**System Test Plan**

**For**

**RF Direction Detection**

Cassandra Harrison

Robert Kramer

Sofia Mvokany

Krishna Patel

Kyle Reagan

|  |  |
| --- | --- |
| Version/Author | Date |
| 1.0 Krishna Patel | 11/3/2020 |
| 1.1 All | 11/9/2020 |
|  |  |
|  |  |

**Table of Contents**

[**1. Introduction**](#_yoywm2c9jxv8) **3**

[1.1 Purpose](#_lkab4rfbi8iu) 3

[1.2 Objectives](#_mwmqwimmwuap) 3

[**2. Functional Scope**](#_wsnnygb5g0t6) **3**

[**3. Overall Strategy and Approach**](#_xtpzfxnxfq4q) **4**

[3.1 Testing Strategy](#_sb7ofl4jdcue) 4

[3.2 System Testing Entrance Criteria](#_rgydhknee0jw) 4

[3.3 Testing Types](#_ii58g9ro20hb) 4

[3.3.1 Usability Testing](#_1p5dpotzzuhk) 4

[3.3.2 Functional Testing](#_6d66u3vzrs48) 4

[3.4 Suspension Criteria and Resumption Requirements](#_emzby8dh43ji) 5

[3.4.1 Suspension Criteria](#_irlrhp9j1fii) 5

[3.4.2 Resumption Requirements](#_dmgom1hii7a3) 5

[**4. Execution Plan**](#_4tt3qwthk5jm) **5**

[4.1 Execution Plan](#_bkhhl3k1hdzr) 5

[**5. Traceability Matrix & Defect Tracking**](#_holdni9wnooa) **6**

[5.1 Traceability Matrix](#_ywy42pa7peye) 6

[5.2 Defect Severity Definitions](#_ddzktsueat4j) 6

[**6. Environment**](#_55tjekqvrkqu) **7**

[6.1 Environment](#_ajd2ktusk0bz) 7

[**7. Assumptions**](#_rb8b743z9wql) **7**

[**8. Risks and Contingencies**](#_kusx9jyw1i5o) **7**

[**9. Appendices**](#_dpj8q5lusctv) **7**

# **1.** **Introduction**

## **1.1** **Purpose**

This document is a test plan for RF Direction Detection System Testing, produced by the System Testing team. It describes the testing strategy and approach to testing the team will use to verify that the application meets the established requirements of the business prior to release.

## **1.2** **Objectives**

This document describes the plan for testing the RF Direction Detection System. This Test Plan document supports the following objectives:

* Identify the software and hardware that should be tested
* List the recommended test requirements (high level).
* Recommend and describe the testing strategies to be employed.

# **2.** **Functional Scope**

The Modules in the scope of testing for the RF Direction Detection System Testing are mentioned in the document attached in the following path :

* Testing Strategy
* System Testing Entrance Criteria
* Testing Types
* Suspension Criteria and Resumption Requirements

# **3.** **Overall Strategy and Approach**

## **3.1** **Testing Strategy**

RF Direction Detection System Testing will include testing of all functionalities that are in scope (Refer Functional Scope Section) identified. System testing activities will include the testing of new functionalities, modified functionalities, screen level validations, workflows, functionality access, testing of internal & external interfaces.

## **3.2** **System Testing Entrance Criteria**

In order to start system testing, certain requirements must be met for testing readiness. The readiness can be classified into:

* Availability of the test environment supporting necessary hardware, software, settings and tools for the purpose of test execution.
* Testers are trained and necessary resources are available
* Requirements should be clearly defined and approved
* Test Design and documentation are ready.

## **3.3** **Testing Types**

### **3.3.1** **Usability Testing**

User interface attributes, cosmetic presentation, and the content will be tested for accuracy and general usability. The goal of Usability Testing is to ensure that the User Interface is comfortable to use and provides the user with consistent and appropriate access and navigation through the functions of the application (e.g., access keys, consistent tab order, readable fonts, etc.)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Test No. | Test Description | Inputs/Action | Expected Output | Test Result | Test Comments |
| 1 | User changes rotation speed | a. Open Arduino Source Code  b. Go to line 12 and change stepDelay value to the desired value.  c. Compile and Upload code to Arduino Board  d. Plugin 12 V supply to CNC shield | The antenna should change to the speed the user desired. | Pass | The value can be changed to any value as long as it is a positive integer or decimal value. |
| 2 | User changes angle output | a. Open Arduino code  b. Go to the “steps” variable (default should be 17.778)  c. Change by a factor of 10 (177.778) | The angle output should be every 10 degrees instead of every 1 degree | Pass | Can be changed to output at any number of degrees, simply have to do the correct calculations for step to degree ratio |
| 3 |  |  |  |  |  |
| 4 |  |  |  |  |  |
| 5 |  |  |  |  |  |
| 6 |  |  |  |  |  |
| 7 |  |  |  |  |  |
| 8 |  |  |  |  |  |
| 9 |  |  |  |  |  |

### **3.3.2** **Functional Testing**

The objective of this test is to ensure that each element of the component meets the functional requirements of the business as outlined in the:

· Business / Functional Requirements

· Business rules or conditions

· Other functional documents produced during the course of the project i.e. resolution to issues/change requests/feedback

