Projector Control Software Setup Tutorial

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1.0 Summary

This document covers the steps to install the projector control software on any machine. All the files used will be included in the folder. You should be able to set it up in between 45 minutes to 2 hours depending on the speed of your computer and the steps you will need to take depending on your current setup. These steps can vary depending on the operating system you are running on your computer, the serial cable you are using and the projector you have in your setup. The original setup of the software was installed on a laptop running Ubuntu (Linux based OS) and used a USB to Serial attachment connected to a serial cable. This document will start by covering the setup for these specific components.

2.0 Hardware Overview

To set up the software, we need to start by understanding the hardware we are working with. In the case of the original installation of the project in Christiansburg Middle School, this was the list of components of the system:

1. **Panasonic PT-VZ580.**
   Link: [Panasonic Website](#)
   Note: If you are replacing the projector, the software is compatible with any projector that supports serial communication.
2. **USBGear Mini USB 2.0 to RS-232 DB-9 Serial Adapter w/ 15kV ESD Protection & 3ft. USB Extension Cable.**
   Link: [Amazon Link](#)
   Note: If you are replacing the USB to Serial adapter, ensure that the adapter's drivers are compatible with your operating system. Download them if necessary. In this case we don't need to since this adapter works with Linux without the need to install a driver.
3. **YCS basics 25 Foot DB9 9 Pin Serial / RS232 Male/Female Extension Cable.**
   Link: [Amazon Link](#)
4. **Laptop with USB port.**

3.0 Setting up the software with Panasonic PT-VZ580 Projector and current cables

To install the software on another computer, with the current projector and cables, please follow the steps below:

1. **Install Linux-Based Operating System:**
   Since the current USB-to-Serial Adapter is best compatible with Linux-based operating systems, using linux as your computer's operating system will be

best. I recommend installing Ubuntu but any other Linux operating system should be sufficient. To start we need to download some files and prepare a USB drive. Here are the steps to set up the laptop:

If you have a laptop that support the GPT partition (you can know that by looking up your laptop and what partition it uses online) and would like to install Ubuntu; The team has provided a USB drive that is ready to install the latest version of Ubuntu.To do so you can skip to step 11. If not, the directions to prepare the USB drive for installation are explained below.

1. Download the installation file for the Linux operating system you want to have (in our case Ubuntu) on your laptop. You have the choice of choosing what version of the operating system you would like to have. Our recommendation is to pick the one linked below. Here is the link to install Ubuntu:
Link: [Ubuntu Desktop Installation](#)
2. Download and install Rufus from the official website. Rufus is a tool that will help you create the necessary files you need on your USB drive. Once its installed, open it.
Link: [Rufus Website](#)
3. Open Rufus then connect your USB drive to your computer. Rufus will automatically detect it.
4. Open Rufus and select the USB drive you want to use from the "Device" dropdown menu. Ensure that you pick the correct one.
5. In the "Boot selection" section of Rufus, click the "Select" button and browse to the location where you saved the file you installed in step one of the operating system. Select that file and click "Open".
6. In the "Partition scheme" section of Rufus, select "MBR" if your laptop has a traditional BIOS or "GPT" if it has UEFI. You can find what the laptop you are installing linux on uses by a quick internet search.
7. In the "File system" section of Rufus, select "FAT32".
8. In the "Cluster size" section, leave the default value.
9. In the "New volume label" section, give your USB drive a name if you want.
10. Click the "Start" button to start the process. Rufus will format your USB drive and copy the Linux file to it. This may take 5-10 minutes.
11. Once Rufus is done, you can safely eject the USB drive and insert it into your laptop that you want to install Linux on.
12. Power on your laptop and press the key that opens the boot menu. This is usually F12 or Esc, but it may vary depending on your laptop, look up that information online.

13. Select the USB drive from the boot menu and press Enter. This will boot your laptop into the Linux installer.
14. Follow the on-screen instructions to install Linux on your laptop.

2. Install Python and Code Editor to edit the code:

Once you have installed Linux successfully, you are ready to install all the necessary files and libraries to run the code. Since we installed a Linux Based operating system, you can skip this step because it comes with python installed (Step 4 shows the installation just in case). To check if python was installed, do the following:
1. Open a terminal on your Linux system. You can usually do this by pressing Ctrl+Alt+T.
2. Type the following command and press Enter:
    ```
    python3 --version
    ```
3. If you receive an answer on the terminal screen, then it's installed.
4. If you don't receive a response confirming the installation, you don't have python installed to Type the following command and press Enter:
    ```
    sudo apt-get install python3
    ```
After installing python, you need to install some libraries to allow the python code to run. Here are the steps to do so:
1. Open a terminal by pressing Ctrl+Alt+T.
2. Install tkinter (Animation Library) by running the following command:
    ```
    sudo apt-get install python3-tk
    ```
3. Install pyserial (Serial COmmunication Library) by running the following command:
    ```
    pip3 install pyserial
    ```
    - If you get an error message about pip not being installed, , you can install it using the following command:
        ```
        sudo apt-get install python3-pip
        ```
4. Install libreOffice (powerpoint equivalent) by running the following command:
    ```
    sudo apt-get install libreoffice
    ```
Once python and the libraries are installed, it's time to install an Integrated development environment to edit the code. I recommend Thonny on Linux. Here are the steps to install Thonny:
1. Open a terminal by pressing Ctrl+Alt+T.
2. install Thonny IDE from the terminal using the following command:
    ```
    sudo apt-get update && sudo apt-get install thonny
    ```

