

MUSIC PLAYER MFD

FOR ORBITER SPACE FLIGHT SIMULATOR

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This MFD incorporates and redistributes the proteaAudio library (proAudioRt), which is used for audio processing. Special thanks to Gerald Franz for creating and making proteaAudio available. The proteaAudio library is redistributed with this MFD in accordance with its zlib-style license, which permits redistribution with attribution.

ProteaAudio GitHub repository: <https://github.com/jkl1337/proteaAudio>

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INTRODUCTION

The Music Player MFD (Multi-Function Display) is an advanced audio player for Orbiter Space Flight Simulator that transforms your space journeys with rich audio experiences. Beyond basic playback functionality, this MFD features sophisticated audio visualizations, beat-reactive animations, track management, and lyric display capabilities.

This MFD uses pre-analyzed audio data to provide dynamic visualizations that respond to the audio characteristics of each track. Using the included Python script, your music files are processed to extract detailed audio features such as beat information, frequency analysis, and waveform data. These visualizations are then synchronized with playback, creating five different visualization modes along with lyric synchronization for an immersive audiovisual experience during your space exploration.



INSTALLATION

1. Download the Music Player MFD package (zip file)
2. Unzip the downloaded file directly into your Orbiter root directory
 - This will automatically place all files in their correct locations
 - The MFD configuration will be placed in `Config\MFD` directory
 - The proAudioRt module will be installed in the appropriate location

Activating the MFD in Orbiter

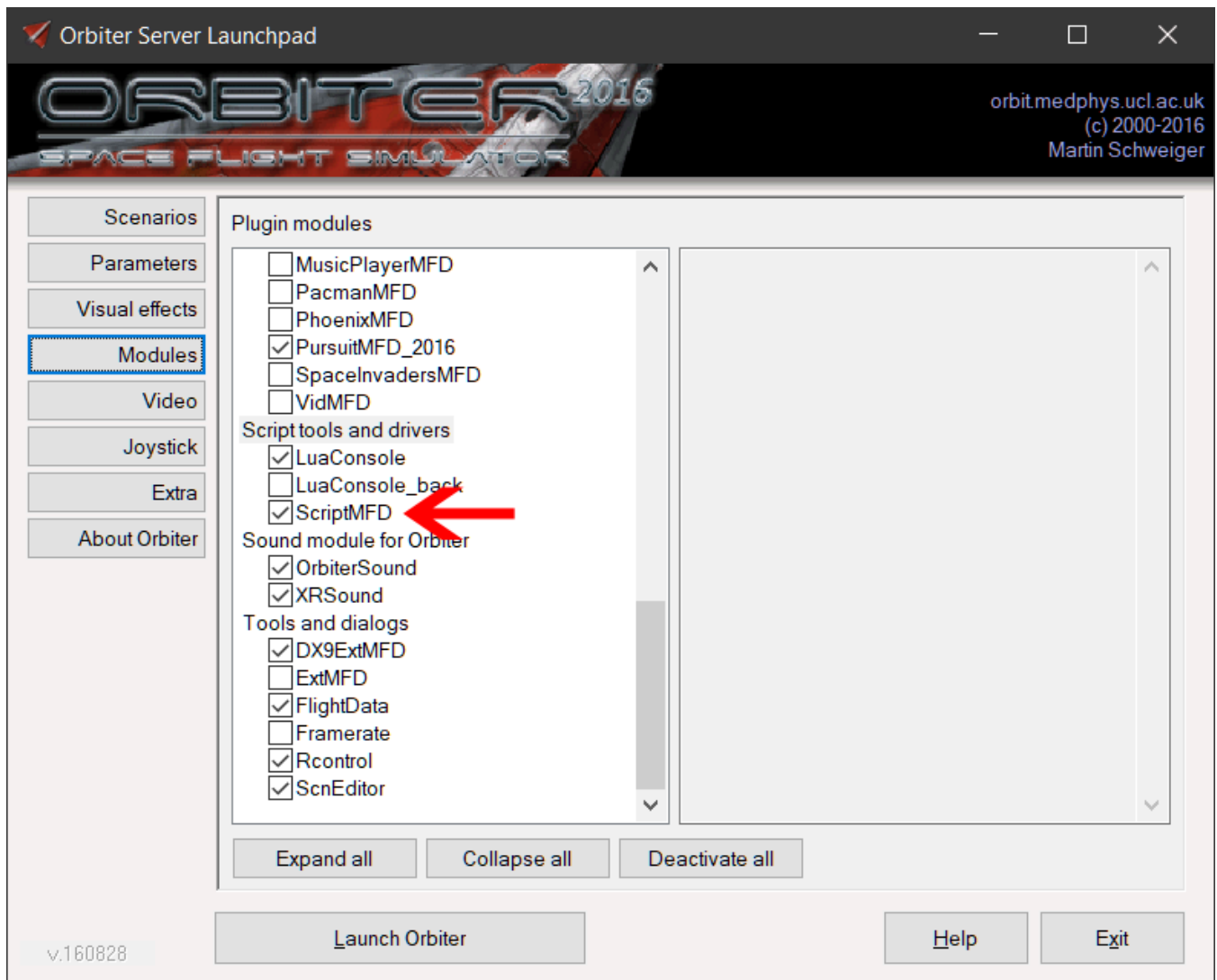
1. Edit the `ScriptMFD.cfg` file in your Orbiter `Config` directory with a text editor
2. Add the following line to the file:

```
MFD\MusicPlayer.cfg
```