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Test No. | Test Description/Requirement | Inputs/Action | Expected Output | Test Result | Test Comments |
| 1 | Rotate Antenna 180 degrees | a. Plug in a 12V power source.  b. Connect Arduino Board to PC and upload source code. | The antenna attached to the stepping motor should rotate 180 degrees clockwise then 180 degrees counterclockwise | Pass | The antenna rotates as expected. |
| 2 | Rotate Antenna at a speed of 1000 microseconds | a. Plug in 12V power source.  b. Connect Arduino Board to PC and upload source code. | The antenna should rotate at a speed of 1000 microseconds | Pass | The antenna rotates at the speed expected. |
| 3 | Arduino Serial Port Displays angle of rotation | a. Plug in 12V power source.  b. Connect Arduino Board to PC and upload source code.  c. Open Arduino Serial Port | Serial port should show the angel the antenna is turning at continuously | Pass | The angle is printed for every 10 degrees. |
| 4 | Telemetry radios connect and transmit data to each other | 1. Connect both radios to power sources via supplied cables 2. Open SDR to desired frequency (915MHz) | Both radios should have a solid green light and a blinking red light when data is being transmitted. The band shown in the SDR should pulsate when data is being transmitted. | Pass | Unsure if the amount of data communicated by each radio is symmetrical. |
| 5 | Drone is simulated via one telemetry radio configured with Pixhawk and Mission Planner | 1. Connect telemetry radio to specified Pixhawk port using wired cable 2. Connect Pixhawk to computer 3. After opening Mission Planner, connect the Pixhawk configuration | The flight parameters in Mission Planner should update each second. If the Pixhawk setup is moved, the parameters will reflect the numerical changes as well as the visual flight pattern. | Pass | Mission Planner was unable to detect Yaw for the simulated drone. |
| 6 | The antenna will pick up signals at 915 MHz | 1. Connect the antenna to the SDR 2. Connect the SDR to the computer | At 915 MHz, the SDR software will show a detected signal |  |  |
| 7 | The antenna will have a minimum gain when the signal direction is perpendicular to the plane of the loop | 1. Set up antenna for signal detection 2. Place the signal source in front of the loop and observe signal 3. Place the signal source to the side of the loop and observe the signal | The observed signal from side placement will be significantly larger than the signal from the front placement |  |  |
| 8 |  |  |  |  |  |
| 9 |  |  |  |  |  |

## **3.4** **Suspension Criteria and Resumption Requirements**

This section will specify the criteria that will be used to suspend all or a portion of the testing activities on the items associated with this test plan.

**3.4.1** **Suspension Criteria**

Testing will be suspended if the incidents found will not allow further testing of the system/application under-test. If testing is halted, and changes are made to the hardware, software or database, it is up to the Testing Manager to determine whether the test plan will be re-executed or part of the plan will be re-executed.

### **3.4.2** **Resumption Requirements**

Resumption of testing will be possible when the functionality that caused the suspension of testing has been retested successfully.

# **4.** **Execution Plan**

## **4.1** **Execution Plan**

The execution plan will detail the test cases to be executed. The Execution plan will be put together to ensure that all the requirements are covered. The execution plan will be designed to accommodate some changes if necessary if testing is incomplete on any day. All the test cases of the projects under test in this release are arranged in a logical order depending upon their interdependency.

# **5.** **Traceability Matrix & Defect Tracking**

## **5.1** **Traceability Matrix**

List of requirements, corresponding test cases. \*\*\*\* Requirements will come from SRS document

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Requirement No. | Requirement Description | Test Cases | Status | Pass/Fail | Comments |
| 3.3.3 | The loop antenna shall constantly be rotating 180/360 degrees. | 1 | Tested/Done | Pass |  |
| 3.3.4 | The DOA system shall be constantly rotating on a rotating platform. | 1 | Tested/Done | Pass |  |
| 4.1.3.1 | The antenna shall be able to rotate 180 degrees | 1 | Tested/Done | Pass |  |
| 4.1.2 | The user will manually tell the antenna when to rotate and when to stop. | 1 | Tested/Done | Pass |  |
| 3.5.1 | The system shall be able to detect signals operating at 915 MHz | 0 | Untested |  |  |
| 3.5.2 | The system shall observe a minimal signal gain when the source is in front of the plane of the loop | 0 | Untested |  |  |
|  |  |  |  |  |  |

## **5.2** **Defect Severity Definitions**

|  |  |
| --- | --- |
| **Critical** | The defect causes a catastrophic or severe error that results in major problems and the functionality rendered is unavailable to the user. A manual procedure cannot be either implemented or a high effort is required to remedy the defect. Examples of a critical defect are as follows:  · System abends  · Data cannot flow through a business function/lifecycle  · Data is corrupted or cannot post to the database |
| **Medium** | The defect does not seriously impair system function can be categorized as a medium Defect. A manual procedure requiring medium effort can be implemented to remedy the defect. Examples of a medium defect are as follows:  · Form navigation is incorrect  · Field labels are not consistent with global terminology |
| **Low** | The defect is cosmetic or has little to no impact on system functionality. A manual procedure requiring low effort can be implemented to remedy the defect. Examples of a low defect are as follows:  · Repositioning of fields on screens  · Text font on reports is incorrect |

# 

# 

# **6.** **Environment**

## **6.1** **Environment**

To execute these test cases the team will use a Pixhawk simulator, to test the software defined radio and antenna components of the system. To test the stepping motor the team will use the actual product and Ardino to execute the test cases concerning the rotating mechanism of the system

# **7.** **Assumptions**

* There will be no other signal sources operating at 915 MHz.

# **8.** **Risks and Contingencies**

Due to continuous changing requirements there is a technical risk which may lead to failure of functionality and performance of the system. This may pose a budget risk as well as the budget is $1500 and the cost may overrun as there are different aspects being added last minute to the design or different testing approaches added to the system. There are no future contingencies, once the product is built few things will have to change.

# **9.** **Appendices**

# 

# 