ECE 411
Homework 7 - Test Plan

Smart Bird Feeder
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Version 1.0

Contents

1   INTRODUCTION
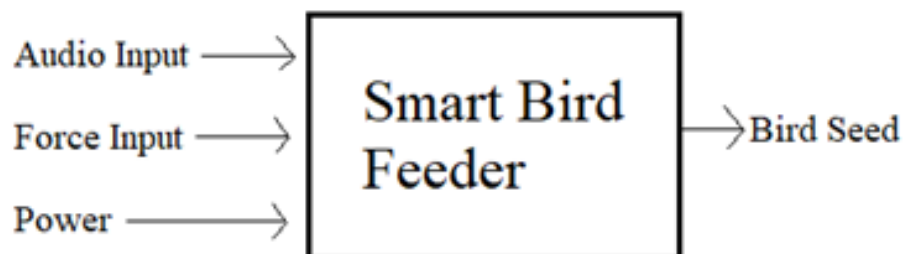
1.1   This Document

2 REFERENCE DOCUMENTS

2.1 Industry Standards

IEEE 1625-2004 - IEEE Standard for Rechargeable Batteries for Portable Computing

2.2 Design Documentation

Stevie Nicks and the Xaybanha Zhous
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Module	Smart Bird Feeder
Inputs	Frequency detected signal (interrupt) and 0-2.5V force measurement) and power
Outputs	Bird Seed
Functionality	Processes Chirp interrupt signal and Weight measurement to determine whether to run the actuator.

3 OVERVIEW

3.1 Operational Description

The objective is to use a microcontroller to only release seed if the microphone is activated above a threshold frequency and the weight sensor feels a weight less than the threshold, above which is assumed to be a crow or squirrel.

The device will use a processing module to automatically dispense bird feed when a small bird is "detected". This is coded using a microcontroller to output a PWM which activates the servo to release seed based on the inputs sensed by the microphone activate with a chirp above the frequency threshold and a strain gauge sensor with a voltage related to the weight on the sensor below the weight threshold.

3.2 Definition of Terminology

Term: Weight sensor
Part Name: Force sensing resistor
Vendor: Mouser
Vendor Part Number: 588-FSR03CE
Definition: The sensor whose threshold will determine whether it is a small bird or large bird/squirrel.

Term: Microphone Part Name: Electret Condenser Microphone
Vendor: Amazon
Vendor Part Number: B00LZV1ERG
Definition: The sensor whose activation will determine if there is a bird trying to get seed.

Term: Gate opener
Part Name: Servo Motor
Vendor: Mouser
Vendor Part Number: 426-SER0043
Definition: The actuator which upon receiving the PWM signal from the microcontroller will rotate the servo to open the gate.

Term: Microcontroller
Part Name: 8-bit AVR Microcontroller with 1K bytes in-system programmable flash
Vendor: Mouser
Vendor Part Number: 556-ATTINY13V10PQ
Definition: The process module that uses thresholds to determine whether a bird is chirping, its weight, which it then uses to send a PWM signal to activate the servo.

3.3 Computational Methods

Force is in volts.

Frequency is in kilohertz.

4 PRETEST PREPARATION

4.1 Test Equipment

Oscilloscope
Digital Multimeter
Power Supply

4.2 Test Setup and Calibration

Apply the digital multimeter between the weight sensor and the microcontroller for the weight sensor test.
Apply the digital multimeter between the microcontroller and the gate opener.
Apply the oscilloscope probes between the microphone and the microcontroller.

5 SYSTEM TESTS

5.1 Functional Tests

5.1.1 Power Switch and Indicator

5.1.2 Servo Test

Test Case 1

Test Writer: Stevie Taylor							
Test Case Name:	Smart Bird Feeder Servo Test		Test ID:	SBF-ST-01			
Description:	Verify the servo that will release the seed can open and close the gate.		Type:	white box			
Tester Information							
Name of Tester:			Date:				
Hardware Version:		1	Time:				
Setup:		Make sure the servo is reset to initial position and the gate is closed.					
Step	Action	Expected Result	Pass	Fail		N/A	Comments
1	Open gate	Open gate. Servo should rotate +45 degrees to go to releasing bird seed position.					
2	Close gate	Close gate. Servo should rotate -45 degrees to return to initial position.					
Overall test result:							

5.1.3 Mass Sensor Test

Test Case 2

Test Writer: Stevie Taylor						
Test Case Name:		Smart Bird Feeder Mass Sensor Test	Test ID:	SBF-MST-01		
Description:		Verify the mass sensor reacts to the input of force with the correct amount of voltage output.	Type:	white box		
Tester Information						
Name of Tester:			Date:			
Hardware Version:		1	Time:			
Setup:		Make sure the mass sensor has very high resistance with no mass applied.				
Step	Action	Expected Result	Pass	Fail	N/A	Comments
1	Apply force similar to the mass of a small bird (~50g) to mass sensor.	Outputs 0-2.5V.				
2	Apply force similar to the mass much less than a crow (~300g) to mass sensor.	Outputs 0-2.5V.				
3	Apply force similar to the mass less than a crow (~400g) to mass sensor.	Outputs 0-2.5V.				
4	Apply force similar to a mass equal to crow (~500g) to mass sensor.	Outputs above the threshold 2.5V.				
Overall test result:						

5.2 7 Day Stability

5.3 Vibration of Bird Landing on Device Stability Tests