WildTracker

Graphical User Interface Implementation Test Report

Project: WT18G4 **WP Name: Subsystem Testing** **WP Number: WP - GR - 04**	**Type of Test:** Software Test
Test Article: Graphical User Interface	
System Requirements: REQ-M-05, REQ-M-06, REQ-M-07	**Test Equipment:** See section 3
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Revision Record

Document Issue/Revision Status	Description of Change	Date	Approved
1.0	Final Issue	26/10/2018	Delenn Palmer

Table of Contents

Paragraph **Page No.**

Definitions

WT	WildTracker - Software implementation of an autonomous detection and tracking tool for wildlife
QUT	Queensland University of Technology
HLO	High Level Objectives
PMP	Project Management Plan
GUI	Graphical User Interface
TF	TensorFlow
CNN	Convolutional Neural Network
OpenCV	Open Source Computer Vision
OD	Objective Detection
DL	Deep Learning
ML	Machine Learning

1 Introduction

It is critical that software is tested to ensure that it performs what it is intended for. By testing the software bugs can be found/fixed, improvements can be made, the overall client experience can be improved. The tests enclosed within this document provide a method to ensure what has been requested by the customer is provided.

1.1 Scope

This test report covers the functions of the Graphical User Interface (GUI). This includes the functionality of the buttons and labels all performing as expected and properly interfacing with the Object Detection subsystem.

1.2 Background

QUT ASL is a world leading research centre based in Brisbane, Australia. They conduct research into autonomous technologies which support the development of autonomous aircraft or drones for remote sensing with on-board sensor systems for a wide range of commercial applications.

The QUT Airborne Systems Lab (ASL) has commissioned students of EGH455 in collaboration with WWF and Wildlife Australia to design and build an autonomous detection and tracking tool for wildlife. Group 4 has been tasked with designing an Unmanned Aerial System (UAS) application that must have the ability to identify and report the number of, the size of and volume of wildlife present in footage retrieved by drones. In addition, the data acquired and processed must be accessible both in the real-time use of the application and after the video has been exported.

2 Reference Documents

2.1 QUT Systems Engineering Documents

RD/1	WT18G4-SUP-Customer Needs	Autonomous detection and tracking tool for wildlife
RD/2	WT18G4-SR-01	WildTracker Project: System Requirements Document 2018
RD/3	WT18G4-PMP-04	WildTracker Project: Project Management Plan 2018
RD/4	WT18G4-FD-01	WildTracker Project: Final System Design 2018

2.2 Non-QUT Documents

2.3 Numbering Scheme

For ease of identification, a numbering system has been developed.

For the requirement REQ-M-01:

REQ – This is a requirement derived from the client's brief and the associated HLOs

M – Denotes a *mandatory* requirement, whereas D denotes the *desired* requirement.

3 Test Objectives

It is important that there are objectives in place for testing as to ensure that the testing serves to enhance what is eventually delivered to the client. The objective of these tests were to ensure that all of the elements in the GUI worked properly. That is, to ensure that buttons presses worked, text boxes displayed correctly, and the video could be played/seeked.

3.1 REQ-M-05

Description: The WildTrack system shall be capable of distinguishing between wildlife species and displaying necessary label on the GUI

Rationale: The provided information will allow clients to obtain information from footage at a glance.

3.2 REQ-M-06

Description: The WildTrack system shall be capable of detecting the number of an animal species and displaying the appropriate label on the GUI.

Rationale: The provided information will allow clients to obtain information from footage at a glance.

3.3 REQ-M-07

Description: The system will have an easy to use interface that allows for the opening of footage, ability to select wildlife to be detected and a button to process footage. Pausing the footage and reviewing processed footage will also be a feature.

Rationale: The system will be used by people of varying disciplines and must be accessible and intuitive for use and must adhere to REQ-M-05 and REQ-M-06

4 Test Set-up and Equipment

4.1 Required Equipment and Software

4.1.1 Hardware

- Generic desktop/laptop

4.1.2 Software

- Anaconda
  - Python 3.6 package
  - PyQt package

4.1.3 Test Set-up of Laptop

The set-up of the laptop involved the installation of the above software. Anaconda was downloaded (https://www.anaconda.com/download/) and installed onto the test laptop with the default options selected. From there, the anaconda prompt was started which allowed for the install of the Python 3.6 and PyQt package. These packages were installed via the anaconda command: *conda install python=3.6 pyqt*. This is all that was required to set-up the testing environment on the laptop.

