ECE411 Homework\_6

Test Plan, Revision 2.0

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## Introduction

We have designed a metronome to satisfy the practicum requirements of an input device, output device, and microcontroller.

We define metronome as a pace setting device that provides an aural and visual indictor of pace.

A formal definition:

“a mechanical or electrical instrument that makes repeated clicking sounds at an adjustable pace, used for marking rhythm, especially in practicing music.” [1]

To test this, the focus is on the actuators to verify the device is performing the designed function.

## Pretest preparation

1. Ohm board to verify as built assembly meets requirements for system testing.
2. Ensure board has 9V battery installed.

## Test equipment / Test setup and calibration

1. Human of average intelligence, physique, hearing, visual acuity.
2. Multi-meter to perform Ohm test
3. 9V battery

## Systems Test

### Test Case 01 Description

Verify on/off (toggle) switch work, ie does the button turn the device on/off.

### Test Case 01

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |
|  | Test Writer | Team#14 (Kyle Johnson, Kam Robertson, Saly Hakkoum, Brian Dunn) |  |  |  |  |
|  | Test case name: | Test Case 01 |  |  |  |  |
|  | Description | Verify on/off (toggle) switch work |  |  |  |  |
|  | Type | Black Box |  |  |  |  |
|  |  |  |  |  |  |  |
|  | Tester Information |  |  |  |  |  |
|  | Name of tester |  |  |  |  |  |
|  | Hardware Version | Version 2.0 |  |  |  |  |
|  | Setup | 1. Ohm board to verify as built assembly meets requirements for system testing. 2. Ensure board has 9V battery installed. |  |  |  |  |
|  |  |  |  |  |  |  |
| Step | Action | Expected Results | Pass | Fail | NA | Comment |
| 1 | Position metronome on flat surface | Device ready for visual observation. |  |  |  |  |
| 2 | Verify device is at initial state | Observe initial state, OFF |  |  |  |  |
| 3 | Press power button | The device changes state, visual indications such as lights turn on. |  |  |  |  |
| 4 | Verify device is in on state | Lights turn on. |  |  |  |  |
| 5 | Press power button | The device changes state, visual indications such as lights turn off |  |  |  |  |
| 6 | Verify device is in off state | Lights are off |  |  |  |  |

### Test Case 02 Description

Verify button changes function of metronome.

Lights (LED) flash when button pressed.

### Test Case 02

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Test Writer | Team#14 (Kyle Johnson, Kam Robertson, Saly Hakkoum, Brian Dunn) |  |  |  |  |
|  | Test case name: | Test Case 02 |  |  |  |  |
|  | Description | Verify button changes function of device |  |  |  |  |
|  | Type | Black Box |  |  |  |  |
|  |  |  |  |  |  |  |
|  | Tester Information |  |  |  |  |  |
|  | Name of tester |  |  |  |  |  |
|  | Hardware Version | Version 2.0 |  |  |  |  |
|  | Setup | 1. Ohm board to verify as built assembly meets requirements for system testing. 2. Ensure board has 9V battery installed. |  |  |  |  |
|  |  |  |  |  |  |  |
| Step | Action | Expected Results | Pass | Fail | NA | Comment |
| 1 | Position metronome on flat surface | Device ready for visual observation. |  |  |  |  |
| 2 | Verify device is at initial state | Observe initial state, OFF |  |  |  |  |
| 3 | Press power button | The device changes state, visual indications such as lights turn on. |  |  |  |  |
| 4 | Verify device is in on state | Lights turn on. |  |  |  |  |
| 5 | Press function button | Lights flash when button pressed |  |  |  |  |
| 6 | Observe change in function | Verify function changes when button pressed |  |  |  |  |

### Test Case 03 Description

Verify button changes function of device (modes)

1. Lights (LED) flash when button pressed once. Muted 4/4 time
2. Lights (LED) flash when button pressed twice in addition to sound (beep) matching up with each LED flash. 4/4 time
3. “ “ 2/4 time (BEEP,beep…)
4. “ “ 2/3 time (BEEP, beep, beep…)
5. “ “ 3/4 time (BEEP, beep, beep, beep…)
6. “ “ 6/8 time (BEEP, beep, beep, beep, beep, beep…)
7. Standby: UUT returns to idle state

