Software Requirements Specification for

Furiosa

a Video Editor for Windows
Version 1

Prepared by: John Jack Lewis
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Revision History

Date	Version	Description	Author
9/19/2020	1.0	First Completed Copy	JLEW

1.   Introduction

1.1   Purpose

This Software Requirements Specification document describes the functional and non-functional software requirements for the desktop application *Furiosa*. *Furiosa* is a desktop application available for Windows 10 that allows users to edit videos and create video presentations. The application code is open source and the application is free.

1.2   Intended Audience

This document is intended for the member of the project team, John Jack Lewis, and his advisor, Dr. Eicholtz, Dr. Roberson, and Dr. Hamilton, to clearly communicate the functionality of the application.The software engineer, John Jack Lewis, and any future software engineers can use this document to more accurately plan sprints and verify the functionality and features of the application.

1.3   Project Scope

Furiosa is a Windows application that allows users to edit and composite images, audio, and videos to create videos and video presentations. It consists of a user interface that allows for easy and comprehensive use of composited videos and images and editing tasks. It is programmed in Python.

In its first version, Version 1, *Furiosa* will contain more limited features but still allow users to edit videos with basic functionality. This functionality will be defined in this document.

2.   Overall Description

2.1   Product Features

FE-1:   User Interface
FE-2:   Clip Manipulation
FE-3:   Project Video Manipulation
FE-4:   Video and Project Filters
FE-5:   Visual Effects

2.2 User Types and Characteristics

Default User	A Default User will use *Furiosa* on their local computer to edit videos and video presentations for their purposes. A Default User has a Windows Operating System.
Developer	A developer will have the administrator-level privileges to moderate the application for bug fixes and future versions.

2.3 Operating Environment

OE-1:   The system shall operate in a Windows 10 Environment.

OE-2:   Projects shall be retrievable and saved within folders to which user has appropriate permissions

2.4 Design and Implementation Constraints

CO-1:   User system can compile Python code and necessary dependencies

CO-2:   Third-party dependencies are maintained by their respective developers

2.5 User Documentation

User issues will be documented within the repository on GitHub. User issues will be addressed within two weeks, assuming general circumstances.

2.6 Assumptions and Dependencies

AS-1:   Users have knowledge of appropriate installation of software

AS-2:   Users do not require cloud storage for saving projects

DE-1:   Newer versions of Python will be backwards compatible with Python 3

3. System Features

3.1 User Interface

3.1.1 Description and Priority

A user interface will equip all buttons and possible actions within the workspace of the application. These actions will be detailed below. The primary view of the workplace will consist of two video panels, a sequence line panel, and an "Effects" panel. The left video panel will show a preview of the "Currently Selected" video. The right video panel will show a preview of the entire project. The sequence line panel will show selectable widgets for audio, video, and effects that are present within the project. The "Effects" panel will show a tree view of all effects present in the project.

Priority: high

3.1.2 Stimulus/Response Sequence

Stimulus: A user imports one video into an empty project in the video editor tab.

Response: Project length equals length of input video. Sequence line shows input video. Project preview shows the first frame of the input video.

Stimulus: A user imports a new video into an existing project already containing video(s) in the video editor tab

Response: Project length equals the sum of input video length and previous project length. Sequence line appends to new video to current project video sequence.

Stimulus: A user selects "play" to preview project

Response: Project preview panel displays moving project video beginning at current-time cursor.

Stimulus: On an audio clip in the sequence line panel, a user clicks and holds the left button on a mouse/keypad and moves their mouse to an empty audio area of the sequence line panel and releases the selection.

Response: The system shall move the audio clip with the movement of the mouse and place the audio clip down in the last location when the selection is released.

Stimulus: A user hits the "Delete" key while a video clip is selected
Response: Clip will be removed from the sequence line panel and the area that the previous clip was containing will remain empty.

3.1.3 Visualization

TODO: SHOW SKELETON OF WORKSPACE

3.1.4 Functional Requirements

File Input *Priority*: high	Users will be able to input videos from File Selector Dialog into project
Remove Clips *Priority:* high	Users will be able to select and delete audio and video clips from a project.
Playback *Priority:* high	Users will be able to preview clips and entire projects with play buttons within each video panel and sequence line panel.
Rearrange Clips *Priority:* high	Users will be able to rearrange the audio and video clips in a project by click and drag
Workspace Adjustment *Priority*: low	Users will be able to rearrange the panels in the workspace.