3. When the Installation is complete, you should be able to open it from your applications menu.

After installing the IDE, you are ready to install and set up the projector files.

3. Find the Serial Connection Name

Now it's time to find the name of the serial connection to our laptop before we edit the code. To do so, follow the steps below:

1. Start by plugging the serial cable to your projector on one end (to the serial port) and the other end to the USB-to- Serial adapter.
2. Turn on your projector using the Power Button on top or the Remote Controller.
3. Open a terminal on your computer by pressing Ctrl+Alt+T.
4. Type the following command into the terminal and press Enter:

   ls /dev/tty*
5. Now plug in your USB-to-Serial Adapter to your laptop.
6. Type the following command into the terminal and press Enter:

   ls /dev/tty*
7. Compare your results from steps 4 and 6, look for the new "dev/tty.." name that shows up during the second attempt, that is your serial connection name.
8. Make note of that name to use in upcoming steps.

4. Find the paths to your assets file

As part of running this software, we need access to the graphical assets that are stored in the Porjector_Files folder we installed. We need to find the pathname of each folder within Assets in Projector Files.The folders are named after each file they are imported into in the file. The files are called: mainMenu , animBackdrop, favApps, projInputs, projSettings. Let's use the terminal to find the path for each file. Make sure to keep note of these for upcoming steps. Here is how to find the path:

1. Open a terminal on your computer by pressing Ctrl+Alt+T.
2. Type the following command and press Enter:

   ```
   sudo updatedb
   ```
3. Type the following command, replacing "filename" with the name of the files mentioned above, one at a time, then press Enter:

   ```
   locate filename
   ```
4. Take note of all the paths you find, you should have 5 paths when you're done.

5. Download and edit software code file

The next step is to download the software files to your computer. You can access the Projector_Files folder on the provided USB drive (labeled) or the link below:

   Link: Projector_Files

After downloading, follow these steps:

1. Open Thonny or your preferred code editor (Integrated development environment). Open the python files listed below in the software:
   a. pageManager.py: the execution file that manages communication between the separate menus.
   b. mainMenu.py: Contains all the buttons and functionalities of the Main Menu page of the software.
   c. projectorInputs: Contains all the buttons and functionalities of the Projector Inputs page of the software.
   d. favoriteApps.py: Contains all the buttons and functionalities of the Favorite Apps page of the software.
   e. projectorSettings.py:Contains all the buttons and functionalities of the Projector Settings page of the software.
   f. animateBackdrop.py:Contains all the buttons and functionalities of the Animate Back drop page of the software.
2. Once you have all the files open, we will need to edit a few lines of code in these specific files:
   a. PageManager.py:
      i. No need to change anything.
   b. MainMenu.py:
      i. Change the line of code starting with path (line 7) to
         `Path(r"mainMenuPath")`
      ii. Instead of MainMenuPath, replace it with the path of the mainMenu folder path you found in the *Find the paths to your assets file* section.
      iii. Change the line starting with ser = serial (line 9) to
         `ser = serial.Serial('your serial connection name', 9600)`
      iv. Replace 'your serial connection name' with the name we found in the *Find the Serial Connection Name.*
      v. Save your changes.
   c. ProjectorInputs:
      i. Change the line of code starting with path (line 7) to
         `Path(r"projInputsPath")`
      ii. Instead of projInputsPath, replace it with the path of the projInputs folder path you found in the *Find the paths to your assets file* section.
      iii. Change the line starting with ser = serial (line 9) to
         `ser = serial.Serial('your serial connection name', 9600)`
      iv. Replace 'your serial connection name' with the name we found in the *Find the Serial Connection Name.*
      v. Save your changes.
   d. FavoriteApps.py:
      i. Change the line of code starting with path (line 10) to
         `Path(r"favAppsPath")`

        ii.   Instead of favAppsPath, replace it with the path of the favApps folder path you found in the *Find the paths to your assets file* section.

        iii.   Save your changes.

e. <u>ProjectorSettings.py:</u>

        i.   Change the line of code starting with path (line 7) to
```
Path(r"projSettingsPath")
```

        ii.   Instead of projSettingsPath, replace it with the path of the projSettings folder path you found in the *Find the paths to your assets file* section.