4.2 Graphical User Interface Software Implementations

The software used to implement the GUI was Python v3.6 and the PyQt GUI framework. Python is a programming language that is developed under an open source license, making it freely usable and distributable, even for commercial use. In addition it is capable of incorporating endless community-contributed modules which allow for extensions of its functionality.

The PyQT GUI framework is one such module. It is one of the most popular GUI frameworks available for Python. As expected of something so popular it has many features with over 620 classes that cover graphical user interfaces, XML handling and other technologies.

5 Test Procedure

5.1 Play/Pause button

Satisfies requirements: REQ-M-07

The objective of this test is to ensure that the Play/Pause button plays and pauses the video.

Steps:

- Launch the GUI application
- Load a video
- Attempt to play the video
- Attempt to pause the video

Pass condition:

- The video plays and pauses

5.2 Seek video buttons

Satisfies requirements: REQ-M-07

The objective of this test is to ensure that the Seek button allows the playback position of the video to be moved forward/backward a set amount of seconds.

Steps:

- Launch the GUI application
- Load a video
- Play the video
- Attempt to seek forwards in the video
- Attempt to seek backwards in the video

Pass condition:

- The video seeks both backwards and forwards

5.3 Load video button

Satisfies requirements: REQ-M-07

The objective of this test is to ensure that the Load video button loads a video that can then be played.

Steps:

- Launch the GUI application
- Attempt to load the video
- Attempt to play the video

Pass condition:

- Loading the video produces no errors and the video can be played

5.4 Analyse video button

Satisfies requirements: REQ-M-07

The objective of this test is to ensure that the Analyse video button analyses the video that can then be played.

Steps:

- Launch the GUI application
- Load the video
- Attempt to analyse the video
- Attempt to play the video

Pass condition:

- Analysing the video produces no errors and the processed video can be played

5.5 File path labels

Satisfies requirements: REQ-M-07

The objective of this test is to ensure that the file path labels display the correct file path to the original and processed video

Steps:

- Launch the GUI application
- Load the video
- Analyse the video
- Verify the file path labels

Pass condition:

- The file paths displayed on the labels are the correct file paths to the videos

5.6 Number of animals label

Satisfies requirements: REQ-M-06

The objective of this test is to ensure that the label displaying the number of animals shows the correct number of animals

Steps:

- Launch the GUI application
- Load the video
- Analyse the video
- Play the video
- Verify the Number of animals label

Pass condition:

- The number of animals labels displays the correct number of animals as seen in the video

5.7 Animal list box/Animal video labels

Satisfies requirements: REQ-M-05

The objective of this test is to ensure that the animal list box displays all the animals in the video and that the video has labels on the animals

Steps:

- Launch the GUI application
- Load the video
- Analyse the video
- Play the video
- Verify animal list and animal labels

Pass condition:

- Animal list reflects what is shown in the video and animals have labels on them in the video

