|  |  |
| --- | --- |
|  | **2019** |
|  | North-West University  Dr. Henri Marais |

|  |
| --- |
| **[System specification]** |
| Automated Pet Feeder (APF) |

Document Identification

|  |  |
| --- | --- |
| Project Title: | Automated Pet Feeder (APF) |
| Document Number: | APF\_0.1 |
| System / Sub-System: | Automated Pet Feeder (APF) |
| Document Issue Date: | 2020-11-11 |
| Client: | Dr. H Marais |
| Client Reference: | REII327-2020-APF |

Origination and Approval

|  |  |  |  |
| --- | --- | --- | --- |
| Checked by Party | Individual Name | Signature | Date |
| Author: | Dr. Henri Marais |  |  |
| Quantity Assurance: |  |  |  |
| Technical Approval: | Dr. Melvin Ferreira |  |  |
| Project Manager: | Dr. Henri Marais |  |  |

Acceptance

|  |  |  |  |
| --- | --- | --- | --- |
| Checked by | Individual Name | Signature | Date |
| Approved by: | Dr. Henri Marais |  |  |

Distribution List

|  |  |  |
| --- | --- | --- |
| Company | Individual Name | Date |
| North-West University | Dr. Henri Marais |  |
| North-West University | REII327 2020 class |  |

Security Levels and Restrictions

|  |  |  |
| --- | --- | --- |
| Level | Description | Applicable Level |
| 1 | Strictly Confidential – not to be distributed |  |
| 2 | Company Confidential – distributed inside company |  |
| 3 | Client Confidential – distributed to limited clients and contractors | **X** |
| 4 | Public Domain – distributed freely |  |

Contact Information

|  |  |
| --- | --- |
| Contact Person | Dr. Henri Marais |
| Company | North-West University |
| Street Address | 11 Hoffman street, Potchefstroom, 2535 |
| Telephone Number | 0182991973 |
| Email address | henri.marais@nwu.ac.za |
| Web site | N/A |

**TABLE OF CONTENTS**

[Document Identification i](#_Toc479158437)

[Origination and Approval i](#_Toc479158438)

[Acceptance i](#_Toc479158439)

[Distribution List i](#_Toc479158440)

[Security Levels and Restrictions i](#_Toc479158441)

[Contact Information i](#_Toc479158442)

[List of Figures iii](#_Toc479158443)

[List of Tables iii](#_Toc479158444)

[1 Introduction and scope 1](#_Toc479158445)

[1.1 Identification 1](#_Toc479158446)

[1.2 Intended use of the power source 1](#_Toc479158447)

[2 Applicable and other referenced documents 1](#_Toc479158448)

[2.1 Applicable documents 1](#_Toc479158449)

[2.2 Other referenced documents 1](#_Toc479158450)

[3 Definitions, Acronyms, and Abbreviations 2](#_Toc479158451)

[3.1 Definitions 2](#_Toc479158452)

[3.2 Acronyms 2](#_Toc479158453)

[3.3 Abbreviations 2](#_Toc479158454)

[4 Requirements 2](#_Toc479158455)

[4.1 Identification of external interfaces 2](#_Toc479158456)

[4.2 Identification of states and modes 2](#_Toc479158457)

[4.3 System function and performance requirements 2](#_Toc479158458)

[4.4 Relationship between states and modes 2](#_Toc479158459)

[4.5 System external interface requirements 2](#_Toc479158460)

[4.6 Environmental requirements 2](#_Toc479158461)

[4.7 External resource requirements 2](#_Toc479158462)

[4.8 Physical requirements 2](#_Toc479158463)

[4.9 Other qualities 2](#_Toc479158464)

[4.10 Design and construction requirements 2](#_Toc479158465)

[5 Notes 2](#_Toc479158466)

[5.1 Verification requirements 2](#_Toc479158467)

[5.2 List of safety requirements 2](#_Toc479158468)

[Document History 3](#_Toc479158469)

[Revision History 3](#_Toc479158470)

[Authorisation History 3](#_Toc479158471)

List of Figures

**No table of figures entries found.**

List of Tables

**No table of figures entries found.**

# Introduction and scope

## Identification

This system requirements specification is provided with the sole intent of guiding the development of an aerial trespassing deterrence system (ATRED).

## Intended use

Unmanned aerial vehicles (UAVs) have traditionally posed only a significant threat from a military perspective. However, in recent years, small, commercially available, UAVs (commonly known as drones or quadcopters) have become cost effective and common place.

Although regulations preclude the operation of a UAV over private areas (constituting an invasion of privacy) or certain government installations, enforcement is highly limited or non-existent. The ATRED system will form part of a larger system to deter the operation of UAVs, specifically drones, in restricted airspace. The ATRED system, specifically, will neutralise invading drones on command as specified herein.

