# System Requirements Specification

**RF Direction Detection Project**

**CEC/EE 420 Fall 2020**

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| Name | Date | Reason for Change | Names | Version |
|---|---|---|---|---|
| Initial Release | 9/10/20 | Initial Release | ALL | 1.0 |
| Update Sections | 9/22/20 | Updated all sections and Table of Contents | Krishna Patel | 1.1 |
| Hardware, Communication & Security Requirements | 9/24/20 | Hardware, Communication & Security Requirements | Krishna Patel | 1.2 |
| System Features | 9/25/20 | System Features | Robert Kramer | 1.3 |
| Communication Requirements | 9/25/20 | Communication Requirements | Sofia Mvokany | 1.4 |
| Software & Security Requirements | 9/25/20 | Software & Security Requirements | Cassandra Harrison | 1.5 |
| Assumptions | 9/25/20 | Assumptions | Kyle Reagan | 1.6 |

Table of Contents

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# 1. Introduction

## 1.1. Purpose

This product is designed to detect the direction of arrival of RF (radio frequency) signals...

## 1.2. Intended Audience and Reading Suggestions

## 1.3. Product Scope

## 1.4. References

# 2. Product Overview

## 2.1. Product Perspective

## 2.2. Product Functions

## 2.3. User Classes and Characteristics

### 2.3.1. (insert class sections)

Use Case Diagram

- <Include a use case diagram here. It should be consistent with all the above work. >

Use Case Descriptions:

- <Briefly describe each use case included in the above diagram. >

### 2.4. Operating Environment

#### 2.4.1. User Interface

#### 2.4.2. Data Collections

#### 2.4.3. Data Transmission

### 2.5. Design and Implementation Constraints

### 2.6. User Documentation

### 2.7. Assumptions and Dependencies

Assumptions:

- The detected signal shall come from a source emitting a continuous, constant frequency signal

Stakeholders:

- <A stakeholder is anyone who has an interest in the system to be developed. For example, the customer, the various classes of users, applicable regulatory agencies, ... List each category of stakeholder and give a phrase or a sentence to describe their interest or concerns>

# 3. External Interface Requirements

<Use the following template for <u>each</u> requirement. >

| |
|---|
| No: <unique requirement number><br><br>#1 |
| Statement: <the "shall" statement of the requirement> |
| Source: <source of the requirement> |
| Dependency: <list each other requirement on which satisfaction of this requirement depends. (May be "None")> |
| Conflicts: <list each other requirements with which this requirement conflicts. (May be "None")> |

| |
|---|
| Supporting Materials: <list any supporting diagrams, lists, memos, etc.> |
| Evaluation Method: <How can you tell if the completed system satisfies this requirement? > |
| Revision History: <who, when, what> |

< Describe the fundamental actions that the system must perform. Functional requirements can be partitioned into subfunctions or subprocesses. Note: the System design partition does not have to correspond with the functional requirements partition. Functional requirements include:

- validity checks on the inputs,
- exact sequence of operations,
- responses to abnormal situations
- relationship of outputs to inputs
    - input/output sequences, formulas for input to output conversion, etc.
- ...>

## 3.1. User Interfaces (Software)

<Describe the users and their constraints:

3.1.1. What different types of users must the system support?

3.1.2. What is the skill level of each type of user? What type of training and documentation must be provided for each user?

3.1.3. Do any users require special accommodations (large font size, ...)

3.1.4. Must the system detect and prevent misuse? If so, what types of potential misuse must the system detect and prevent?

- 

## 3.2.

## 3.3. Hardware Interfaces

3.3.1. The DOA system shall be coordinated by a single-board computer.

3.3.2. The DOA system shall have a loop antenna design.

3.3.3. The loop antenna shall constantly be rotating 180/360 degrees.

3.3.4. The DOA system shall be constantly rotating on a rotating platform.

Resource Requirements

<Describe the system resources:

- skilled personnel required to build, use, and maintain the system?
- physical space, power, heating, air conditioning, ...?
- schedule?

- Funding?
  - hardware/software/tools?
  - ...>

## 3.4. Software Interfaces

3.4.1 The operating software shall be able to process communication between all components.

## 3.5. Communications Interfaces

3.5.1. The system shall be able to receive a frequency bandwidth of 915MHz.

3.5.2. The system shall be able to detect the direction of the signal received.

< Describe the interactions of the system with other entities. Interface requirements include a precise description of the protocol for each interface:

- what data items are input
- what data items are output
- what is the data type, the format, and the possible range of values for each data item? (i.e. what is the "domain" of this data item?)
- how accurate must each data item be?
- how often will each data item be received or sent?
- timing issues (synchronous/asynchronous)>
- how many will be received or sent in a particular time period?
- how accurate must the data be?
- ...>

# 4. System Features

## 4.1. RF Directional Antenna

### 4.1.1. Description and Priority

The RF directional antenna will be tuned to detect a specific frequency given off by a drone. By rotating the antenna, the user will be able to determine the direction of the drone. A display will show the strength of the signal so that the user can determine relative closeness to the antenna.

### 4.1.2. Stimulus/Response Sequences

The user will manually tell the antenna when to rotate and when to stop. The antenna will rotate 180 degrees before turning the other way for another 180 degrees.

### 4.1.3. Functional Requirements

4.1.3.1 The antenna shall be able to rotate 180 degrees

4.1.3.2 The antenna shall display the frequency that it is picking up onto a computer display

4.1.3.3 The display will show the strength of the signal that is detected

# 5. Other Nonfunctional Requirements

## 5.1. Performance Requirements

< Describe the environment in which the system must operate. Physical environment requirements include:

5.2. type of equipment/environment on which the system must run

5.3. location of the equipment

5.4. environmental considerations: temperature, humidity, ...

5.5. ...>

## 5.6. Safety Requirements

### 5.7. Security Requirements

As of right now, there are no applicable security requirements for this system.

<Describe any security requirements:

- must access to the system or information be controlled?
- must one user's data be isolated from others?
- how will user programs be isolated from other programs and from the operating system?
- how often will the system be backed up?
- must the backup copies be stored at a different location?
- should precautions be taken against fire, water damage, theft, ...?
- what are the recovery requirements?
- ...>

### 5.8. System Quality Attributes

### 5.9. Business Rules

# 6. Appendix A: Glossary

3.4 User and Human Factors Requirements

- <Describe the users and their constraints:
    - What different types of users must the system support?
    - What is the skill level of each type of user? What type of training and documentation must be provided for each user?
    - Do any users require special accommodations (large font size, ...)
    - Must the system detect and prevent misuse? If so, what types of potential misuse must the system detect and prevent?
    - ...>
    -
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