3.2   Clip Manipulation

3.2.1 Description and Priority

Users will be able to manipulate individual video and audio clips that are part of a project.

Priority: high.

3.2.2 Stimulus/Response Sequence

Stimulus: User selects to split a clip.
Response: The system creates a new clip on both sides of the current time pointer, each consisting of the video or audio up-to and from the current time pointer, respectively.

Stimulus: User clicks and drags the right border of a selected clip to the center of the selected clip.
Response: The system reduced the size of the selected clip and the clip ends at the new endpoint of the clip.

Stimulus: User selects to resize a video clip into a square shape within a project that has aspect ratio 1080x720
Response: The system will replace a section of 360x720 pixels of the video with black pixels, depending on the requested position of the square.

3.2.3 Visualization

TODO: SHOW VIDEO CLIPS

3.2.4 Functional Requirements

Trim Clips *Priority*: high	Clips can be shortened from either end of the video
Split Clips *Priority*: high	Clips can be divided from any point within the clip
Frame rate alteration	Frame rate of video clips can be reset for "fast-forward" and

Priority: medium	"slow-motion" speed changes of clips
Video Resize *Priority:* medium	Videos can be reshape by aspect ratio or by a shape
Copy Clip *Priority:* low	Clip can be copied to clipboard.
Paste Clip *Priority:* low	Clip from clipboard can be inserted into the sequence line panel

3.3   Project Manipulation

3.3.1 Description and Priority

Users will be able to manipulate projects uniquely. These visual changes are applied to multiple or all video clips and these audio changes are applied to multiple or all audio clips. For specifics of project filters, see section 3.4.

Priority: high.

3.3.2 Stimulus/Response Sequence

Stimulus: User selects and drags a clip to an empty area of the sequence line panel.

Response: The system shall move the positioning of that clip with the mouse and set the new position of that clip within that project to the time area where the clip was released.

Stimulus: User selects and drags a video clip to a point where the cursor rests between two anchored videos on the sequence line.

Response: The system shall push the clips to the right of the cursor to the right of the sequence panel by the currently selected clip's time length.

Stimulus: User selects and drags a video clip on top of another clip and holds the mouse still in that position for 1 second.

Response: The system will show an opening within the back-most clip in with the size of the currently selected clip.

Stimulus: After a back-most video shows that a currently selected video can be released, a user releases the mouse.

Response: The system will place the currently selected video within the clip box on the sequence line. The system shall update the currently selected clip panel to show the now layered videos, with a dotted border around the last selected video, indicated in can be resized and moved.

3.3.3 Visualization

Composite Videos Sequentially:
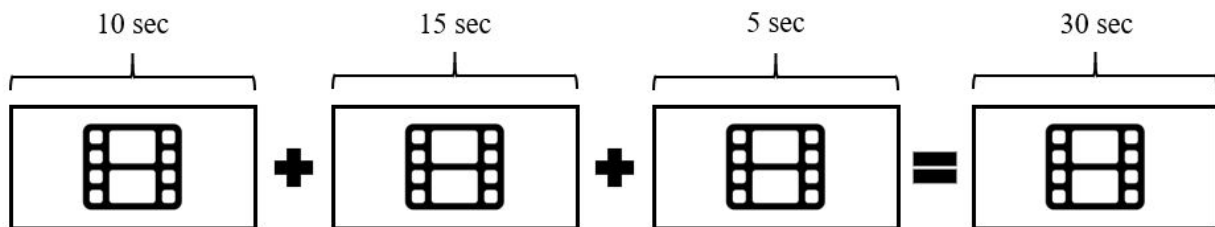
Per-frame Video Layering:
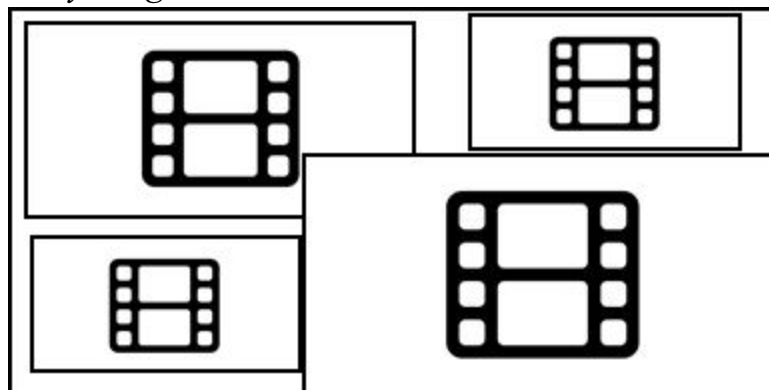
3.3.4 Functional Requirements

Composite Videos Sequentially *Priority*: high	Users will be able to concatenate individual video inputs and photo-as-video inputs to build one composite project video.
Per-frame Video Layering *Priority*: high	Users will be able to layer multiple videos on top of each other.