3. Save the file and exit the text editor
4. Launch Orbiter and go to the Modules tab in the Orbiter Launchpad
5. In the "Script tools and drivers" section, check the box next to "ScriptMFD"
6. Start your simulation and press **M** to access the Music Player MFD

Requirements:

- Orbiter Space Flight Simulator
- proAudioRt module (included with the MFD based on the proteaAudio library)



Converting Music to OGG Format

The Music Player MFD requires audio files in OGG (Ogg Vorbis) format. Here are several ways to convert your music files:

Using Audacity (Free Audio Editor):

1. Download and install Audacity from <https://www.audacityteam.org/>
2. Open Audacity and select File > Open to load your audio file
3. After editing (if desired), select File > Export > Export as OGG
4. Set quality settings (recommended: quality level 6-8 for good balance of quality/size)
5. Save the file to your `orbiter\XRSound\Default\Music` directory

Using Online Converters:

1. Several websites offer free audio conversion:
 - [Online Audio Converter](#)
 - [Convertio](#)
 - [FreeConvert](#)
2. Upload your audio file

3. Select OGG as the output format
4. Download the converted file and place it in your `Orbiter\XRSound\Default\Music` directory

Using VLC Media Player:

1. Open VLC Media Player
2. Select Media > Convert/Save
3. Add your audio file and click Convert/Save
4. Select "Audio - Vorbis (OGG)" from the profile dropdown
5. Choose a destination file in your `Orbiter\XRSound\Default\Music` directory
6. Click Start to begin conversion

After converting your files to OGG format, follow the instructions in the "Getting the Most Out of the MFD" section to extract audio features for visualizations.

BASIC USAGE

1. Launch Orbiter Space Flight Simulator
2. Press `M` key to open the Music Player MFD
3. Use the MFD buttons or keyboard shortcuts to navigate and control playback
4. Press `M` again or close the MFD when finished



CONTROLS AND FEATURES

The Music Player MFD has two pages of controls, accessible via the "PG" button. Below are the available controls for each page:

Page 1 Controls:

Button	Keyboard	Function
NXT	D	Next track
PRV	A	Previous track
PLY	E	Play selected track
STP	Q	Stop playback
V+	W	Volume up
V-	S	Volume down
SHF	F	Toggle shuffle playback
VIS	V	Change visualization mode
OS-	Z	Decrease lyrics offset
OS+	X	Increase lyrics offset
LYR	G	Cycle lyrics display mode
PG	P	Switch to Page 2

Page 2 Controls:

Button	Keyboard	Function
NXT	D	Next track
PRV	A	Previous track
PLY	E	Play selected track
STP	Q	Stop playback
V+	W	Volume up
V-	S	Volume down
DP+	I	Increase audio disparity (stereo effect)
DP-	K	Decrease audio disparity (stereo effect)
LST	L	Toggle track list view
		(Not assigned)
		(Not assigned)
PG	P	Switch to Page 1

