Robotic Sorting System

Pace Dominy

Joseph Miller

Lam Tran

**Interface Control Document**

**Robotic Lever**

REVISION – Draft

3 October 2022

Interface Control Document

for

Robotic Sorting System (Robotic Arm)

Prepared by:

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Author Date

Approved by:

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Project Leader Date

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

John Lusher II, P.E. Date

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

T/A Date

**Change Record**

| **Rev.** | **Date** | **Originator** | **Approvals** | **Description** |
| --- | --- | --- | --- | --- |
| **-** | 10/3/2022 | Pace Dominy |  | Draft Release |

**Table of Contents**

[**Table of Contents III**](#_heading=h.30j0zll)

[**List of Tables IV**](#_heading=h.1fob9te)

[**List of Figures V**](#_heading=h.3znysh7)

[**1.**](#_heading=h.1t3h5sf) **Executive Summary 1**

[**2.**](#_heading=h.4d34og8) **Introduction 2**

[2.1.](#_heading=h.2s8eyo1) Background 2

[2.2.](#_heading=h.17dp8vu) Overview 2

[2.3.](#_heading=h.3rdcrjn) Referenced Documents and Standards 2

[**3.**](#_heading=h.26in1rg) **Operating Concept 3**

[3.1.](#_heading=h.lnxbz9) Scope 3

[3.2.](#_heading=h.tyjcwt) Operational Description and Constraints 3

[3.3.](#_heading=h.35nkun2) System Description 3

[3.4.](#_heading=h.1ksv4uv) Modes of Operations 3

[3.5.](#_heading=h.44sinio) Users 3

[3.6.](#_heading=h.2jxsxqh) Support 3

[**4.**](#_heading=h.z337ya) **Scenario(s) 4**

[4.1.](#_heading=h.3j2qqm3) Scenario Name #1 4

[**5.**](#_heading=h.3dy6vkm) **Analysis 4**

[5.1.](#_heading=h.1y810tw) Summary of Proposed Improvements 4

[5.2.](#_heading=h.4i7ojhp) Disadvantages and Limitations 4

[5.3.](#_heading=h.2xcytpi) Alternatives 4

**List of Tables**

No table of figures entries found.

**List of Figures**

# No table of figures entries found.

# Overview

The Interface Control Document for the Robotic Arm Subsystem will detail the physical, electrical and communication interfaces of this subsystem in detail. The Robotic Arm Subsystem consists of the two robotic arms, a pulley system that guides the arms and the supports for the robotic arms.

# References and Definitions

## References

| **Document Number** | **Revision/Release Date** | **Document Title** |
| --- | --- | --- |
| ANSI/NFPA 70 | 2023 | National Electric Code |
| RSS FSR | 1.0/3 October 2022 | Robotic Sorting System Functional System Requirements |
| RSS Conveyor Belt FSR | 1.0/3 October 2022 | Conveyor Belt Functional System Requirements |

## Definitions

CCA Circuit Card Assembly

mA Milliamp

mW Milliwatt

MHz Megahertz (1,000,000 Hz)

TBD To Be Determined

TTL Transistor-Transistor Logic

VME VERSA-Module Europe

# Physical Interface

## Weight

Robotic Arm Subsystem will weigh no more than 20 lbs in accordance with RSS ICD section 3.1.2.

## Dimensions

The Robotic Arm Subsystem shell be no wider than 2 ft, no taller than 5 inches and no longer than 1 ft 4 inches.

## Mounting Locations

### Motor

The motor for the guiding belt will be mounted to the frame of the conveyor belt subsystem.

### Robotic Levers

The robotic levers will be connected to two supports that are attached to the conveyor belt subsystem frame and that sit above the conveyor belt. The end of the levers will slant upward so that they can attach to the guiding belt which sits above the conveyor belt.

### Guiding Belt

The guiding belt will sit high enough that fruit can pass under the belt/pulley system. The guiding belt also functions as a support for the robotic levers. The ends of the guiding belt will have two rods connected to the conveyor belt frame that the pulleys rotate around in the x-y plane.

# Thermal Interface

The Robotic Arm Subsystem does not require a thermal interface.

# Electrical Interface

## Primary Input Power

Power delivery will come from the Power Subsystem as specified in the Power Subsystem ICD.

# Communications / Device Interface Protocols

## Device Peripheral Interface

Controller signal inputs will come from the Raspberry Pi and go through the PCB. Protocol will be specified as necessary in the Power Subsystem ICD.