## Intended users

The ATRED system is intended to be used by owners of private property or operators of government installations where airspace is restricted. The operators should be considered as non-technical personnel without any nefarious intentions.

# Applicable and other referenced documents

## Applicable documents

The following documents form a part of Section 4, Requirements, to the extent specified therein. Where a conflict exists between a requirement in Section 4, Requirements, and the content of an Applicable Document as listed below, the requirement in Section 4, Requirements, shall have precedence to the extent of the conflict barring standards or regulatory violations.

***Note:*** *Where the user of this specification identifies a conflict between Section 4, Requirements, and an Applicable Document, the user of this specification should inform the issuer without delay.*

Where no issue is identified explicitly for an Applicable Document, the issue shall be the issue in effect at the date of this specification.

|  |  |  |
| --- | --- | --- |
| Document Identifier | Document Description | Document Location |
| SI Units – Guide | Guide for the use of the International System of Units (SI) – NIST special publication 811 (2008) | eFundi/Resources/Reference |
|  |  |  |
|  |  |  |
|  |  |  |

## Other referenced documents

None

# Definitions, Acronyms, and Abbreviations

## Definitions

**As specified** means as specified in Section 4 of this document

**May** expressive permissive guidance

**Shall** expresses a binding requirement

**State** expresses an observable condition of the system at a given time

**Mode** expresses behaviour exhibited by the system

**Active-state**

**Failed-state**

**Off-state**

The Oxford Concise English Dictionary shall be used in the interpretation of terms in Section 4, Requirements, which are not otherwise defined above.

## Acronyms

**APF** Automated Pet Feeder

**FSU** Food Storage Unit

## Abbreviations

The abbreviations used in this document are as follows:

**ReqID** Requirement Identification

# Requirements

## Identification of external interfaces

The APF system shall provide the following external interfaces

### Solar Power Supply Interface – ReqID001

### Operator visual interface

### Maintenance interface

### Pet feeding interface

## Identification of states and modes

### States

#### Off state

In the powered down state the APF is off and has no functionality

#### Operational state

In the active state the APF will be in the state to dispense food on timed intervals

#### Failed state

In the failed-state the APF cannot dispense food and the operator is alerted

### Modes

#### Operational mode

In the Operational mode the APF monitors its timer.

#### Dispensing mode

The APF dispenses food from the FSU to the feeding tray.

#### Maintenance mode

The APF will not be able to dispense food, timer will not be reset (keep track of real time) and food will be able to be loaded to the FSU.

## System function and performance requirements

### Storage function

### Dispensing function

Depending on selected portion size (small/medium/large), the APF will have a mechanical trap door that stays open for a set time.

Inside FSU a hardened filter will be present to regulate the amount of food resting on the trap door.

### Refill function

### Setup function

Operator selects frequency (times to dispense per day) as well as the time between individual meals. Select between portion sizes (small/medium/large).

## Relationship between states and modes

\*Diagram to be added

## System external interface requirements

### Solar Power Supply Interface

The APF shall be powered via single connection to a \*insert deets\* and have a backup solar power supply unit.

### Operator visual interface

### Maintenance interface

### Pet feeding interface

The ammunition loading interface shall allow at least a single projectile to be loaded into the ATRED with a gloved hand.

## Environmental requirements

### Operational environment

The APF needs to be able to function outdoors as well as indoors, at a temperature range between -10 °C and 50 °C as well as having an IP64 rating.

### Storage environment

\*Deets needed

## External resource requirements

The APF should not consume an excessive amount of supplied power. When on backup power, the APF should function in a low power mode.

The APF should at all times be able to hold 2kg of food.

## Physical requirements

The APF system deployed in an operational context will have a maximum bounding box of 70cm and (including the recommended 2kg of food) weigh no more than 5kg.

## Other qualities

\*Deets needed

## Design and construction requirements

The APF FSU to be made out of lightweight industrial grade aluminium.

The inner support will be constructed out of a very durable machined plastic.

# Notes

## Verification requirements

TODO: Verification requirements -> How to asses + marks for performance

## List of safety requirements

Class act.

Document History

|  |  |  |  |
| --- | --- | --- | --- |
| Issue | Date | Status | Filename |
| 0.1 | 11/11/2020 | Active | Overview of APF SyRS format – 0.1 |
|  |  |  |  |
|  |  |  |  |

Revision History

|  |  |  |
| --- | --- | --- |
| Issue | Date | Changes |
| Document created | 11/11/2020 | N/A |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

Authorisation History

|  |  |  |  |
| --- | --- | --- | --- |
| Issue | Date | Status | Reference |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |