Automated Postural Assessment of Office Workers
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**Introduction**
Office workers, including engineers, architects, and designers, spend most of their work time at their computer desks and may assume stationary postures for approximately 11 hours per day [1]. Occupational injuries and illnesses associated with work-related musculoskeletal disorders (WMSDs) can happen in any industry [2]. With long periods in sedentary postures, the development of WMSDs becomes more likely. This ongoing project proposes an automated postural assessment of workers using simulations, computer vision, and machine learning.

**Skills Learned**
During my time in the civil engineering lab, I learned how to navigate new software such as 3D Experience and DELMIA. Within this software, I have learned how to create 3D modules and manikins to simulate natural office worker behavior. These models also produce supplementary data in the machine learning process. I received formal introductions to the Unity platform and virtual reality (VR) (Fig. 2).

**Objective & Impact of Professor’s Research**
Dr. Becerik-Gerber’s research is in human-building interaction to meet the needs of occupants. By adjusting the room temperature to make workers more comfortable or automatically adjusting the room’s brightness to a person’s preference, office workers will be more productive.

Dr. Sobelman’s research focuses on using information technology for economic development, construction management support, process integration during the development of large-scale engineering systems, information logistics, artificial intelligence, etc.

Patrick Rodrigues, my SHINE mentor, is researching how to use machine learning and computer vision (which is part of the virtual reality field) to create a system that will provide real-time information about a person’s posture [3]. By doing this, a worker will be able to regulate their own posture and prevent developing chronic musculoskeletal disorders, which include joint pain, neck pain, back pain, and more. Currently, the project aims to find methods to increase the amount of training data by employing synthetic images from biomechanical models (Fig. 1).

**How This Relates to Your STEM Coursework**
This experience has given me a glimpse into the immersive field of scientific research. Before this internship, I didn’t realize the depth of each scientific field. For example, I believed that civil engineering was about constructing public structures like buildings, roads, and industrial factories. However, I am now aware that fields like computer science, environmental science, and robotics can overlap with civil.

I now know how to create, develop, test, and reconstruct a pilot experiment from scratch. During my time in the civil lab, I constructed an interactive experiment (Fig. 4) that could give us time to capture images of natural human posture. It would also capture intentionally good or bad posture.

**Next Steps**
While I would love to return to the SHINE program and contribute to another research project, I plan on partaking in an EF Educational Tour to South Korea and Japan during the summer of next year. During the tour, I will get to see and possibly gain hand-on experience with how robotics and engineering can be applied to today’s problems.

I look forward to learning about other scientific fields such as mechanical and aerospace engineering, along with how they overlap with other scientific studies. If given another opportunity, I would be honored to come back to SHINE as an up-coming senior.

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**References**