        iii.   Change the line starting with ser = serial (line 8) to
```
ser = serial.Serial('your serial connection name', 9600)
```

        iv.   Replace 'your serial connection name' with the name we found in the *Find the Serial Connection Name.*

        v.   Save your changes.

f. <u>AnimateBackdrop:</u>

        i.   Change the line of code starting with path (line 10) to
```
Path(r"animBackdropPath")
```

        ii.   Instead of animBackdrop, replace it with the path of the animBackdrop folder path you found in the *Find the paths to your assets file* section.

        iii.   Change the line starting with folder_path found towards the end of the code in the NAV TO SAVED DESIGN section to
```
folder_path = "path to a folder to your computer"
```

        iv.   To save any designs for a quick access on your computer, create an empty folder, name it and then locate its path as seen in section 3 *Find the paths to your assets file.* Replace "`path to a folder to your computer`" with that path.

        v.   Save your changes.

3. After making these changes and saving them, connect your USB-to-Serial adapter (which is connected to a projector) to your computer and run your code. The run button is usually found on top of your preferred coding platform.

    a. If you see the main menu screen with the purple and blue buttons, then you have completed editing the videos.

    b. If not, check the errors window on your platforms for errors. If the errors have to do with the file paths, go back to step 2 and ensure all your paths that you typed in are correct. If the error has to do with the serial connection, perform the following steps:

        i.   Check that the serial connection name you typed in the serial code is correct in all the files.

        ii.   Ensure that your USB is connected, just to be safe, turn on the projector (the projector isn't necessary for this laptop to recognize the connection).

If you don't have permission to use it, you need to give your laptop permission to use the serial port by opening the terminal and typing the following command then press enter:

`sudo usermod -aG dialout your_username`

Replace your_username with your computer's username.

iv. Turn off your computer and turn it back on, the permission issue should be resolved.

4. After running the code, and the software launches, open every menu and check that all the visuals of buttons are showing, if some aren't, go back the the file titled under the page and check if the path to correct assets file is included. Also confirm the the projector is responding to your button commands, if not, ensure the serial connection to the projector is plugged in correctly.

6. Create Icon on your computer to launch the software

To allow quick access to the software, we will create an icon on your computer to launch the software. To do that, follow the steps below:

1. Create a new file with a text editor and save it with a ".desktop" file extension, for example, "myinterface.desktop".
2. Add the following lines to the file:

```
[Desktop Entry]
Name=Projector Control
Comment=Launch My Interface
Exec=/usr/bin/python /path/to/pagemanager.py
Icon=/path/to/Icon.png
Terminal=false
Type=Application
Categories=Utility;
```

Replace "/usr/bin/python" with the path to your Python executable,
   - You can find the path by running `which python3` in the terminal.

Replace "/path/to/pagemanager.py" with the path to your pagemanager file,
   - You can find that by running locate `pathManager.py` in the terminal.

Replace "/path/to/Icon.png" with the path to the icon you want to use.
   - We have provided an Icon for you saved in the Projector_Files folder. You can find the path to it by running locate `Icon.png` in the terminal.

3. Save the file with the name "ProjectorControl" and close the text editor.
4. Make the file executable by running the following command in the terminal:

`chmod +x /path/to/ProjectorControl.desktop`

5. Replace "`/path/to/ProjectorControl.desktop`" with the path to the desktop entry file you just created.

     a. You can find the path by running locate `ProjectorControl.desktop` in the terminal.

6. Move the file to the appropriate directory where your desktop environment looks for desktop entries, usually either "/usr/share/applications" or "~/.local/share/applications". We recommend that you move the file to the system-wide applications directory. Run the following command in the terminal: `sudo mv /path/to/ProjectorControl.desktop /usr/share/applications/`

Replace "`/path/to/ProjectorControl.desktop`" with the path to the desktop entry file you just created.

     a. You can find the path by running locate `ProjectorControl.desktop` in the terminal.

7. Now if you go to your applications menu on your laptop, you should see an icon of a projector with the name Projector Control. On Ubuntu: you can right click on the Icon and "Add to Favorites" to make it show up on your desktop.
8. Now if you press the icon, the software should launch easily. The software only launches if the serial connection is connected to the computer.
9. If the icon doesn't show, or the software doesn't launch after connecting the USB, go back to the previous steps and ensure that you have typed everything correctly. Minor errors in the .desktop files can cause this process to fail.

Now you are ready to use the software and communicate with the projector! Great job on making it this far!

4.0 Conclusion

We hope that this document provides you with the information you need to set up the software on your computer. These steps , as mentioned earlier, are specific to the components provided to the customer. If the customer switches to a different USB-to Serial connection, they may need to install necessary drivers; then conduct the same steps mentioned above. If the customer wants to use another system to replace linux, they must ensure that the USB-to-Serial adapter's driver is compatible with the system they are using. They also need to tweak some of the steps listed above to match the operating system they are running. The code should run on any platform once the steps listed above are executed.