GETTING THE MOST OUT OF THE MFD

The Music Player MFD reaches its full potential when your music files are analyzed to extract audio features for the visualizations. Without this analysis, some visualization modes will not work correctly. Follow these steps to prepare your music files:

Installing Python and Required Libraries

Windows Installation:

1. Download Python:

- Visit python.org and download the latest Python 3.x installer (e.g., Python 3.11)
- Choose the 64-bit version for best performance

2. Install Python:

- Run the installer
- **IMPORTANT:** Check the box that says "Add Python to PATH"
- Select "Customize installation"
- Ensure "pip" is selected
- Click "Next" and then "Install"

3. Verify Installation:

- Open Command Prompt (search for "cmd" in the Start menu)
- Type `python --version` and press Enter
- You should see the Python version displayed

4. Install Required Libraries:

- Open Command Prompt as Administrator
- Type the following commands and press Enter after each:

```
pip install librosa
pip install numpy
pip install pandas
```

- This may take several minutes as librosa has many dependencies

Troubleshooting Python PATH Issues:

If the `python --version` command returns an error, you may need to manually add Python to your PATH:

1. Find your Python installation directory (typically `C:\Users\`

`[username]\AppData\Local\Programs\Python\Python3x\` or `C:\Program Files\Python3x\`)

2. Open System Properties:

- Right-click on "This PC" or "Computer"
- Select "Properties"
- Click on "Advanced system settings"

3. Click on "Environment Variables"
4. In the "System variables" section, find and select the "Path" variable
5. Click "Edit"
6. Click "New" and add these two entries:
 - `C:\Users\[username]\AppData\Local\Programs\Python\Python3x\`
 - `C:\Users\[username]\AppData\Local\Programs\Python\Python3x\Scripts\`
(Replace with your actual Python installation path and username)
7. Click "OK" on all dialog boxes
8. Restart Command Prompt and test with `python --version`

Extracting Audio Features

Once Python and the required libraries are installed, you can analyze your music files to extract the features needed for visualizations:

1. Open Command Prompt and navigate to your music directory:

```
cd C:\path\to\Orbiter\XRSound\Default\Music
```

2. Run the extraction script (which was included in the zip file you extracted during installation):

```
python process_ogg.py
```

3. Follow the prompts:
 - Answer "Y" to process all OGG files (even if they've been processed before)
 - Answer "N" to only process new files that haven't been analyzed yet


```
Windows PowerShell
PS Z:\Orbiter2016\XRSound\Default\Music> python process_ogg.py

Options:
Y - Process ALL OGG files in the folder (will overwrite existing data)
N - Process ONLY OGG files that don't have corresponding CSV files yet

Extract data from all OGG files? (Y/N): y

Processing all OGG files regardless of existing CSV files...

Found 22 OGG files in folder
[1/22] Processing Billie_Jean.ogg... Loading audio file... Done
Extracting audio features... Done
Data saved to:
- Billie_Jean.csv
- Billie_Jean_waveform.csv
Done
[2/22] Processing Bring_Your_Daughter_To_The_Slaughter.ogg... Loading audio file... Done
Extracting audio features... Done
Data saved to:
- Bring_Your_Daughter_To_The_Slaughter.csv
- Bring_Your_Daughter_To_The_Slaughter_waveform.csv
Done
[3/22] Processing Bronski Beat - Smalltown Boy.ogg... Loading audio file... Done
Extracting audio features... Done
Data saved to:
- Bronski Beat - Smalltown Boy.csv
- Bronski Beat - Smalltown Boy_waveform.csv
Done
[4/22] Processing Calm_Spaces.ogg... Loading audio file... Done
Extracting audio features... Done
Data saved to:
- Calm_Spaces.csv
- Calm_Spaces_waveform.csv
Done
[5/22] Processing Danzig_Mother.ogg... Loading audio file... Done
Extracting audio features... Done
Data saved to:
- Danzig_Mother.csv
- Danzig_Mother_waveform.csv
Done
[6/22] Processing Delerium_Silence.ogg... Loading audio file... Done
Extracting audio features... Done
Data saved to:
- Delerium_Silence.csv
- Delerium_Silence_waveform.csv
Done
[7/22] Processing Edge_of_Tomorrow.ogg... Loading audio file... Done
Extracting audio features...
```