Change frame rate *Priority*: high	Users can select and change what frame rate in which the project will be made
Filtering *Priority*: high	Users can apply a filter to be applied to the entire project.
Text *Priority*: medium	Users will be able to add text to projects that can span multiple clips.

3.4   Video and Project Filters

3.4.1 Description and Priority

Users will be able to apply many filters to individual videos and entire projects. These filters can be pre-set, or they can be manipulated within the user interface.

Priority: high.

3.4.2 Stimulus/Response Sequence

Stimulus: User drags a contrast slider with a single clip selected.
Response: The system will increase or decrease contrast in the current video panel based on the position of the slider. The system shall show a save button and a cancel button.

Stimulus: User drags a contrast slider without a clip selected.
Response: The system will increase or decrease contrast in the current video panel and project video panel based on the position of the slider. The system shall show a save button and a cancel button.

Stimulus: User selects a "Black and White" filter from the predefined "Effects" dropdown menu with no video selected.
Response: The system will show a preview of this filter in the project video panel. The system shall show a save button and a cancel button.

Stimulus: User selects the save button after adjusting sliders in a user adjustable filter.

Response: The system will save this effect to the entire project. A message box will appear asking if the user wishes to save this filter's settings.

3.4.3 Visualization

3.4.4 Functional Requirements

Predefined filters *Priority:* high	Users will have options to select from a set of predefined filters that can be applied to all clips or individual clips
Color-adjustable filters *Priority:* medium	Users will be able to use sliders to apply the weight of specific color filters.
Saturation-adjustable filters *Priority:* medium	Users will be able to use sliders to apply the weight of specific saturation filters.
Contrast-adjustable filters *Priority:* medium	Users will be able to use sliders to allow changes in contrast.
Halo filters *Priority:* low	Users will be able to use sliders to change the shape, color, and diameters of halo filters.
Save User-defined filters *Priority:* low	Users will be able to save filters based on the position of sliders and give these filters a name, which will then appear in the "Effects" panel in current and future projects.

3.5   Visual Effects

3.5.1 Description and Priority

Users will be able to apply visual effects based on pre-trained machine learning models. These visual effects are not too advanced in Version 1, but can help create some unique and more artistic creations.

Priority: Medium.

3.5.2 Stimulus/Response Sequence

Stimulus: User right clips on a video clip and selects the edit tab.
Response: The system shall show two effects selections, in which a hover over either will show details of that effect and an approximation of time to apply that effect.

3.5.3 Visualization

Deepfake Effect

3.5.4 Functional Requirements

Face Detection *Priority*: medium	Users will be able to apply face detection models to animations.
Deepfake Creation *Priority*: medium	Users will be able to create deepfakes within clips

4.   Non-Functional Requirements

4.1   Performance Requirements

Furiosa will be able to run at speeds relative to the hardware on the computer. Some of the effects will require an Nvidia GPU to perform the machine learning functions for visual effects. If a GPU with adequate memory allocation (~2GB) is unavailable, these processes will be unavailable. Therefore, the application assumes a GPU with adequate memory is available when this application is running. Additionally, RAM availability must be considered. The specifics of RAM is not yet known at the time of this document's completion.

4.1.1 Programmatic Requirements

PR-1: System shall save videos at a speed no greater than ____ seconds per frame

PR-2: System shall execute machine learning effects at a speed no greater than ____ frames per second

4.1.2 Visual Requirements

PR-3: System shall be able to preview video in frame-rate specified by project and video clips

5. Glossary

Term	Definition
OS	An Operating System is the system software that supports the basic functions of a computer
Workspace	Window in which editing takes place for a project

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Clip	A video or audio segment
Current Time Pointer	Line and shape indication the time of the currently selected clip or project
GPU	Graphics Processing Unit
RAM	Random Access Memory