6 Results

6.1 Play/Pause button – SUCCESS

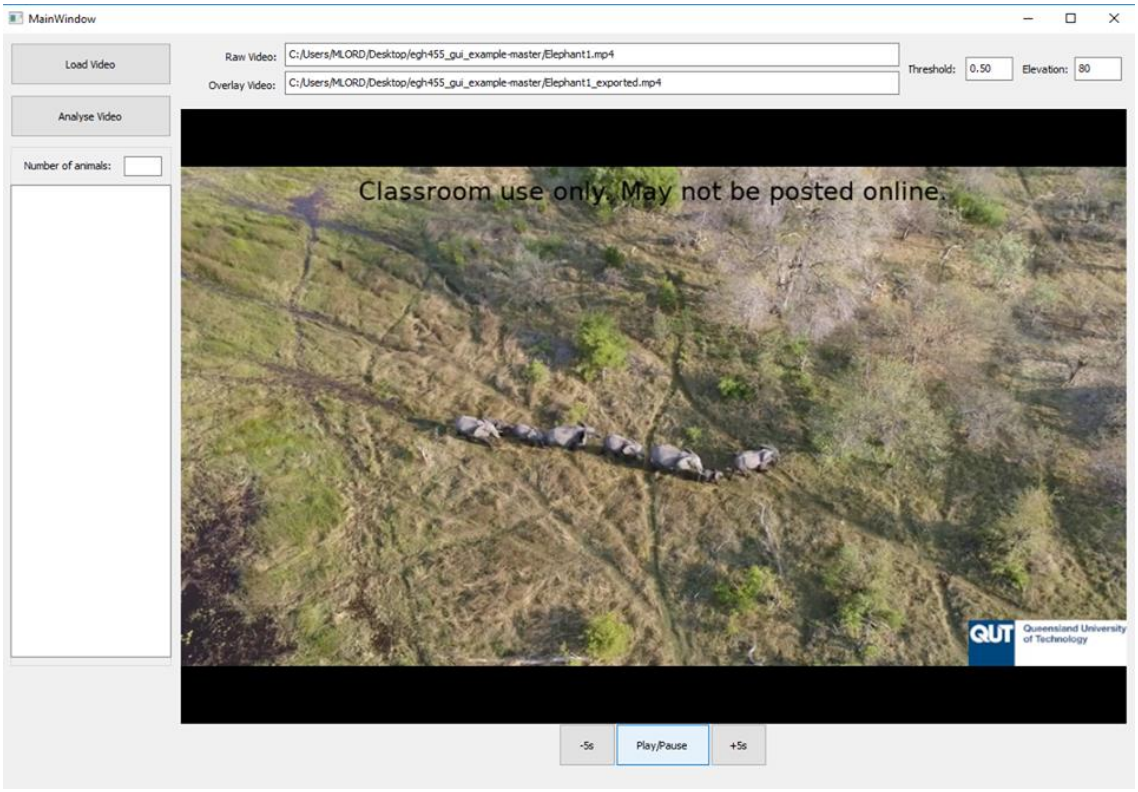

Figure 1 - Video that was played, seeked through, and paused

Figure 1. shows a video that was played, paused and seeked back and forth by 5 seconds indicating that the Play/Pause button functions.

6.2 Seek video buttons – SUCCESS

Figure 1. shows a video that was played, paused and seeked back and forth by 5 seconds indicating that the Seek buttons functions.

6.3 Load video button - SUCCESS

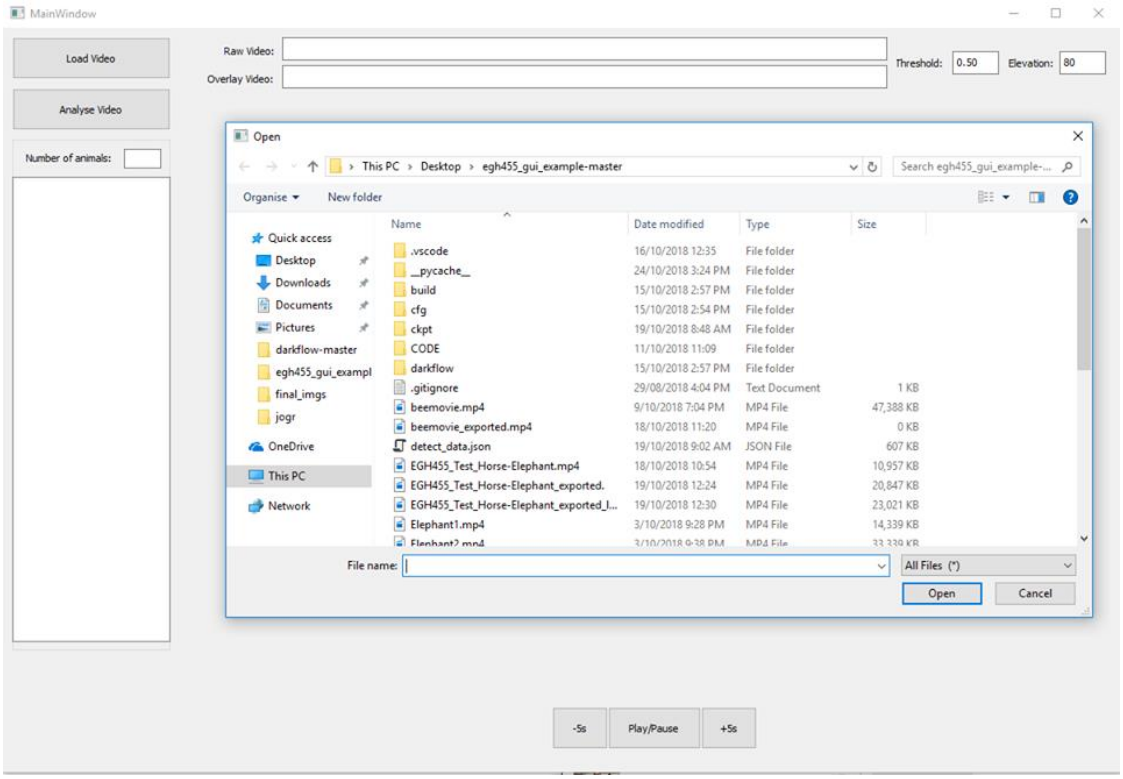

Figure 2 Load video prompting opening of file selector

Figure 2. shows the result of pressing the Load Video button. Figure 1. is what is shown afterwards the animal video is selected. This indicates that the Load video button functions.

