Spacecraft Mission Visualiser
User Manual

CONTENTS

1. INTRODUCTION

The Spacecraft Mission Visualiser is an application that is meant to be an external helper to the PANGU suite of tools by making the production of PANGU spacecraft flight simulation files more intuitive and interactive. Its feature set focuses on users who are already familiar with the PANGU Viewer and the PANGU User Manual's Flight Files section.

While reading the manual please keep in mind that screenshots of the interface were taken on a Linux system. Some elements might appear slightly different on Microsoft Windows systems.

2. FEATURES AND FUNCTIONALITY

2.1. Starting the application

In the distribution for Microsoft Windows systems, the executable is located in the **`usr/`** directory with the title **`SpaceMissionSimVis.exe`**.
In the distribution for Linux systems, the executable is located in the **`usr/bin/`** directory with the title **`SpaceMissionSimVis`**.

After launching, a graphical user interface should appear resembling the image below:

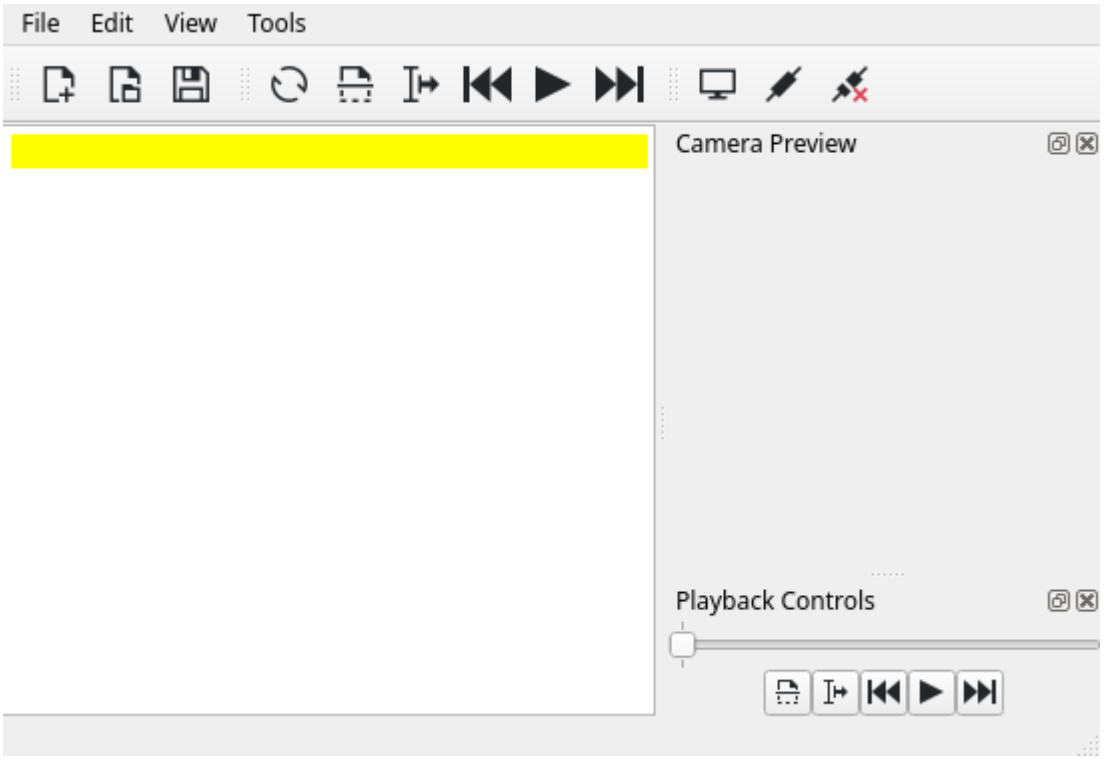

Figure 1: Example main window

2.2. Settings

The settings window can be accessed by navigating to the **Tools menu > Settings**. After opening, it should resemble the image below:

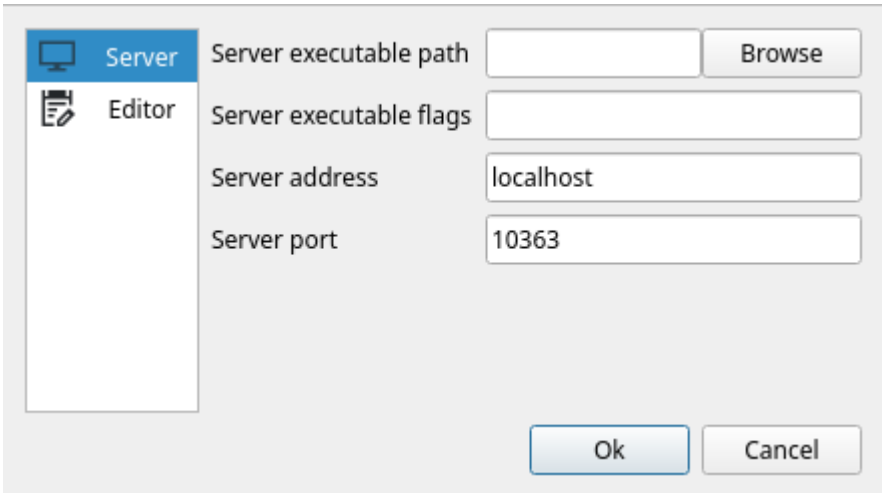

Figure 2: Settings window

2.3. Creating, opening, saving flight files

Flight files can be newly created, opened and saved by navigating to the **File menu** and selecting the appropriate action, or instead by clicking the appropriate icon, respectively, in the toolbar:

Figure 3: Highlighted file handling icons in the toolbar

2.4. Text editor

The application's text editor supports additional basic editing functionality like selecting, copying, cutting and pasting text, as well as undoing and redoing edits.

