Assignment 1, Bonus

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# Introduction

The bonus implements functionality allowing the pacemaker to be inhibited by quickly pressing switch 3.

# Bonus

## Description

## Variables

### Measured

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Units/Type** | **Description** | **Range** |
| t | ms | time since button depressed | – |
| m\_button\_pressed | boolean | Button depressed | {true, false} |

### Constant

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Units/Type** | **Description** | **Range** |
| p\_max\_press\_length | ms | Maximum valid button press time | – |

### Controlled

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Units/Type** | **Description** | **Range** |
| h\_pulse\_detected | boolean | Simulates pulse in atrium or ventricle | {true, false} |

### Internal

No internal values

## Initial values

h\_pulse\_detected = false

## Requirements

|  |  |  |
| --- | --- | --- |
| **t** | **m\_button\_pressed** | **h\_pulse\_detected** |
| t < p\_max\_press\_length | false | true |
| true | false |
| t > p\_max\_press\_length | false | false |
| true | false |

## State Transitions

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Next State  Current State | IDLE | BUTTON\_DOWN | VALID\_PULSE | INVALID\_PULSE |
| IDLE | – | m\_button\_pressed | – | – |
| BUTTON\_DOWN | – | – | t < p\_max\_press\_length  ~m\_button\_pressed | t = p\_max\_press\_length |
| VALID\_PULSE | ~m\_button\_pressed | – | – | – |
| INVALID\_PULSE | automatic | – | – | – |

## State details

|  |  |
| --- | --- |
| **State** | **Description** |
| IDLE | Waits for button press |
| BUTTON\_DOWN | Measures time of button press |
| VALID\_PULSE | Sends 1 ms pulse on h\_pulse\_detected |
| INVALID\_PULSE | Waits for button release |

## Future changes

There are no foreseeable changes to this design

## Testing

|  |  |  |  |
| --- | --- | --- | --- |
| Test Case | Expected Result | Actual Result | Pass/Fail |
| p\_mode: AAI  p\_lower\_rate\_limit: 60 BPM  Atrium PW: 10.0 ms  Heart Rate: 30 BPM  Button pressed halfway between natural pulses | No pace between natural pulses | No pace between natural pulses | Pass |
| p\_mode: VVI  p\_lower\_rate\_limit: 60 BPM  Ventricle PW: 10.0 ms  Heart Rate: 30 BPM  Button pressed halfway between natural pulses | No pace between natural pulses | No pace between natural pulses | Pass |

Test 1

Graphical user interface, text, application

Description automatically generated

Test 2

Graphical user interface, text, application

Description automatically generated