Testplan for SmartPitcher

Project team: Youjung Kim
                 Sion Park
                 Joel Kim
                 Jeff Yoo
                 Fereshteh Sana

Contact Person: Youjung Kim
                 youjungk@sfu.ca

Submitted to: Dr. Andrew Rawicz
                 Steve Whitmore
                 School of Engineering Science
                 Simon Fraser University

Issue Date: March 28th, 2016

1. Testing Overview

The test plan is categorized into three phases. The first is a step by step test which requires the steps of functionality set up to meet the environmental condition. The second is the functional testing of the three main features of the SmartPitcher to ensure each mechanical system responses correctly. The third and the final phase is failure tests to observe SmartPitcher's limit based on each condition.

2. Basic Integration Testing

Phase 1

Test Field	Setup Test
Steps	- Place SmartPitcher on a flat surface - Integrate Arduino Microcontroller to the laptop using USB cable - Connect the webcam to the laptop - Open Roborealm, the vision application program from the laptop - Turn on the "Bluetooth Spp Pro" smartphone application - Connect the 12V battery to the VNH5019 motor shield - Load balls into the track - Wear armband and attach the smartphone - Compile/Upload the programming codes written in Arduino IDE
Expected Result	LED from Arduino and VNH5019 Motor Driver turns on. Furthermore, Arduino IDE detects the port connected to Arduino and the DC motors, operating as pitching machine wheels, initiate rotation.

3. Functional Testing

Phase 2

Functional Test 1

Test Field	Motor Speed Control Test
Steps	- Open "Serial Monitor" on Arduino IDE software - Stand in front of the machine - Move close/away from the machine
Expected Result	The "Serial Monitor" on Arduino IDE continuously updates the distance data between the user and the SmartPitcher in 9600 baud rate using Ultrasonic Range Finder

Functional Test 2

Test Field	Motion Tracking Test
Steps	- Wear a green jersey - Stand in front of the machine - Move left and right
Expected Result	Entire machine follows the movement of the user with servo.write(91) or servo.write(89) speed. It shall stop when the webcam detects the user positioned in the range of $\pm$20 pixels from the center.

Functional Test 3

Test Field	Ball Loading (Bluetooth Trigger) Test
Steps	- In "Bluetooth Spp Pro", press "Connect" button and wait for scanning/connecting interface - Press "Keyboard mode" - Press "Shoot" button
Expected Result	LEGO motor starts its operation by assisting linear gear to push the balls to the spinning wheel

Functional Test 4

Test Field	DC Motor Torque Test
Steps	- Attach the 7-inch plastic wheels (1.4 pounds) above 2 DC motors with the use of Aluminum processed Universal Mounting Hub - Complete Phase 1
Expected Result	Without reaching the maximum efficiency, each motor's torque can efficiently handle the mass of wheels and do not experience any slowness due to the weight of the wheels

4. Failure Testing

Phase 3

Failure Test 1

Test Field	Battery Endurance Test
Steps	- Complete Phase 1 - Run the SmartPitcher for more than an hour
Expected Result	Since VNH5019 keeps operating with high amount of current, the motors and the entire microprocessor show tendency to overheat

Failure Test 2

Test Field	Ultrasonic Distance Measurement Test
Steps	- Complete Phase 1 - Make the distance away from the Ultrasonic on the machine more than 4 meter
Expected Result	Ultrasonic Range Finder provides incorrect measurement due to environmental signal interference

Failure Test 3

Test Field	Bluetooth Effective Range Test
Steps	- Complete Phase 1 - Move the Bluetooth Transceiver (Smartphone provided with Android application) more than 15 meter away from the pitching machine
Expected Result	The device is unable to send and connect the Bluetooth signal to the Bluetooth shield