

**The A Team**

**Image Processing Tool for**

**Leidenfrost-Ratchet Systems**

**Test Plan Document for Version 2.0 (Final Draft)**

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**1. Introduction**

This document details the test plan for the testing phase of the software development life cycle. This document set the scope of various tests to be conducted, the activities to be completed, the general resources required, and the process to be used to test final product before release.

1.1 Purpose of Test Plan Document

The test plan document will overview the intended testing process, the types of test strategies used and the test report form the executed test cases.

1.2 Product Overview

The current purpose of the software is to efficiently track a drop of liquid and record measurements through images gathered from a high speed camera as the drop falls from an injection needle and travels along a ratchet surface.

**2. Overview**

2.1 Test Strategies

The following list will be part of test strategies we follow.

* **Unit Testing** – This uses white box testing to find any faults in the function. We will use a control data to test each function. The programmer does the unit testing. Anne Lam, Sanan Aamir, Romando Garcia, and James Rowe will be in charge of unit testing.
* **Interface Testing** – This uses black box testing to see functionality of the user interface. Test case is required to check every possible expected result from the user interface. Hieu Tran will be working on the interface testing.
* **System Testing –** This uses black box testing to check for each input the user enters and the expected results will show the correct data. Hieu Tran will be in charged of working on the system testing.

1.4 Testing Process

The flow chart in Figure 1 shows the process of the test plan.

Figure 1. Test Plan Flow Chart

**2. Testing Criteria**

Testing criteria for each testing strategy A-Team plan to use during the testing phase of the software development cycle.

2.1 Unit Testing

“At agreed upon regularly scheduled intervals, the system’s developmental progress will be subject to peer review. If necessary, the testing schedule will correspond to the completion of a system module. The objective of these reviews is to ensure correctness and to test the functional integrity within each individual module. Issues to consider are matching of parameters, arguments, relative attributes, I/O interface and memory management. Symbolic execution will be tested utilizing ‘basic path testing’ also known as ‘white box’ testing” (Sommerville, pg 448).

**Entrance Criteria** - At least one module should be coded and tested to schedule a formal review meeting. As the group meets every Monday and Wednesday in a week, the development team will try to code at least one module by every Monday and Wednesday so that it can be formally reviewed in the next group meeting.

**Exit Criteria** – Highest priority module should pass each unit test created by the programmer.

2.2 Interface Testing

Interface Testing is performed to evaluate whether Image Processing Tool user interface pass data and perform correctly to the user. It is to verify if all the interactions between these modules are working properly and errors are handled properly.

**Entrance Criteria** – Entry criteria start when at least 2 highest priority modules have pass the unit test.

**Exit Criteria** – When tester verifies all interface test cases has pass and produced the correct expected output.

2.3 System Testing

System testing is a black box testing technique performed to verify the required input and the system provides the correct output. The functionality of the Image Processing Tool will be tested from a user interaction perspective.

**Entrance Criteria –** Entry criteria will start when the interface test phase has been completed.

**Exit Criteria –** When the tester has verifies all the system test cases has pass and produced the correct expected output.

**3. Test Schedule**

For the testing phases, the following schedule will apply, with room for flexibility as needed:

Unit testing: 4 days

Interface testing: 3 days

System testing: 2 day

**4. Resources**

This section list the resources required to execute the test plan.

4.1 Human

The A-Team consists of:

Sanan Aamir – Tester/Programmer

Romando Garcia – Tester/Programmer

Anne Lam – Tester/Programmer

James Rowe – Tester/Programmer

Hieu Tran - Tester

4.2 Hardware

The testing phase will required at least one PC with the following specifications:

32 - bit architecture

at least 1GB of RAM

at least 1GHz of Processor Speed

4.3 Software

The testing phase requires the following software:

Microsoft Visual Studio 10 or higher

Microsoft .NET 2.0 or higher

Windows 7 or higher

**5. Test Cases**

The test cases for the user interface for system integration testing. list are shown in appendix A.

**6. Glossary**

|  |  |
| --- | --- |
| **Term** | **Definition** |
| **Leidenfrost-Ratchet System** | A system involving a ratchet surface heated to a fluid's Leidenfrost point will allow a droplet of that fluid to spontaneous accelerate along that surface, even if it means traveling up slope. |
| **Droplet** | A very small drop of a liquid. |
| **Black Box** | A method of software testing that examines the functionality of an application without peering into its internal structures or workings. |
| **White Box** | A method of testing software that tests internal structures or workings of an application |
| **Unit Test** | A software testing method by units of source code, sets of one or more computer program modules together with associated control data, usage procedures, and operating procedures, are tested to determine whether they are fit for use. |

**7. References**

This document was completed with guidance from the Mavis and Scors test plan document, Test Plan Power Point slides written by Catherine Stringfellow, Professor at Midwestern State University, and Software Engineering book written by Sommerville.

