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A Reflective Journey of My Experiences at Iowa State

This past semester, I took a class in Theoretical Foundations of Computer Engineering. I found it interesting but also difficult because the steps to solving a problem weren't always clear to me. Oftentimes, you needed to use principles to find an answer instead of following a certain layout. I remember the combinations and permutations part of the course very well because I would find myself thinking about it all the time, especially the phrase, "If there are more pigeons than pigeonholes, then there must be a pigeonhole with more than one pigeon." When I first heard the phrase in class, I really got a kick out of it. But it was actually an important piece in making proofs. The principle was applied differently in each problem, but if I could recognize when it appeared, I better understood how to form a solution. When approaching a solution to problems in this class, it helped me to recognize the similarities between problems. So that even when certain elements of the problem varied from those I had seen before, I was still able to recognize what principles I needed to apply to come to a solution. By seeing how a common principle functions in a previous problem, I could better formulate how the principle would function in a problem I was less familiar with.

Through my coursework in CPRE 3810, I learned how to design a pipelined MIPS processor with hazard detection and forwarding. To increase performace the processor overlapped instruction execution to allow multiple instructions to be processed simultaneously. However, this created data and control hazards which needed to be addressed with stalling, forwarding, branch prediction, and flushing. Timing was also an issue that often occurred. This system had many parts that were connected to each other, so identifying the issue when a problem occurred was difficult. Sometimes changing one component would create issues in another area. When trying to isolate the issue, I had to think of many possible points where the problem could occur. I also had to keep in mind how the data was flowing between components for each instruction, and test if the correct output was being given at the right time. These experiences taught me how to design and isolate issues for a complex system, and what techniques to use to increase efficiency.

At Iowa State, I have collaborated with my peers many times for group projects and labs. Having these experiences has taught me how to assert my ideas respectfully. When I don't contribute my perspective to avoid difficult conversations, progress can move in a direction I am unhappy with. I know it is better to voice my opinions rather than to have an end result I am unhappy with. Computer engineering requires a lot of collaboration, and I know professionally I will be expected to share my perspectives in order to create outcomes the entire team is proud of. Additionally, I have also been taught that I have an ethical responsibility to speak up when I am uncomfortable with how the project is being handled. If I feel the work has violated codes or

rules, or if I am worried that people's safety or the environment is at risk, I cannot avoid raising the issue to avoid discomfort.

As an engineer, I believe that what I do could have many societal, global, and economic impacts. In my ethics course, I analyzed a case study examining social media algorithms' influences on society. I was especially interested in this case study because it highlighted how negative effects that arise from complex systems do not always have a cause-and-effect explanation. This research has shown me that as technology becomes more integrated into everyday life, its societal and global impacts demand broader considerations than before.

I have done some personal projects outside of school for my own learning, but mostly for pleasure. Before taking a class about user interfaces, I signed up for a course on Udemy to learn more about web development. I enjoy art and design, so I wanted to use my computer skills to make something visually engaging and expressive. Using what I have learned from this course, I made a website to display my own pictures and pictures of my friends. I will continue to learn more about user interfaces in the class I am taking this semester, and I will be able to implement it in my senior design project, where we are creating a website.

As I finish my time at Iowa State and head into the professional world, I know I need to continue learning and growing as an engineer. I would like to foremost become a more organized and responsible person. I have been working to start creating a schedule for myself and follow through with my commitments. When adjusting to a workplace environment, I will be relied on more heavily, so I will continue to find ways to stay organized. I have always been a curious person hope that curiosity will follow me as I move forward, so I will continue to learn as much as I can about computer engineering. I have many projects I would like to do with computers in the future, and I will need to continue to learn to complete them. I hope that by continuing to create things, I will be motivated to learn more.