The script will generate two CSV files for each OGG file:

- `trackname.csv` - Contains the main audio analysis data (sampled at 20Hz resolution)
- `trackname_waveform.csv` - Contains high-resolution waveform data (sampled at 40Hz resolution)

This process may take some time depending on how many music files you have and your computer's performance. The analysis includes:

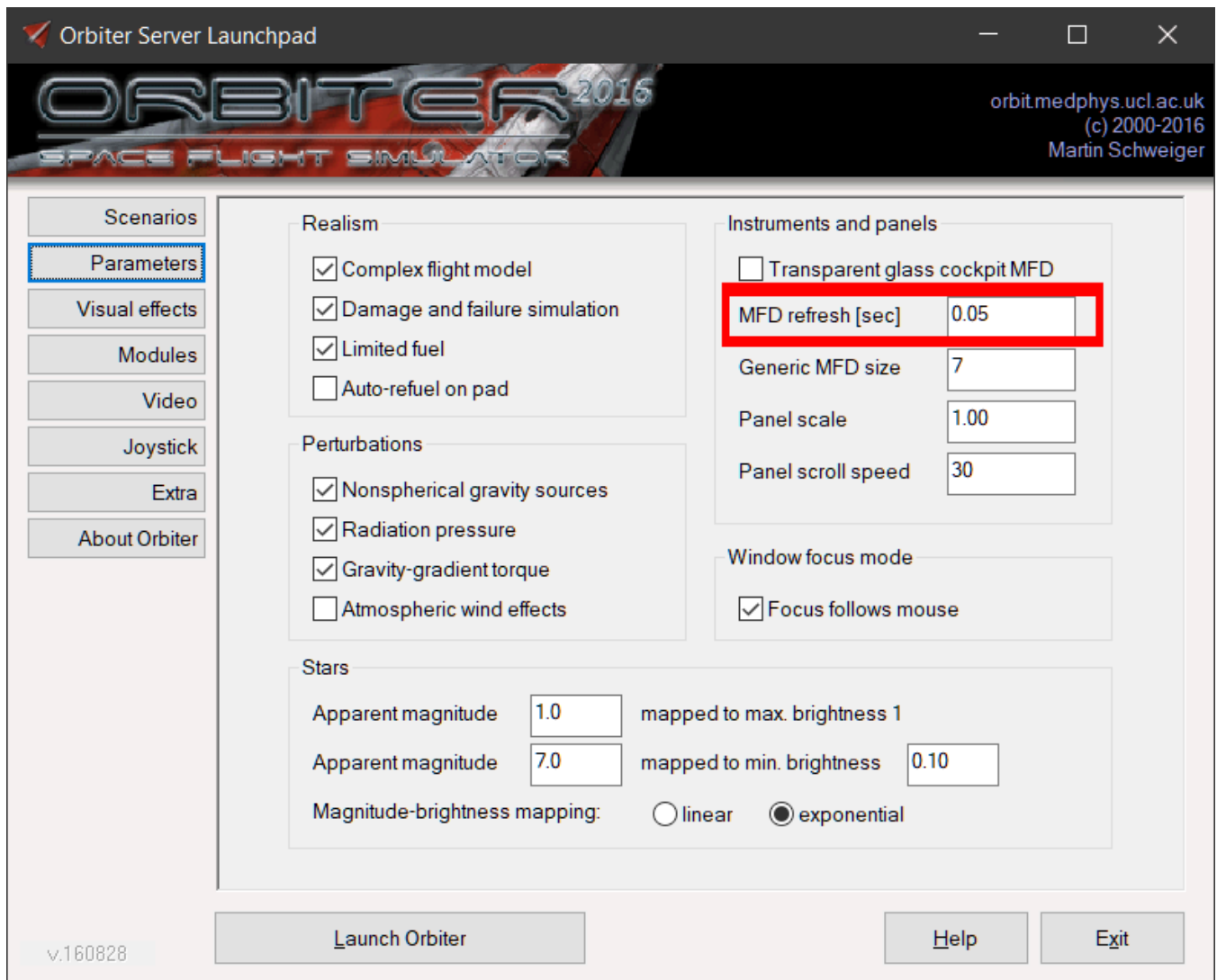
- Amplitude envelope
- Frequency band energy levels
- Beat detection
- Spectral characteristics
- High-resolution waveform data

Once the extraction is complete, restart Orbiter and the Music Player MFD. You should now have access to all visualization modes with proper audio-reactive behavior.

