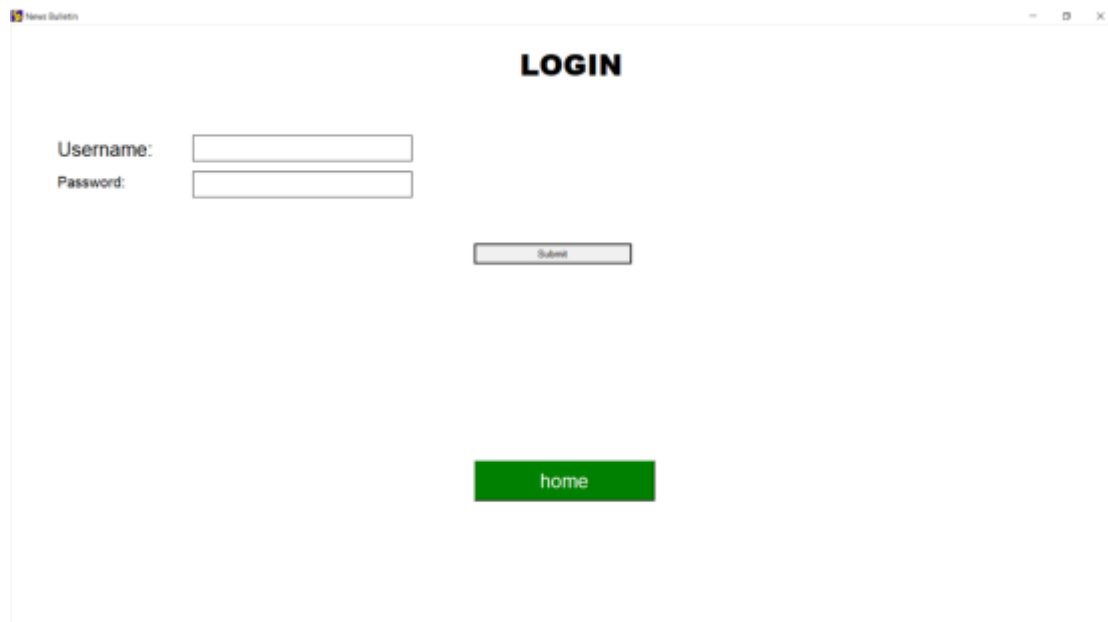
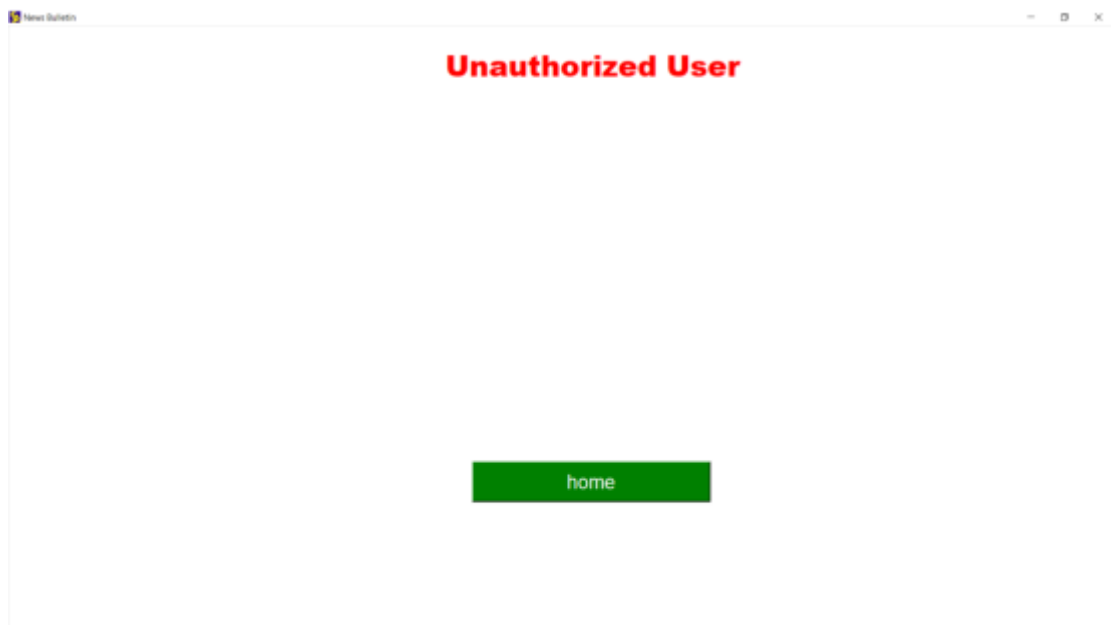


Figure 5.2 Login screen



The screenshot shows a web browser window titled "New Bulletin" with a "User Registration" form. The form contains three input fields: "Username:", "Password:", and "Confirm Password:". Below the fields are two buttons: a light gray "Submit" button and a green "Back" button.

