Individual Capstone Assessment

Our senior design project is about creating a product which enables greater personalization in classrooms. The goal is to create a prototype to implement for college level engineering courses, by automating the creation of homework and subsequently practice problems. The prototype of the product will leverage GenAI to in a supervised manner generate unique Statics problems based on the selection of user Major from a predefined list, the type of Statics problem, and the bounds of the numbers determined by the user. This product will allow for a more personalized and in-depth class experience for students since they will have personalized problems, and for professors will be able to spend their time prepping and creating new content rather than rewriting homework problems every semester. The end product should support the end-to-end needs of a homework problem set, from synthesis to grading. This means that a solution and/or rubric would need to be generated in a way that would be useful to graders such as TAs or professors.

I will be leveraging lots of experiences from my class curriculum to guide the development of my project. The three classes that jump to mind as the most useful for this are Software Engineering, AI Principles, and ENED. Software Engineering will be extremely important as my main role is to manage our project, ensuring that we identify and address design specifications and criteria in a timely manner without the unnecessary duplication of effort. AI Principles will be essential as it taught me and my colleagues the basic principles of AI and how to use it to create effective agents to create decision-making machines to achieve a specified goal. ENED will be essential as the experience of sharing a classroom with people from various majors and thinking critically about how the course is delivered to us will be very helpful to design a product which will achieve the same purpose. ENED was also a large part of my experience with 2D statics problems, which is a portion of the problems we will attempt to generate.

From co-op, I will be using a lot of my soft skills such as communication and project management to succeed. Before explaining how those will guide me, I should mention that my experience as a Consumer Market Knowledge intern at P&G will be of great value for this project. Specifically in the initial design phase, as my experience at P&G is what taught me how to conduct proper research to understand consumer and stakeholder needs to design and implement an effective brand and product. Through all of my co-ops at P&G, GE Aerospace, and GE Appliances I have had experience in leading projects and being a point of contact for the knowledge required to complete my assigned tasks. This experience of balancing time spent implementing the product, documentation, and communication with team members will be essential to the success of the product. Another great experience I will leverage is my time as a TA, as it will help me understand how to best design for in-classroom end users and for assignment graders.

My motivation for taking on this project is my passion for teaching and learning. I have 6 semesters of experience as a TA for ENED, where I have learned the value and felt the gratification of getting to be a part of a student's learning journey. The ability to leverage my technical skills to solve a problem so pressing in a space that I feel so passionate about is a true privilege. The preliminary approach to designing a solution will begin by conducting thorough research via user interviews. The goal is to conduct at least three interviews with professors who currently create Statics practice problems to identify what their current process looks like. Once we understand what problems they face overall in the delivery of the course, we will then be able to make informed decisions on how our design could address these challenges.

The next step would be to identify the design criteria and specifications that we need to address in our design. For example, we need to identify which majors need to be supported, which and how many types of statics problems, and how solutions should be formatted. Documenting the number of details of these specifications will be essential to ensure that we are thorough in how we address user needs. Then, we need to decide how we will split the work and implement QA to ensure the quality and robustness of our product. For example, we need to decide if we want to split the work by function or by user journey, and how we will test this. Lastly, we need to identify how we will deliver this information to our user via an effective UX/UI.