Bioengineering Day Poster Addendum (ABET questions)

1. List two to four **Desired Needs** of your project that led to your final design objectives.
- Standardize and automate classification and sorting of healthy vs. unhealthy organoid
- Maintain sterility and viability of organoids while remaining compatible with lab environment
- Gently sort mm-scale brain organoids in laminar flow while preserving quality for further research

2. List the major **Constraints** on your design/project
a. **Safety/Regulatory Affairs** - prototype must limit contamination, leakage, unsafe electrical or fluid contact, and tissue damage.
b. **Risks** - Design must not shear organoids or get clogged. Must not misclassify and software should not lag.
c. **Global Impact** - improves reliability and reproducibility of organoid based research.
d. **Manufacturability** - create a biocompatible chip while ensuring low cost and accessibility to materials
e. **Quality Control/Marketability** - verify channel dimensions, Re < 200 flow behavior, image accuracy, valve timing, and viability. Must not send unhealthy organoids to healthy chamber.

3. List the major **Engineering Standards** on your design/project
-ISO 22916: microfluidic dimensions, connections, interoperability, and device classification.
-ISO 10993-1: biological safety evaluation for materials contacting biological samples.
-ISO 14971: risk management for sample damage, leakage, actuator failure, and incorrect sorting.
-ISO 13485: documentation, traceability, verification, and reproducible fabrication

4. Explain **Ethical, Environmental, or Societal concerns** for practical applications of your project.
False sorting calls could bias downstream experiments and decisions should be validated, documented, and supported by reviewable image records. Low-cost fabrication improves access, while reusable hardware and minimal disposable fluidics help reduce waste.

5. Describe **Active Teamwork** and **Leadership** in your design group
a) **collaboration** and inclusion of diverse opinions? – Team worked together on design decision, evaluating each idea and opinion with respect and consideration.
b) **delegation** of leadership on subprojects?- Work was delegated across subsystems and validated together.
c) establishing and reaching **goals and deadlines**? Expectations from each member was clear and delivered in timely manner. Deadlines were met and all milestones were met according to timeline
d) received or given **constructive feedback**? Members and mentors shared constructive feedback during reviews and aligned the necessary work to improve design.

6. What were the most significant motivating factors that led you to
    a) acquire **new knowledge**
    b) be **self-initiating**
    c) **persist** against challenges and setbacks.

Our mentors motivated us to improve on design and gain significant knowledge as we worked through the design. Members and our PI encouraged new ideas and how to solve problems with design and scheduling to enable teamwork. Regularly updating our mentor and other members to ensure progress and equal delegation of work. The idea of working on a completely new project was a motivating factor as the design was completely original.

7. What are your most **innovative and/or entrepreneurial ideas** for this project
combining a low-cost brightfield imaging with real-time millifluidic routing.
Future versions could become a modular lab add-on with image records, audit trails, machine-learning classifiers, and cross-lab morphology QC benchmarks.