Setting the Correct MFD Refresh Rate

For optimal visualization performance, you should set the MFD refresh rate to match the data resolution:

1. In the Orbiter Launchpad, go to the "Parameters" tab
2. Find the "MFD refresh [sec]" option
3. Set this value to 0.05 (which equals 20Hz, matching the audio data resolution)
4. Click "Apply" to save the settings



This setting ensures that the visualizations update at the same rate as the audio analysis data, providing smooth and accurate visual representation of your music.

ADDING LYRICS TO TRACKS

The Music Player MFD supports synchronized lyrics display. To add lyrics to your tracks:

1. Create a text file with the same name as your audio file, but with the extension `.lyr`
 - For example, if your song is named `mysong.ogg`, name the lyrics file `mysong.lyr`
2. Place the lyrics file in the same directory as your music (`Orbiter\XRSound\Default\Music`)

You can find lyrics with timestamps at [Lyricsify](https://lyricsify.com). All lyrics from this site include timestamps in a compatible format, saving you the work of adding them manually. You'll only need to add timestamps yourself if you're using lyrics from other sources.

Lyrics File Format

The lyrics file should contain timestamped lines in one of these formats:

Format 1 (preferred):

```
[mm:ss.xx]Lyric text
```

For example:

```
[00:15.30]welcome to the space age  
[00:19.45]Floating in zero gravity
```

Format 2:

```
hh:mm:ss Lyric text
```

For example:

```
00:00:15 welcome to the space age  
00:00:19 Floating in zero gravity
```

Format 3:

```
hh:mm:ss.xxx Lyric text
```

For example:

```
00:00:15.300 welcome to the space age  
00:00:19.450 Floating in zero gravity
```

Adjusting Lyrics Timing

If you find that the lyrics are not perfectly synchronized with the music, you can adjust the offset:

- Use the **OS+** and **OS-** buttons to increase or decrease the offset by 0.25 seconds
- The current offset is displayed in the lyrics section of the MFD

Lyrics Display Modes

The Music Player MFD offers three lyrics display modes, toggled with the **LYR** button:

- **Off:** No lyrics are displayed
- **Single-line:** Only the current lyric line is displayed
- **Multi-line:** Previous, current, and next lines are displayed with color coding