2.5. Launching a PANGU server

For convenience, the user can specify a PANGU server executable path and additional flags in the settings window's Server page to then be able to launch the server right from the application. This is by no means necessary however, as the application can connect to any PANGU server using the server address and port specified in the same settings page. After setting the preferred path and flags, the server can be launched by navigating to the **Tools menu > Server > Start server**, or instead by clicking the appropriate icon in the toolbar:

Figure 4: Highlighted 'Start server' icon in the toolbar

2.6. Connecting to a PANGU server

The application can be connected to a running PANGU server by specifying the address and port in the settings, then navigating to the **Tools menu > Server > Connect to server**, or instead by clicking the appropriate icon in the toolbar:

Figure 5: Highlighted 'Connect to server' icon in the toolbar

The application can be disconnected from the server it's currently connected to by navigating to the **Tools menu > Server > Disconnect from server**, or instead by clicking the appropriate icon in the toolbar:

Figure 6: Highlighted 'Disconnect from server' icon in the toolbar

2.7. Scanning commands

To make use of the playback progress bar, the commands in the text editor must first be scanned to populate it with points of interest, which are commands that generate images. The editor can be scanned once by navigating to the **Tools menu > Commands > Scan all commands**, or instead by clicking the appropriate icon in the toolbar or the playback controls:

Figure 7: Highlighted 'Scan all commands' icon in the toolbar

Automatic scanning whenever edits are made can be toggled by navigating to the **Tools menu > Commands > Toggle auto command scanning**, or instead by clicking the appropriate icon in the toolbar:

Figure 8: Highlighted 'Toggle auto command scanning' icon in the toolbar

2.8. Executing commands

A single command in the currently active line can be executed by navigating to the **Tools menu > Commands > Execute line**, or instead by clicking the appropriate icon in the toolbar or the playback controls:

Figure 9: Highlighted 'Execute line' icon in the toolbar

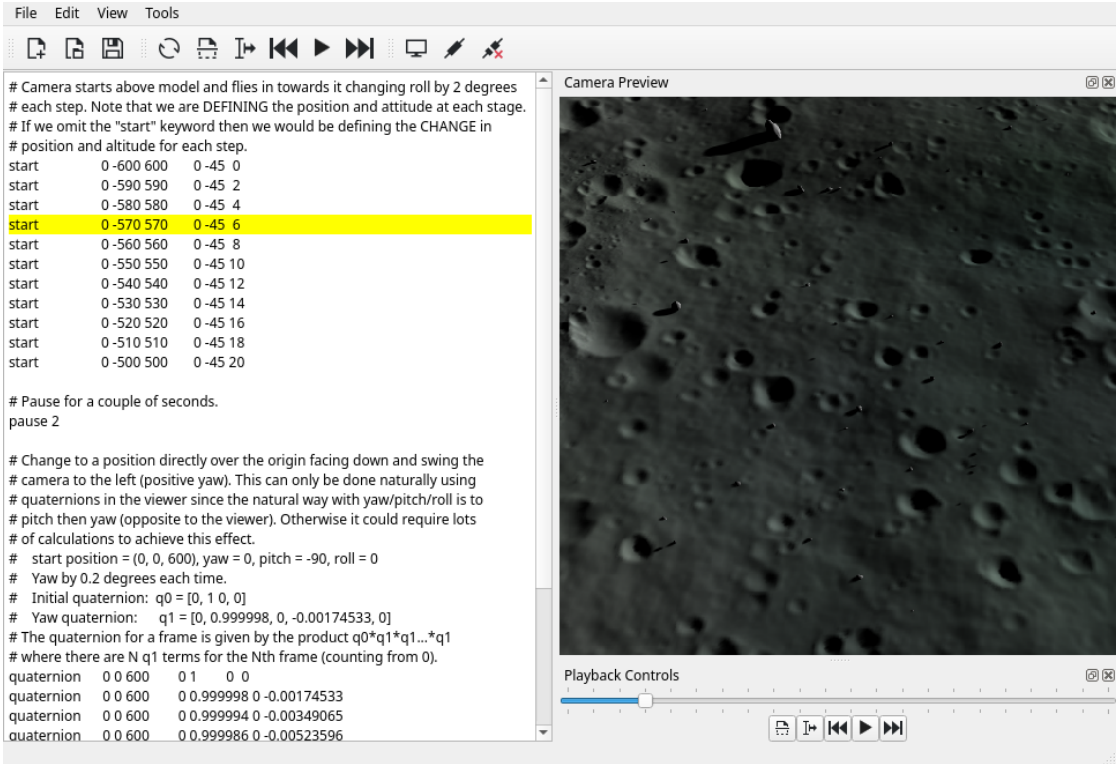

Figure 10: Example main window after executing a command that generates an image

A single command in the previous or next line can be executed by navigating to the **Tools menu > Commands > Execute previous/next line**, or instead by clicking the appropriate icon, respectively, in the toolbar or the playback controls:

