

# BME Design: Progress reports

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**Title:** Microvascular Channel Bioprinter shutoff valve

Date: 6 November 2025

Client: Dr. David Dean

Advisor: Dr. Paul Campagnola

- Steph Vigmond- *Communicator*
- Mahathi Karthikeyan - *BSAC*
- Sophie Speece - *BWIG*
- Ana Toscano - *BPAG*
- Dominique Gooden - *Team Leader*

## Problem statement

Facilitate rapid switching between bioprinter input devices so that microchannels have rapidly decreasing diameter. Also come up with a shutoff mechanism to prevent excess fluid flow from valves.

## Brief status update

The team is working on improving current prototypes, developing code for IRE and CFD, and implementing feedback from Show and Tell last week.

## Difficulties / advice requests

1. Outreach for CFD assistance to BME professors
2. Need help with developing the mechanics involving a push valve shutoff mechanism design idea that Dominique developed (see lab notebook design ideas section in the team LabArchives NB - Dominique's section).

## Current design

See design matrix.

## Materials and expenses

| Item              | Description                        | Manufac-turer    | Mft Pt# | Vendor | Vendor Cat# | Date  | # | Cost Each     | Total          | Link |
|-------------------|------------------------------------|------------------|---------|--------|-------------|-------|---|---------------|----------------|------|
| <b>Category 1</b> |                                    |                  |         |        |             |       |   |               |                |      |
|                   | 3D Printed CEVIK & 5 KSMs          | N/A (3D Printed) | N/A     | N/A    | N/A         | 09/19 | 1 |               | \$3.48         |      |
|                   | 3D Printed CEVIC and 8 KSMs        |                  |         |        |             | 10/20 | 1 |               | \$12.60        |      |
| <b>Category 2</b> |                                    |                  |         |        |             |       |   |               |                |      |
|                   | Purchase makerspace Cervo          | Smraza           |         |        |             | 10/24 | 2 |               | \$5.28         |      |
|                   | PLA 3D printing Rotational Element |                  |         |        |             |       | 3 |               | \$0.27         |      |
|                   | Additional Gear                    |                  |         |        |             |       | 3 |               | \$0.15         |      |
|                   | Makerspace 3D printed              | 3D ma            |         |        |             | 10/24 | 1 |               | \$1.83         |      |
|                   |                                    |                  |         |        |             |       |   | <b>TOTAL:</b> | <b>\$23.51</b> |      |

## Major team goals for the next week

### Next week's individual goals

- Dominique
  - Support with CFD assistance as needed.
  - Continue solidworks progress and hopefully get something printed to test in following week
  - Schedule required training completion
  - Develop a new design matrix for more recent design ideas - shutoff valve mechanism
- Ana
- Sophie
  - Modeled holder to connect IRE and motor
  - Passage cells
  - Write testing protocols and begin testing
- Steph
  - Make further modifications to IRE component
  - Continue research
  - Modify design based on feedback from Client
- Mahathi
  - Write test protocol for circuit to begin testing
  - Look for relay components in the blue lab at ECB
  - Research potential other design ideas

## Timeline

| Task                   | Aug | September |    |    |    | October |   |    |    |    | November |    |    |    | Dec |    |
|------------------------|-----|-----------|----|----|----|---------|---|----|----|----|----------|----|----|----|-----|----|
|                        | 26  | 4         | 11 | 18 | 25 | 2       | 9 | 16 | 23 | 30 | 6        | 13 | 20 | 27 | 4   | 11 |
| <b>Project R&amp;D</b> |     |           |    |    |    |         |   |    |    |    |          |    |    |    |     |    |
| Empathize              |     |           |    | X  |    |         |   |    |    |    |          |    |    |    |     |    |
| Background...          |     |           |    |    | X  |         |   |    |    |    |          |    |    |    |     |    |
| Prototyping            |     |           |    |    | X  |         |   | X  | X  | X  |          |    |    |    |     |    |
| Testings               |     |           |    |    |    |         | X |    |    | X  |          |    |    |    |     |    |
| <b>Deliverables</b>    |     |           |    |    |    |         |   |    |    |    |          |    |    |    |     |    |
| Progress Reports       |     | X         | X  | X  | X  | X       | X | X  | X  | X  |          |    |    |    |     |    |
| Prelim presentation    |     |           |    |    |    | X       |   |    |    |    |          |    |    |    |     |    |
| Final Poster           |     |           |    |    |    |         |   |    |    |    |          |    |    |    |     |    |
| <b>Meetings</b>        |     |           |    |    |    |         |   |    |    |    |          |    |    |    |     |    |
| Client                 |     |           | X  | X  | X  | X       | X | X  |    |    |          |    |    |    |     |    |
| Advisor                |     | X         | X  | X  | X  |         | X |    |    |    |          |    |    |    |     |    |
| <b>Website</b>         |     |           |    |    |    |         |   |    |    |    |          |    |    |    |     |    |
| Update                 |     | X         | X  | X  | X  | X       | X | X  |    |    |          |    |    |    |     |    |

Filled boxes = projected timeline

X = task was worked on or completed

## Previous week's goals and accomplishments

- Ana
  - worked on simulation
  - Testing protocol
- Dominique
  - Brainstormed various design ideas (see activities description for more)
- Steph
  - Worked on modifying IRE design
- Sophia Speece
  - Worked on modifying IRE and printed new CEVIC out of correct material
  - Passaged cells
  - Acquired motor dimensions to model cage
- Mahathi
  - Worked on code for relay
  - Show and tell with team

## Activities

| Name    | Date       | Activity                                   | Time (h) | Week Total (h) | Sem. Total (h) |
|---------|------------|--------------------------------------------|----------|----------------|----------------|
| Mahathi | 5 November | - Worked on Code for Relay and clamp model | 1        | 1              | 24.5           |

|           |                 |                                                                                                                                                                                                |                  |     |      |
|-----------|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|-----|------|
| Steph     | 4 November      | Worked on modifying IRE model                                                                                                                                                                  | 0.5              | 0.5 | 29   |
| Dominique | 2 November 2025 | - Brainstormed a valve shutoff mechanism design idea with team to discuss at next meeting                                                                                                      | 1hr              |     | >10  |
|           | 5 November 2025 | - Brainstormed a design modification to KSM and CEVIC to potentially resolve excess fluid accumulation from other non-active KSMs<br>-Began solidworks design of new valve shutoff design idea | 1 hr             |     |      |
| Sophie    | 4 November      | Met with Steph got go over IRE modifications to prevent fluid escaping                                                                                                                         | 1 hr             |     | 24.5 |
|           | 6 November      | Passaged cells<br>Motor dimensions and began modeling                                                                                                                                          | 0.5 hr<br>0.5 hr | 2h  |      |
| Ana       | 5 November      | Worked on simulation and testing plan                                                                                                                                                          | 2h               | 2h  | 24.5 |