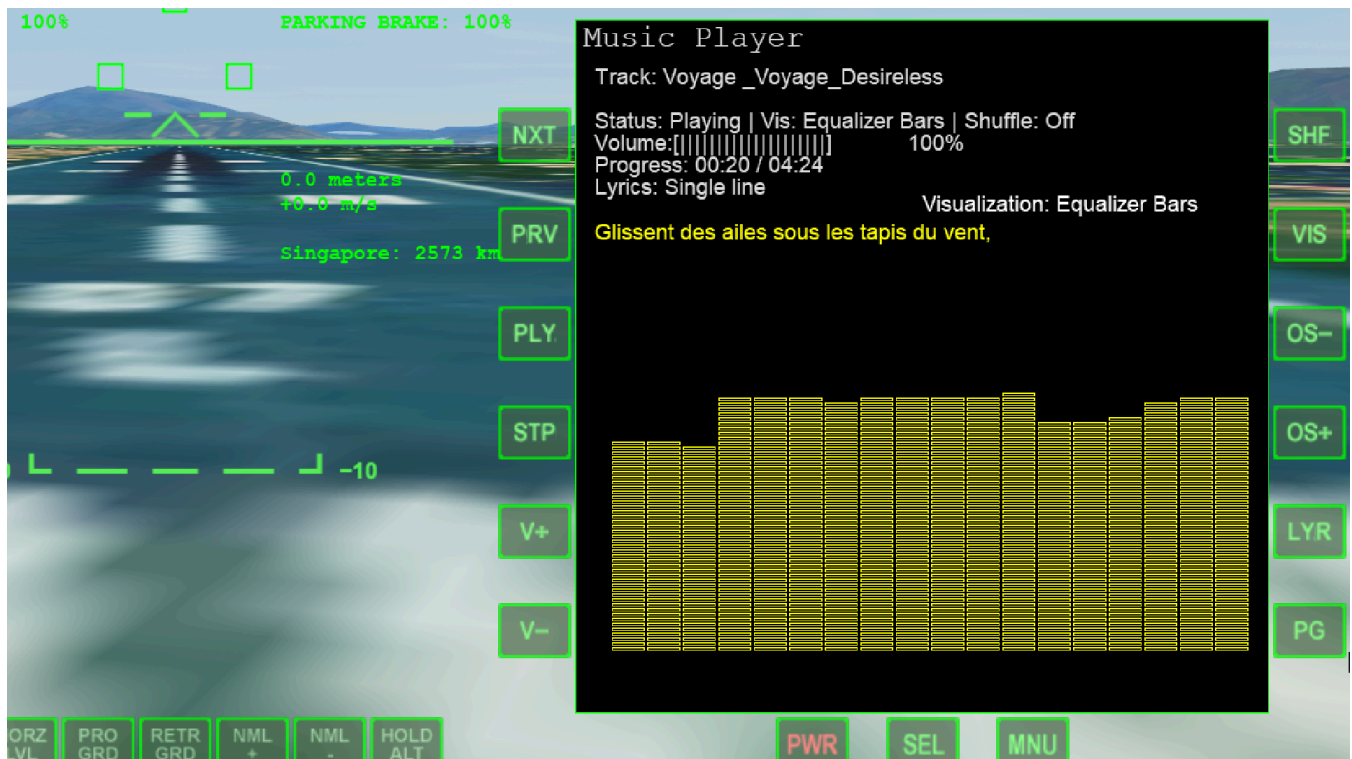


VISUALIZATION MODES

The Music Player MFD offers six visualization modes that can be cycled through using the **vis** button:

1. **Off**: No visualization is displayed
2. **Rain**: Particle rain effect that reacts to music amplitude and beats
3. **Starfield**: Stars emanating from the center with colors based on frequency bands
4. **Psychedelic**: Spiral particles that respond to beats and spectral characteristics
5. **Mirrored Waveform**: Real-time audio waveform display with beat highlighting
6. **Equalizer Bars**: Frequency spectrum display with beat-reactive colors and heights

For the best visualization experience, ensure you've completed the audio feature extraction as described in the "Getting the Most Out of the MFD" section.



TROUBLESHOOTING

Problem: No sound plays when pressing "PLY"

- Ensure proAudioRt is properly installed
- Check that your OGG files are valid and playable
- Verify audio is enabled in Orbiter

Problem: Visualizations don't appear or don't react to music

- Ensure you've run the audio feature extraction script
- Check that the CSV files are in the same directory as your OGG files
- Make sure the CSV filenames match your OGG filenames

Problem: Lyrics don't appear

- Verify that the lyrics file has the same base name as the audio file
- Check that the lyrics file uses one of the supported timestamp formats
- Try adjusting the lyrics offset using the OS+ and OS- buttons

Problem: Python script fails to run

- Ensure Python is correctly installed and added to PATH
- Verify all required libraries are installed
- Try running the commands as administrator

Problem: MFD doesn't appear when pressing Shift-M

- Check that the MusicPlayer.cfg file is correctly placed in the Config\MFD directory
- Verify that ScriptMFD is enabled in the Orbiter Launchpad Modules tab

- Confirm that ScriptMFD.cfg has been updated with the MFD\MusicPlayer.cfg line
 - Try both Left Shift-M and Right Shift-M for different MFD panels
-

For support or to report bugs, please contact Dimitris "dgatsoulis" Gatsoulis.

ACKNOWLEDGMENTS

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- Gerald Franz for creating the proteaAudio library (<https://github.com/jkl1337/proteaAudio>)
 - The Orbiter Space Flight Simulator community
 - Claude 3.7 Sonnet for assistance with development and documentation
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Thank you for using the Music Player MFD for Orbiter Space Flight Simulator!