### Test Case 03

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Test Writer | Team#14 (Kyle Johnson, Kam Robertson, Saly Hakkoum, Brian Dunn) |  |  |  |  |
|  | Test case name: | Test Case 03 |  |  |  |  |
|  | Description | Verify button changes function of device (modes) |  |  |  |  |
|  | Type | Black Box |  |  |  |  |
|  |  |  |  |  |  |  |
|  | Tester Information |  |  |  |  |  |
|  | Name of tester |  |  |  |  |  |
|  | Hardware Version | Version 2.0 |  |  |  |  |
|  | Setup | 1. Ohm board to verify as built assembly meets requirements for system testing. 2. Ensure board has 9V battery installed. |  |  |  |  |
|  |  |  |  |  |  |  |
| Step | Action | Expected Results | Pass | Fail | NA | Comment |
| 1 | Position metronome on flat surface | Device ready for visual observation. |  |  |  |  |
| 2 | Verify device is at initial state | Observe initial state, OFF |  |  |  |  |
| 3 | Press power button | The device changes state, visual indications such as lights blink once, sound occurs "beep" at initial power on |  |  |  |  |
| 4 | Verify device is in on state | Lights blink, single beep, no additional sound, UUT idle |  |  |  |  |
| 5 | Press function button | Lights flash when button pressed once |  |  |  |  |
| 6 | Observe change in function | The device changes state, visual indication such as lights begin flashing in an alternating sequence (no sound) that coincides with beats per minute |  |  |  |  |
| 7 | Press function button | Verify function changes when button pressed |  |  |  |  |
| 8 | Observe change in function | The device changes state, visual indication such as lights begin alternating sequence along with sound to accompany each light flash that coincides with beats per minute |  |  |  |  |
| 9 | Press function button | Verify function changes when button pressed |  |  |  |  |
| 10 | Observe change in function | The device changes state, visual indication such as lights begin alternating sequence along with sound to accompany each light flash that coincides with beats per minute |  |  |  |  |
| 11 | Press function button | Verify function changes when button pressed |  |  |  |  |
| 12 | Observe change in function | The device changes state, visual indication such as lights begin alternating sequence along with sound to accompany each light flash that coincides with beats per minute |  |  |  |  |
| 13 | Press function button | Verify function changes when button pressed |  |  |  |  |
| 14 | Observe change in function | The device changes state, visual indication such as lights begin alternating sequence along with sound to accompany each light flash that coincides with beats per minute |  |  |  |  |
| 15 | Press function button | Verify function changes when button pressed |  |  |  |  |
| 16 | Observe change in function | The device changes state, visual indication such as lights begin alternating sequence along with sound to accompany each light flash that coincides with beats per minute |  |  |  |  |
| 17 | Press function button | UUT returns to idle state |  |  |  |  |
| 18 | Observe change in function | UUT returns to idle state, no lights, sound. |  |  |  |  |

### Test Case 04 Description

Verify rotary encoder function of device

Verify UUT tempo changes (increases) with clockwise rotation of rotary encoder

Verify UUT tempo changes (decreases) with counter-clockwise rotation of rotary encoder

### Test Case 04

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Test Writer | Team#14 (Kyle Johnson, Kam Robertson, Saly Hakkoum, Brian Dunn) |  |  |  |  |
|  | Test case name: | Test Case 03 |  |  |  |  |
|  | Description | Verify rotary encoder function of device |  |  |  |  |
|  | Type | Black Box |  |  |  |  |
|  |  |  |  |  |  |  |
|  | Tester Information |  |  |  |  |  |
|  | Name of tester |  |  |  |  |  |
|  | Hardware Version | Version 2.0 |  |  |  |  |
|  | Setup | 1. Ohm board to verify as built assembly meets requirements for system testing. 2. Ensure board has 9V battery installed. |  |  |  |  |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
| Step | Action | Expected Results | Pass | Fail | NA | Comment |
| 1 | Position metronome on flat surface | Device ready for visual observation. |  |  |  |  |
| 2 | Verify device is at initial state | Observe initial state, OFF |  |  |  |  |
| 3 | Press power button | The device changes state, visual indications such as lights blink once, sound occurs "beep" at initial power on |  |  |  |  |
| 4 | Verify device is in on state | Lights blink, single beep, no additional sound, UUT idle |  |  |  |  |
| 5 | Press function button | Lights flash when button pressed once |  |  |  |  |
| 6 | Observe change in function | The device changes state, visual indication such as lights begin flashing in an alternating sequence (no sound) that coincides with beats per minute |  |  |  |  |
| 7 | Press function button | Verify function changes when button pressed |  |  |  |  |
| 8 | Observe change in function | The device changes state, visual indication such as lights begin alternating sequence along with sound to accompany each light flash that coincides with beats per minute |  |  |  |  |
| 9 | Turn Rotary Encoder (clockwise) | UUT exhibits tempo increase (light sequence and sound sequence) |  |  |  |  |
| 10 | Observe change in function | Verify UUT tempo changes (increases) with clockwise rotation of rotary encoder |  |  |  |  |
| 11 | Turn Rotary Encoder (counter-clockwise) | UUT exhibits tempo decrease (light sequence and sound sequence) |  |  |  |  |
| 12 | Observe change in function | Verify UUT tempo changes (decreases) with counter-clockwise rotation of rotary encoder |  |  |  |  |

## Citations

1. (Dictionary.com "metronome, 2016)