Bioengineering Day Poster Addendum (ABET questions)

Submit one file per person. You may borrow materials from each other in your group.
FILE NAMING CONVENTION -- Examples:
01BENGLastName.pdf
01BTECLastName.pdf
01BSYSLastName.pdf
01BINFLastName.pdf

To help the department to prepare for the next cycle of ABET accreditation, please prepare a one-page, bullet style summary of answers to the questions posed below. This addendum will be displayed at BE Day on the web site for judges to see. (In the past, printed versions were attached to the poster.) Give as much detail as you can while staying within the one-page limit. Use 12 pt font.

In what follows, "device" is broadly interpreted, including computer program, biotechnology process, mechanical or electrical device – i.e. everybody's project.

For each, describe how your team addressed or used the following over the course of your work:

1. List two to four **Desired Needs** of your project that led to your final design objectives.
   Answer in two to four bullet points or concepts within a sentence or two.

- genetic engineering is inefficient for HSPC and iPSC cell lines (especially gRNA choice)
- Template design is time consuming and tedious.
- General LLMs do not work for researchers at a level of specificity needed.

2. List the major **Constraints** on your design/project
   a) Safety/Regulatory Affairs
      a. In-vivo Genetic engineering of cell lines should be performed under the guidelines of FDA approval.
   b) Risks
      a. Inaccuracies in the RAG outputs could result in experimental errors for researchers.
   c) Global Impact
      gRNA selection is no longer a trial and error process for therapeutic genetic engineering community compared to before.
   d) Manufacturability
   - None
   e) Quality Control/Marketability
   - Benchmarking has been done for using this tool in various cell lines.

3. List the major **Engineering Standards** on your design/project
   a) affected the components used in the device, and/**or**
   b) standards that constrain the device and its performance, and/**or**
   c) standards that could be developed from your project

IEEE 2894-2024 which is the standard, Guide for Explainable Artificial Intelligence
ISO 13845. For Medical Devices: Quality Management
ASTM International ASTM F3209-24a. This is the Standard Guide for Autologous Platelet-Rich Plasma, Platelet Gels, and Whole Blood Gels for Use in Tissue Engineering and Cell Therapy

4**.** Explain **Ethical, Environmental, or Societal concerns** for practical applications of your project.

HDR-GPT may hallucinate so researchers should double check what it is outputting.
Our project could also theoretically be used for the design and development of genetic improved living organisms, such as enhanced babies or other animals, which should be highly regulated.

Environmentally this project does not have any concern.

Social concern has to do without with trust worthiness of AI and that should always be regulated given any LLM usage.

5. Describe **Active Teamwork** and **Leadership** in your design group

a) **collaboration** and inclusion of diverse opinions?

We had started with uneven starting points as I started in the summer as compared to Duy whom started in the fall. We worked quickly with each other and with the TAs to polish off our communication style and frequency to be as productive as we can during meetings and classes together.

b) **delegation** of leadership on subprojects?

We divided and conquered based on strengths and availability of individual team members. For instance, Duy did not have access to advanced GPUs, so I delegated computationally easy components like designing the RAG retriever. Also, we made sure that aligned with individual interests for the project as well so that we maximize learning and exposure for everyone.

c) establishing and reaching **goals and deadlines**?

This one is easy as we are both very good about deadlines and getting things done. If there is trouble, we always communicated ahead of time.

d) received or given **constructive feedback**?

We have a direct and trusting culture down so we are never afraid to give each advice during meetings or through text.

6. What were the most significant motivating factors that led you to

a) acquire **new knowledge**

Curiosity to see how much I can learn during a unique experience like senior design.

b) be **self-initiating**

Getting stuff done and not letting my team down

c) **persist** against challenges and setbacks.

Not letting my team down.

7. What are your most **innovative and/or entrepreneurial ideas** for this project

We wanted to make this into a working website (like ChatGPT) instead of just ending with a Github to improve accessibility to the community.