6.4 Analyse video button - SUCCESS

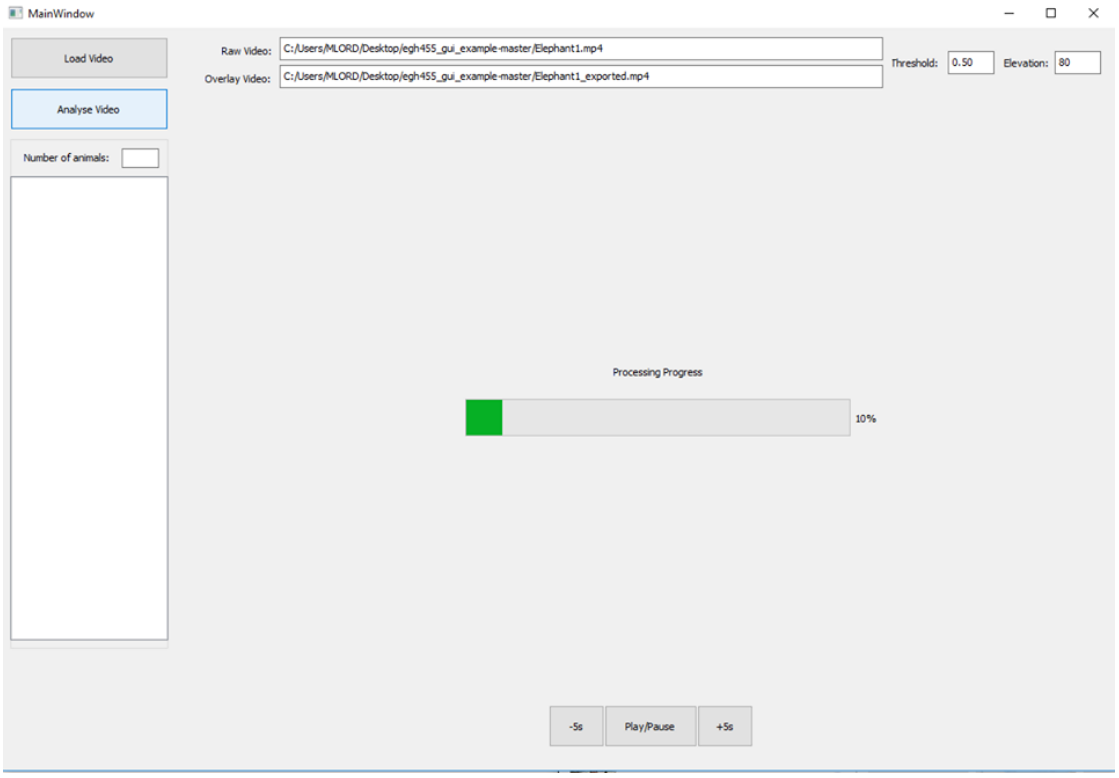

Figure 3 Analyse video button starting analysis of video

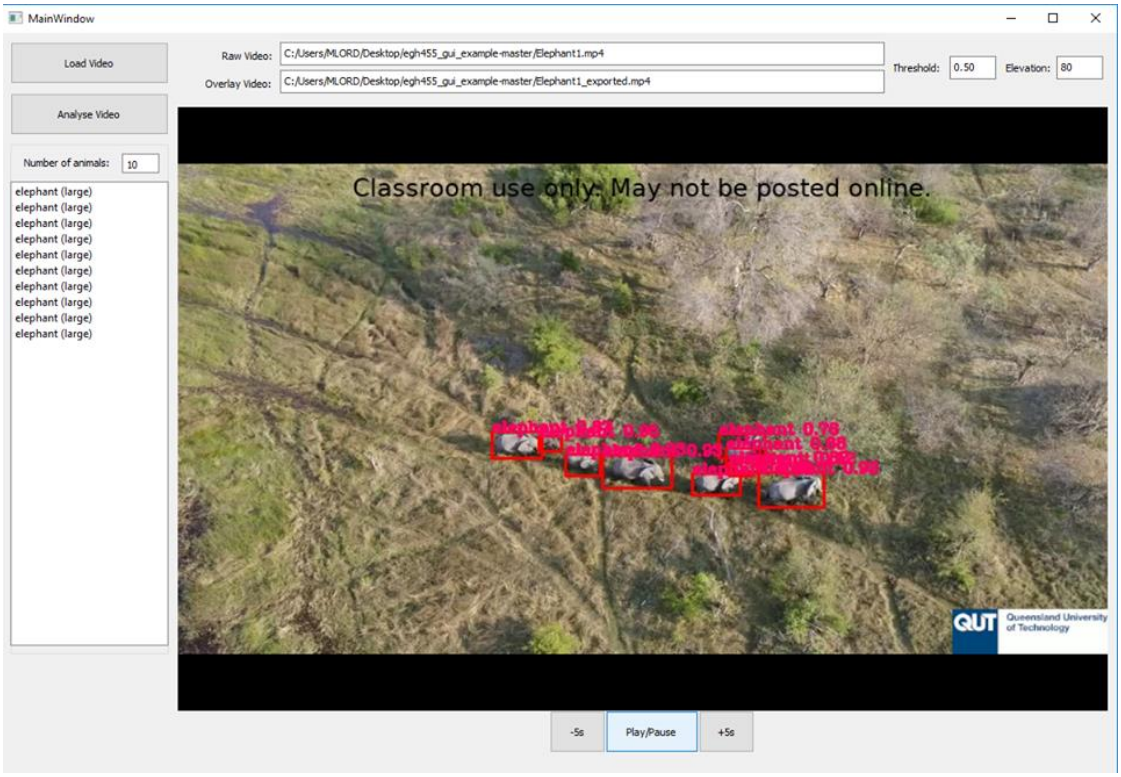

Figure 4 Result of Analyse video button

Figure 3. displays what happens when the Analayse video button is pressed whereas Figure 4. Demonstrates the analysed video as a result of this. This indicates that the Analayse video button functions.

6.5 File path labels – SUCCESS

Figure 4. shows the populated file path labels (at the top of the screen) which match up with the actual file locations as seen in Figure 2. This indicates that the file path labels function.

6.6 Number of animals label - SUCCESS

Figure 4. shows the populated Number of animals label (to the left of the screen) which matches with the number of bounding boxes on the video. This indicates that the Number of animals label functions.

6.7 Animal list box/Animal video labels - SUCCESS

Figure 4. shows the Animal list box and the labels on each elephant in the video. The animal list box has been populated with an entry for each elephant and their size, which corresponds with the video. This indicates that the Animal list box and the Animal video labels function.

7 Test Analysis

7.1 Play/Pause button

This test partially satisfies REQ-M-07 in that the video must be able to be paused and that the GUI must be easy to use

7.2 Seek video buttons

This test partially satisfies REQ-M-07 in that the GUI must be easy to use. Seeking through the video was found to be possible and greatly enhances the user experience.