Appendix A – Interface Test Cases

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Test Cases | Step & Input | Expected Results | What is Tested | Actual Results | Pass or Fail |
| **Load Button** |  |  |  |  |  |
| LB 011  Open File Dialog | Click Load Button > Show Open File Dialog | Open File Dialog Should Appear | User Interface |  |  |
| LB 021 Accept Directory .TIF | Find Image Directory > Open .TIF image folder | Accept .TIF Directory | Open File Dialog |  |  |
| LB 022  Accept Directory .BMP | Find Image Directory > Open .BMP image folder | Accept .BMP Directory | Open File Dialog |  |  |
| LB 023  Reject Single File | Find Image Directory > Open single file | Will not show single file | Open File Dialog |  |  |
| LB 024  Reject Other Directory Extension | Find Image Directory > Open other folder directory | Will not allow user to select other extension | Open File Dialog |  |  |
| LB 031 Show Image | Find Directory > Click Open | Will show Image on UI | User Interface / Open File Dialog |  |  |
| LB 032  Enable Run Button | Find Directory > Click Open | Run Button Will Enable | User Interface |  |  |
| LB 033  Enable Calibrate Button | Find Directory > Click Open | Calibrate Button Will Enable | User Interface |  |  |
| **Initial User Interface** |  |  |  |  |  |
| UI 011 Disable Calibrate Button | Click Image Processing Application | Calibrate Buttons disable | User Interface |  |  |
| UI 012 Disable Run Button | Click Image Processing Application | Run Button is Disable | User Interface |  |  |
| UI 013  Disable Black/White Calibration Drop down | Click Image Processing Application | Black/White Calibration drop down is disable | User Interface |  |  |
| UI 014  Enable Load Button | Click Image Processing Application | Enable Load Button | User Interface |  |  |
| UI 015  Enable Frame Rate Input | Click Image Processing Application | Enable Frame Rate Input | User Interface |  |  |
| UI 016  Enable Base/Needle Height | Click Image Processing Application | Enable Base/Needle Height | User Interface |  |  |
| UI 021  Enable File Menu | Click Image Processing Application | Enable File Menu | User Interface |  |  |
| UI 022  Enable Image Menu | Click Image Processing Application | Enable Image Menu | User Interface |  |  |
| UI 023 Enable About Menu | Click Image Processing Application | Enable About Menu | User Interface |  |  |
| **Frame Rate** |  |  |  |  |  |
| FR 011  Enter Frame Rate | Click Up or Down to select frame rate | Let User Choose Correct Frame Rate | User Interface |  |  |
| FR 011  Enter Frame Rate | Click Down to select negative number | Should stop at zero | User Interface |  |  |
| **Base/Needle Height** |  |  |  |  |  |
| BN 011 Enter Base/Needle Height | Enter negative number Base/Needle Height | Should not let user enter negative number | User Interface |  |  |
| BN 012 Enter Base/Needle Height | Enter letter for Base/Needle Height | Should not let user enter alphabetic | User Interface |  |  |
| BN 013 Enter Base/Needle Height | Enter positive Number for Base/Needle Height | Should let user enter positive number | User Interface |  |  |
| BN 014 Enter Base/Needle Height | Enter decimal number for Base/Needle Height | Should let user enter decimal number | User Interface |  |  |
| **Black/White Calibration** |  |  |  |  |  |
| BW 011 Black/White Calibration | Click Up or Down to select Black/White Calibration | Should let user click up or down | User Interface |  |  |
| BW 012 Black/White Calibration | Click Down to select negative number for Black/White Calibration | Should stop at zero | User Interface |  |  |
| **Run Button** |  |  |  |  |  |
| RB 011 Run Button | Click Run Button | Generate excel | User Interface |  |  |
| RB 012 Run Button | Click Run Button > Save File Dialog > Choose Location > Enter Name | Let user choose location and enter a name | User Interface / Save File Dialog |  |  |
| **File Menu Strip** |  |  |  |  |  |
| FM 011  Open File Dialog | Click Load Button > Show Open File Dialog | Open File Dialog Should Appear | User Interface |  |  |
| FM 021 Accept Directory | Find Image Directory > Open .TIF image folder | Accept .TIF Directory | Open File Dialog |  |  |
| FM 022  Accept Directory | Find Image Directory > Open .BMP image folder | Accept .BMP Directory | Open File Dialog |  |  |
| FM 023  Accept Directory | Find Image Directory > Open single file | Will not show single file | Open File Dialog |  |  |
| FM 024  Accept Directory | Find Image Directory > Open other folder directory | Will not allow user to select other extension | Open File Dialog |  |  |
| FM 031 Show Image | Find Directory > Click Open | Will show Image on UI | User Interface / Open File Dialog |  |  |
| LB 041  Enable Run Button | Find Directory > Click Open | Run Button Will Enable | User Interface |  |  |
| LB 051  Enable Calibrate Button | Find Directory > Click Open | Calibrate Button Will Enable | User Interface |  |  |
| **About Menu Strip** |  |  |  |  |  |
| AB 011 Show Information Form | Click About on the Menu Strip | Open an information regarding about the application | User Interface |  |  |