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| **Design Controls Worksheet – 50 Pts** | **ID: DCW-1** |
| **Due Date: 4/6/2020 11:59 PM, Canvas Upload** |  |

**Date Written –** 4/06/2020

**Date Revised –** 4/06/2020

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**Improvement on Existing Design**

**User Needs**

*User Needs Matrix*

|  |  |
| --- | --- |
| ID | Description |
| UN-1 | Improved UX / UI to allow for operator control. |
| UN-2 | Improve Solidworks files to include assembly, hardware, configurations and drawings. |
| UN-3 | Eliminate warping of printhead resulting to motor temperature when located in incubator. |
| UN-4 | A method to stop or detach pump heads individually when part of a multi-pump design. |
| UN-5 | Eliminate breadboard or prototype parts in circuit. |

**Design Inputs**

*Requirements Matrix*

|  |  |
| --- | --- |
| Requirement ID | Requirement |
| DI-1 | The user Interface shall allow the user to set pump flowrate. |
| DI-2 | The user interface should be easy to use. |
| DI-3 | The user Interface shall allow the user to set tubing geometry. |
| DI-4 | The user interface shall connect to an Arduino board via the serial port |
| DI-5 | The user interface will have a button built in instead of a physical button on the circuit. |

**Design Outputs**

*Design Outputs Matrix*

|  |  |
| --- | --- |
| Requirement ID | Requirement |
| DO-1 | The user interface should be in MATLAB. |
| DO-2 | The user interface should be [easy] to understand, use and run. |
| DO-3 | Value for tube geometry input by the user shall be reflected in the rotation of the pump. |
| DO-4 | Value for flow rate input by the user shall be reflected in the rotation of the pump. |
| DO-5 | The button shall be integrated into the MATLAB user interface |

**Design Verification**

*Verification Matrix –* Write at least 5 Verification tests that

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Requirement ID | Description | Expected Value | Measured Value | Pass/Fail |
| VER-1 | The new UI is in MATLAB | 1 (binary test where 1 is yes) | 1 | Pass |
| VER-2 | The user interface is smooth running | 1 (binary test where 1 is yes) | 1 | Pass |
| VER-3 | User input for tube size are correctly passed and the pump rotates accordingly, to show correct display tube size, and rotation speed. | 1 (binary test where 1 is yes) | 1 | Pass |
| VER-4 | User input for flow rate are correctly passed and the pump rotates accordingly, to show correct display flow rate, and rotation speed. | 1 (binary test where 1 is yes) | 1 | Pass |
| VER-5 | The button is built into the user interface | 1 (binary test where 1 is yes) | 1 | Pass |

**Design Validation**

*Validation Matrix*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| User Need ID | Description | Expected Value | Measured Value | Pass/Fail |
| VAL-1 | Connect Arduino via serial port | 1 | 1 | Pass |
| VAL-2 | MATLAB based user interface | 1 | 1 | Pass |
| VAL-3 | Tube diameter input success | 1 | 1 | Pass |
| VAL-4 | Flow rate input success | 1 | 1 | Pass |
| VAL-5 | Run button toggles functionality | 1 | 1 | Pass |