Figure 5.3 User registration screen



The screenshot shows a web browser window titled "New Bulletin" displaying an "Unauthorized User" error message in red text. At the bottom center, there is a green button labeled "home".

Figure 5.4 User with wrong credentials



Figure 5.5 Main screen after successful login (Admins)

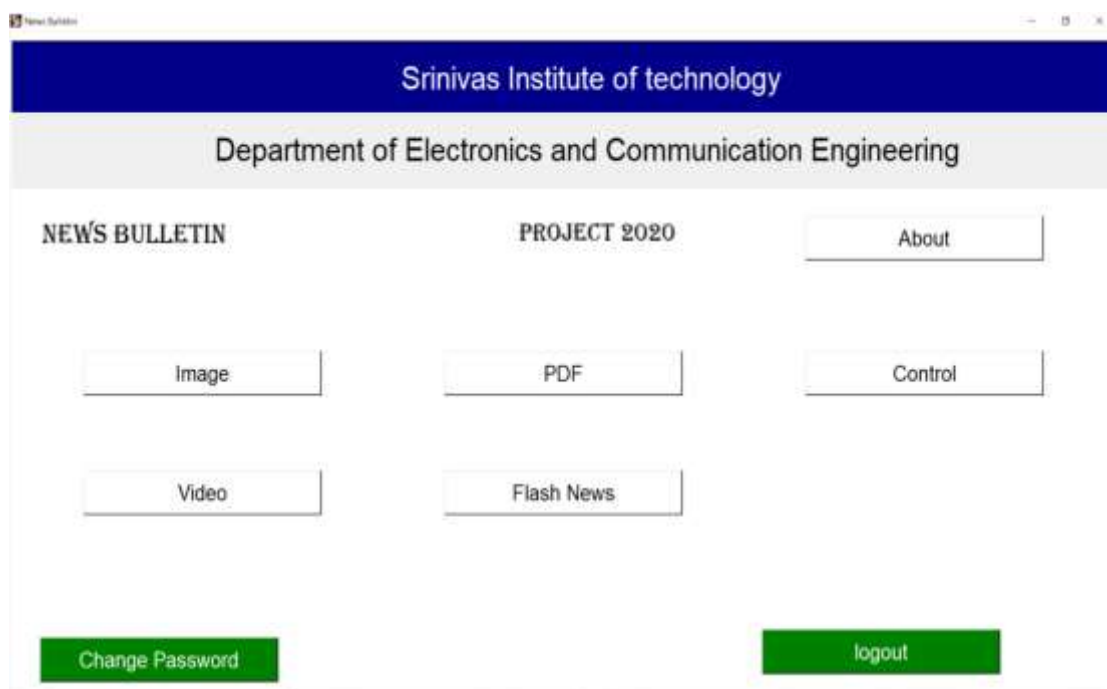


Figure 5.6 Main screen after successful login (Non-Admins)

