NASA LEC Robotic Mining

1.0

Test Plan

September 2020

By: Taylor Ertrachter, Bailey Hamant, James Spies

Table of Contents

Table of Figures & Tables

1 Wheel Navigation Tests

Requirement Tests				
FR #	**Test #**	**Action**	**Inputs**	**Expected Output**
1	1	Wheels Turning Left	Manual Input	Wheels turn left
1	2	Wheels Turning Right	Manual Input	Wheels turn right
1	3	Wheels Turning Left	Automated Input	Wheels turn left
1	4	Wheels Turning Right	Automated Input	Wheels turn right
2	1	Forward	Manual Input	Wheels move forward
2	2	Backward	Manual Input	Wheels move backward
2	3	Forward	Automated Input	Wheels move forward
2	4	Backward	Automated	Wheels move backward
3	1	Robot turns right	Manual Input	Left Wheels Forward and Right Wheels Backward
3	2	Robot turns left	Manual Input	Left Wheels Backward and Right wheels forward
3	3	Robot turns right	Automated input	Left Wheels Forward and Right Wheels Backward
3	4	Robot turns left	Automated input	Left Wheels Backward and Right wheels forward

Table 1 - Requirements Tests for Wheel Navigation

2 Camera Tests

Requirement Tests				
FR #	**Test #**	**Action**	**Inputs**	**Expected Output**
1	1	Camera detects object that we need to avoid	Live camera feed with focus on object	Robot rejects object
1	2	Camera detects object we need to collect	Live camera feed with focus on object	Robot accepts object
2	1	Robot detects what is a sample to collect	Live camera feed with focus on object with high priority	Robot goes to the high priority sample first
2	2	Robot detects what is a sample to collect	Live camera feed with focus on object with low priority	Robot goes to low priority sample last
3	1	Robot moves to avoid object	Live camera feed with focus on object to avoid	Robot moves to avoid object
4	1	Detect object in high amount of light	Live camera feed with focus on object with high light	Robot detects object
4	2	Detect object in low amount of light	Live camera feed with focus on object with low light	Robot detects object

Table 2 - Requirements Tests for Camera

3 Sample Collection Conveyor Belt Tests

Requirement Tests				
FR #	**Test #**	**Action**	**Inputs**	**Expected Output**
1	1	Samples go into the collection bin	Wanted sample is loaded onto the conveyor belt	The samples are accepted and put into the collection bin
1	2	Samples don't go into the collection bin	Unwanted sample is loaded onto the conveyor belt	The samples are rejected and stay on the belt to be brought back to the ground
2	1	Samples go onto conveyor belt	Conveyor belt is lowered to mining area and turned on	Samples are mined properly and moved on the conveyor belt
3	1	The arms are lowered to the mining area	The robot arrives at a mining area to being mining	The conveyor belt is lowered to the proper height to start mining
3	2	The arms are raised after mining is done	The mining has finished and the conveyor belt is not moving	The conveyor belt is raised back to normal height

Table 3 - Requirements Tests for Sample Collection Conveyor Belt

4 Jetson Onboard Computer Tests

Requirement Tests				
FR #	**Test #**	**Action**	**Inputs**	**Expected Output**
1	1	Turn on/off motor for wheels	Manual/Automated	Motor is turned on or off
1	2	Move arms up/down	Manual/Automated	Arms are raised or lowered
1	3	Conveyor belt is turned on/off	Manual/Automated	Conveyor belt starts or stops moving
2	1	Robot is fully turned off	Manual combination of button presses	Robot stops all functions completely
3	1	Robot can receive input from controller	Manual controller inputs	Robot reacts to controller inputs
4	1	Robot operates partially or fully on its own	Camera feed determines robot actions	Robot moves to sample collection areas and avoids obstacles
5	1	Robot can receive input and send output through a WiFi signal	Manual commands from terminal	Robot sends constant feedback through debug terminal and can react to commands manually given through terminal

Table 4 - Requirements Tests for Jetson Master Controller