Figure 11: Highlighted ‘Execute previous/next line’ icons in the toolbar

To emulate the simulation of the commands over time with little user input, the user can make use of command stepping. Command stepping can be started and stopped by navigating to the **Tools menu > Commands > Step through lines/Stop stepping**, or instead by clicking the appropriate icon in the toolbar or the playback controls:

Figure 12: Highlighted ‘Step through lines/Stop stepping’ icons in the toolbar

2.9. Supported commands

Command	Description	Parameters	Examples
`start`	position camera via euler angle and display the result	• x, y, z - position of the camera • a, b, c - yaw, pitch, roll respectively	`start 0 10 0 90 90 90` `start 0.1 0 0 23.55 0 0`
`quaternion`	position camera via quaternion and display the result	• x,y,z - position of the camera • q0, q1, q2, q3 - attitude quaternion with q0 being the scalar term	`quaternion 0 0 600 0 1 0 0` `quaternion 0 0.5 0 0 0.9 0 0`
`update`	display the camera result from the current position	N/A	`update`
`pause`	pause for an amount of seconds	s - seconds to pause for	`pause 4` `pause 32`

2.10. Playback controls

The playback controls can be used to navigate the flight file without touching the editor itself, emulating a media player interface. The interface includes a playback progress bar as well as icons to scan all commands, execute the current, previous or next line as well as start/stop stepping through commands.

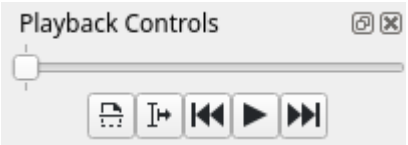

Figure 13: Playback controls interface

The playback progress bar's slider can be used to quickly move around the flight file using commands that generate images, once the text has been scanned to find any, as it affects the editor's currently active line position. The slider's position also updates according to the last executed image-generating command. When moving the slider, the commands being passed by the moving active line will get executed if possible. The time to send the command to the PANGU server and for it to then generate and send the image back is not instant, so some commands might be skipped while moving the slider around. This is done to avoid slowing down the application. However, letting the slider go after dragging it will always result in executing the last command to ensure accuracy.

Figure 14: Playback controls interface with points of interest

2.11. Moving and resizing the interface elements

Some interface elements can be moved around, resized as well as completely taken out of the main window or closed. Resizable elements include: Camera Preview, Playback Controls. They can be resized by clicking and dragging their appropriate edges. Movable elements include: Camera Preview, Playback Controls, toolbars. They can be moved around by clicking and dragging the area containing the component's name or, in the case of toolbars, the leftmost edge of the element. While moving an element, it can be attached and detached from the main window by moving it to and away from its edges or by clicking the appropriate button in the top-right corner of the element. The positions, sizes and visibility of the interface elements will all persist between sessions.

Figure 15: Buttons visible on some of the movable/resizable elements. The leftmost one attaches/detaches the element to the main window, the rightmost one closes it.

Figure 15: The main window after moving the interface elements to various positions

3. EXAMPLE USAGE INSTRUCTIONS

1) Navigate to `example_project` and run `make_model.sh` or `make_model.bat`, depending on your system
2) Open the application
3) Navigate to settings
4) Set the server executable path by clicking ‘Browse’ next to the input field and navigating to `example_project/` and selecting `view.sh` or `view.bat`, depending on your system. You may need to change the file filter in the browsing window from `Executables (*.exe)` to `Bash scripts (*.sh)` or to `Batch scripts (*.bat)`
5) Set the server executable flags to:
   `-server -ini path/to/your/pangu.ini`
   for example:
   `-server -ini /home/username/pangu/pangu.ini`
   (the server will likely still launch if you just include `-server` without the ini, but the model will likely not appear the same as it should)
6) Set the server address to `localhost`
7) Set the server port to `10363`
8) Save the settings by clicking ‘Ok’
9) Start the server by clicking the ‘Start server’ icon
10) Connect to the server by clicking the ‘Connect to server’ icon
11) Open the example flight file by clicking the ‘Open file’ icon, navigating to `example_project` and selecting `flight.fli`
12) Scan all commands by clicking the ‘Scan all commands’ icon
13) Move the progress bar slider. The application should now execute commands in the flight file and display generated images as the slider is moved around
14) Explore any other features highlighted in the FEATURES AND FUNCTIONALITY section
15) Close the application
16) Close the server if it did not close by itself