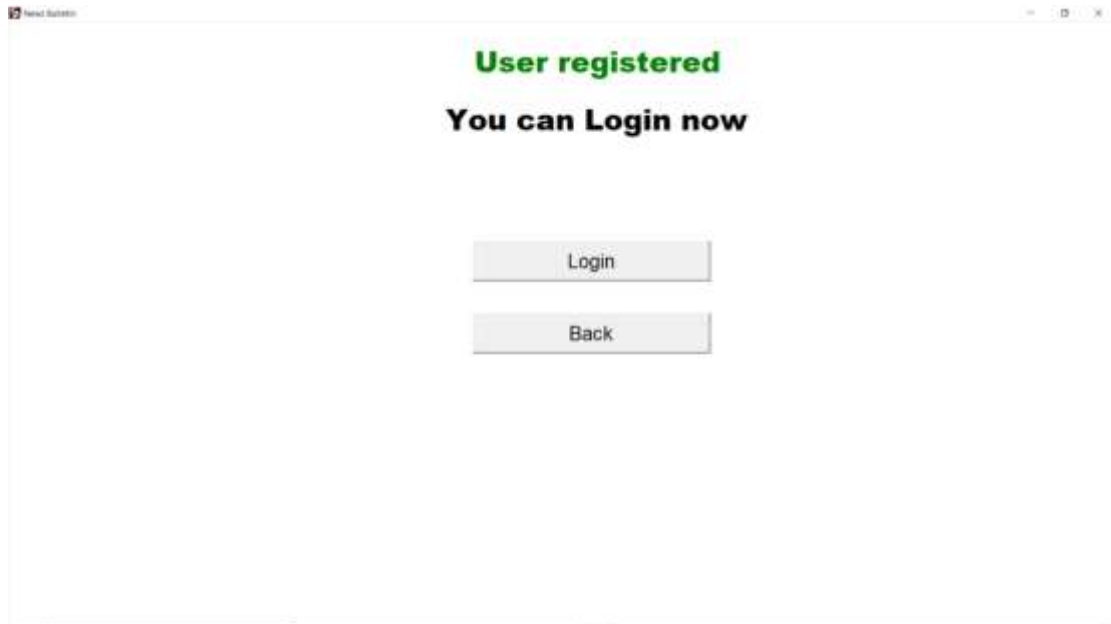


Figure 5.7 After successful registration



Figure 5.8 Change password

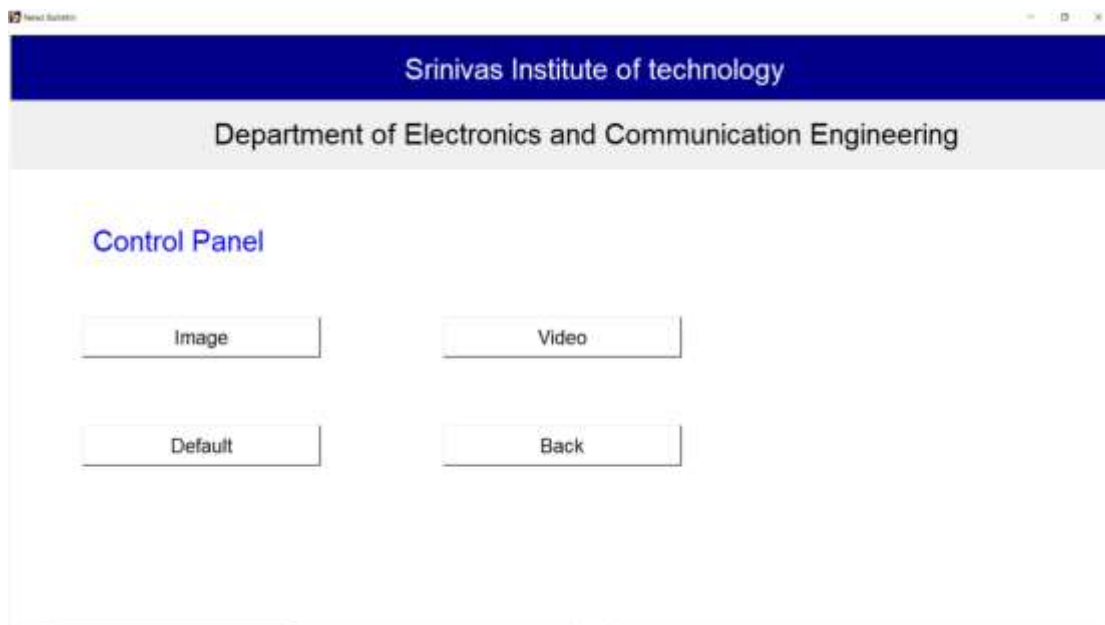


Figure 5.9 Control Panel

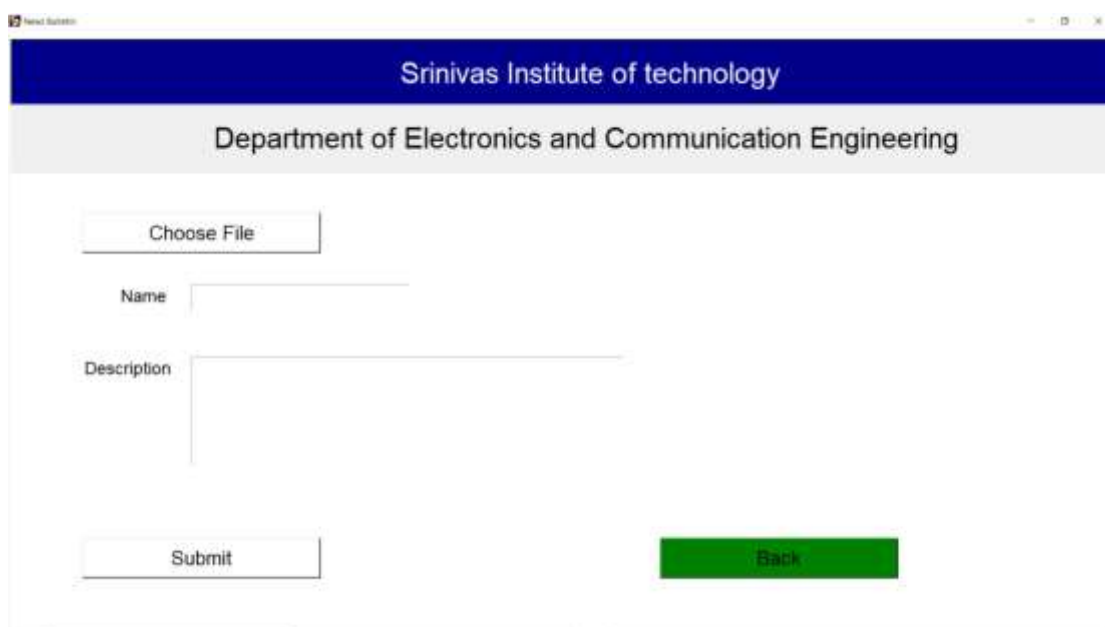


Figure 5.10 Content uploading screen

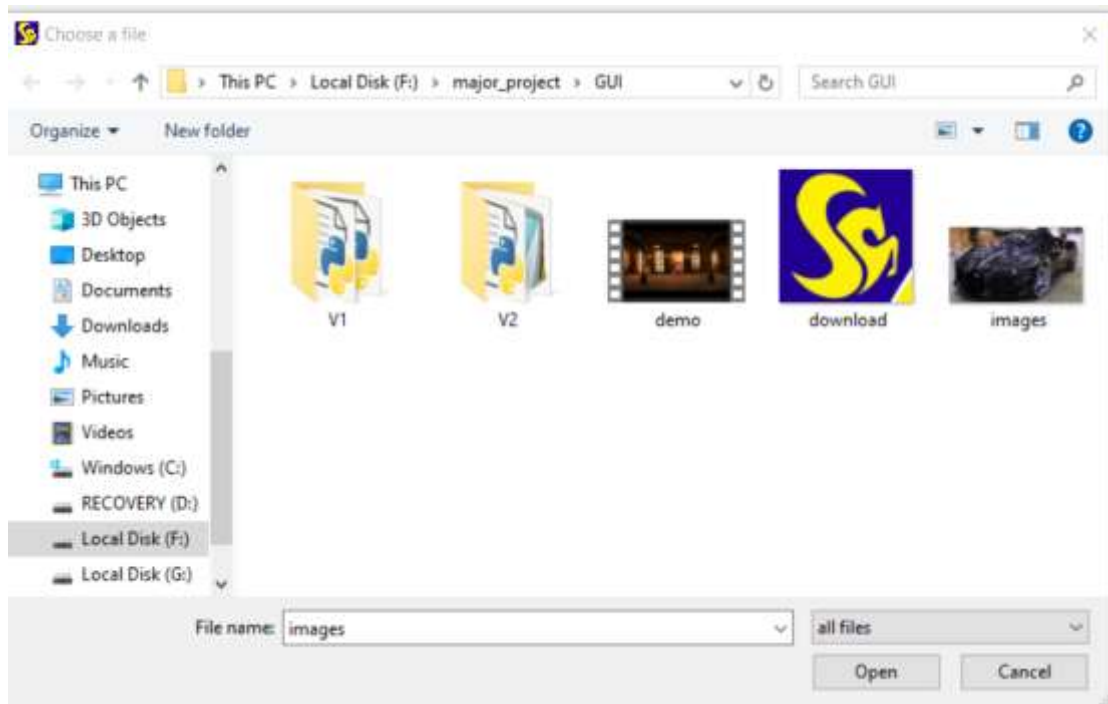


Figure 5.11 File chooser window



Figure 5.12 Screen after selecting image

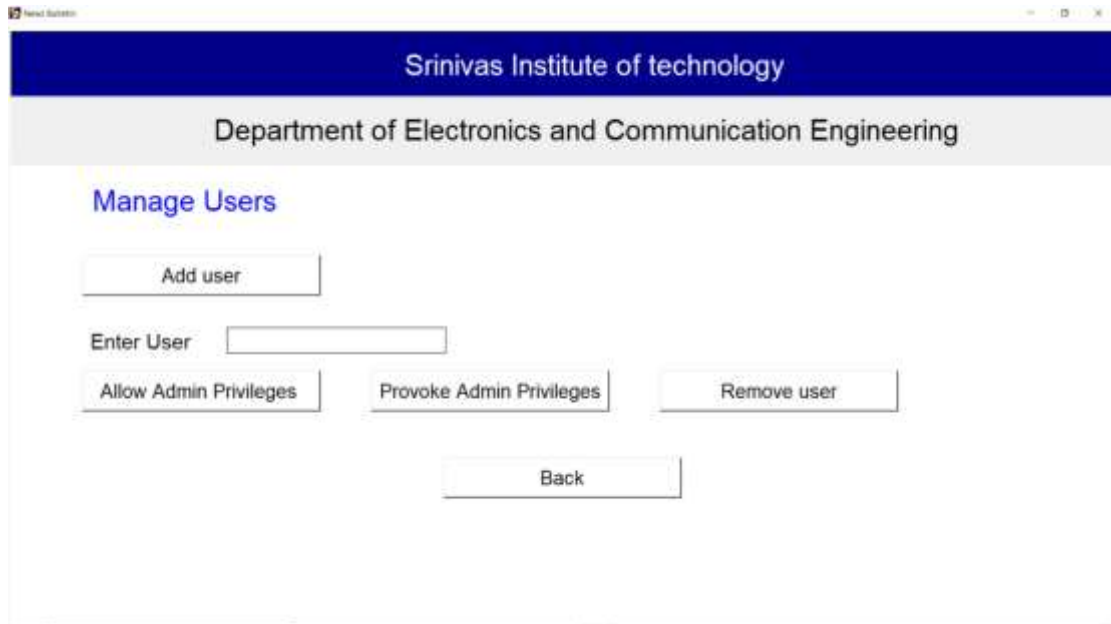


Figure 5.13 Manage users [Admins only]

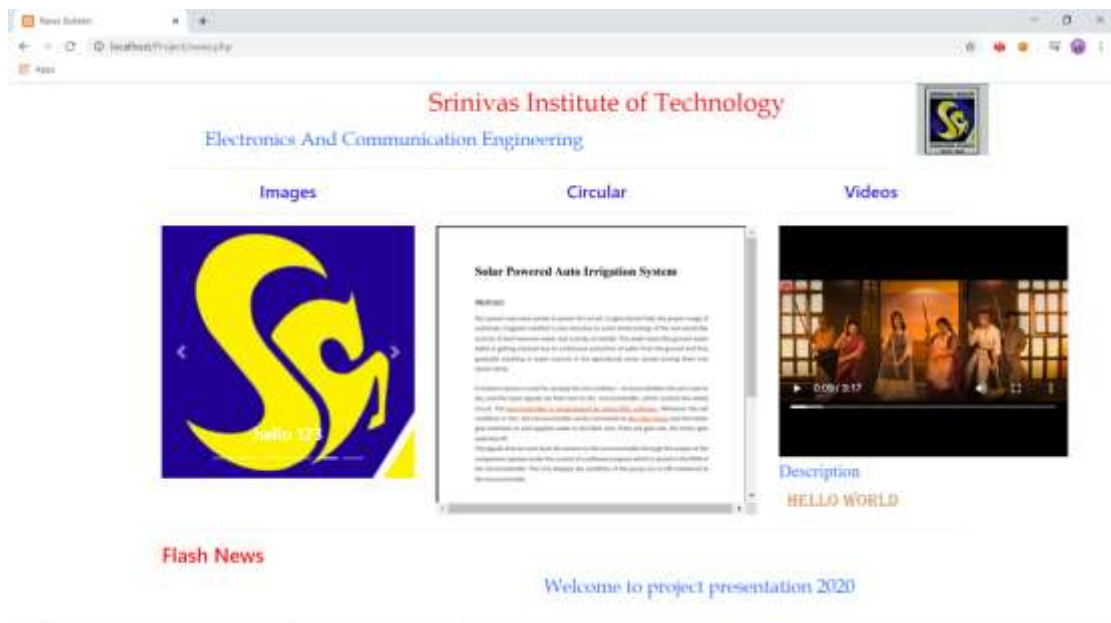


Figure 5.14 Webpage displaying all contents together



Figure 5.15 Webpage displaying only images along with some description



Figure 5.16 Webpage displaying only video along with some description

Conclusion and Future Work

This project helps to create a news bulletin for an institution or organization to display latest news and advancements in institution. Graphical user interface created at server end is made simple for anyone to upload documents like photos, videos, PDF. As our system is simple it can replace all non-digital systems in the public place, college notice board with low cost. Also, it will eliminate large labor force needed to maintain these

noticeboards to replace a notice. These cost saving could help alleviate the initial system upgrade and installation fees and could result in long term cost saving for organizations. Also using this reduces use of paper for notice so it is environmental friendly. A Camera can be added at server end and Live broadcast can be made possible

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