Department of Bioengineering
UNIVERSITY OF COLORADO
DENVER | ANSCHUTZ MEDICAL CAMPUS

Micropump Module

ID: DCW-1

Design Controls Worksheet – 50 Pts

Due Date: 2/13/2020 11:59 PM, Canvas Upload

Date Written – 04/02/2020

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Improvement of 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 in motor temperature when located in an 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 the circuit.

Design Inputs

Requirements Matrix

Requirement ID	Requirement
DI-1	The device shall have a user interface to set the pump flow rate.
DI-2	The device shall be easier to assemble.
DI-3	The design shall be less than 64 cm^2.
DI-4	The design shall allow for detachment of individual pumps.
DI-5	The device shall have a printed circuit board (PCB).

Design Outputs

Design Outputs Matrix

Requirement ID	Requirement
DO-1	The device shall operate with a variable flow rate.
DO-2	The device shall be assembled using simple instructions.
DO-3	The design board shall be printed for the optimal design.
DO-4	The design shall operate with a detachment of individual pumps.
DO-5	The electrical components shall be soldered to the printed board for compact design

Design Verification

Verification Matrix – Write at least 5 Verification tests that

Requirement ID	Description	Expected Value	Measured Value	Pass/Fail
DI-1	UI is changeable to set the flow rate.	Yes	Yes	Pass
DI-2	People without experience in circuit assembly are able to build the device following instructions.	Yes	Yes	Pass
DI-3	Area is less than 24 cm^2.	7 cm^2		Pass
DI-4	Device continues to operate after detachment of individual pumps.	Yes	Yes	Pass
DI-5	The device has a PCB.	Yes	Yes	Pass

Design Validation

Validation Matrix

User Need ID	Description	Expected Value	Measured Value	Pass/Fail
UN-2	Device assembly is easier	Yes	Yes	Pass
UN-1	UI improved	Yes	Yes	Pass
UN-3	No warping of the printhead	Yes	Yes	Pass
UN-4	Pumpheads able to be removed individually	Yes	Yes	Pass
UN-4	Pumpheads able to be stopped	Yes	Yes	Pass
UN-5	Breadboard eliminated	Yes	Yes	Pass