7.3 Load video button

This test partially satisfies REQ-M-07 in that the GUI must be easy to use. Loading the video is a precursor to being able to analyse the video (also a part of REQ-M-07) making the functionality of this button critical.

7.4 Analyse video button

This test partially satisfies REQ-M-07 in that the GUI must have a button to process footage. This is a direct stipulation of REQ-M-07 that was fulfilled and verified through testing.

7.5 File path labels

This test partially satisfies REQ-M-07 in that the GUI must be easy to use. Having the file path to the videos is helpful to the user as it allows for exporting of the processed video and greatly enhances the user experience.

7.6 Number of animals label

This test satisfies REQ-M-06 in that the GUI must display a label which shows the number of animals.

7.7 Animal list box/Animal video labels

This test satisfies REQ-M-05 in that the GUI must display a labels on the animals in the video.

8 Conclusions and Recommendations

The requirements that the testing set out to meet were REQ-M-05, REQ-M-06 and REQ-M-07.

REQ-M-07 was satisfied by tests 5.1-5.5 through having the GUI be “simple to use” in addition to pausing and processing the video with a button.

REQ-M-05 was satisfied by labels added through the video processing step.

REQ-M-06 was satisfied by a label on the GUI which took information from the video analysis and displayed it to said label.

By passing all the tests the GUI system thereby me the necessary requirements.