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Hi, my name is Liam Janssen and I'm a 3rd year mechanical engineering major at California Polytechnic University. I enjoy studying fluid mechanics, and lately I've taken

a interest in coding.





Some of my favorite classes that I've taken that might be interesting are:

- ME540 *Compressible Flow*
- ME542 *Viscous Flow*
- ME470 *Special Advanced Topics (Solutions to Classical Fluid Mechanic Problems)*
- ME418 *Mechanical Control Systems*
- CSC101 *Python*

FEA Simulation Projects

Ansys Discovery + Fluent CFD Simulation

For my senior design project, we are interested with the in-cylinder flow of a diesel engine cylinder + piston system. Our group of 4 was interested in dimpling the piston crown surface in order to optimize the fuel/air mixture, therefore increasing efficiency and decreasing emissions. The unique in-cylinder flow characteristics were challenging as they would be impossible to experimentally model. Here is a video of our preliminary CFD testing of the flow characteristics of a diesel piston system at the crank angle of top dead center.

Structural FEA Analysis (Solidworks)

For our design class, we constructed a scooter. It was first necessary to conduct preliminary analysis so we could spec the appropriate tube size and fastening materials.

Vibrational FEA Analysis

For my advanced vibrations class, our project was to write the labs for the undergraduate vibrations class. For my part, I decided to detail the analytical solutions via FEA analysis in Solidworks and Abaqus. I did this for the Saturn V model, which would later be tested experimentally in lab.

Research Projects

BEACoN Research Scholar

BEACoN, a research program on campus allowed me to conduct research with 2 of my peers under fluid mechanic professor Hans Mayer. We focused primarily on developing microfabrication techniques for thin film microfluidic devices.



Our research abstract was:

As a continuation of an ongoing NSF-ERI project focused on the study of soap film frame retraction, the microfabrication team was responsible for developing frames with patterned metallic edges. Previous iterations of the project utilized wires for soap film frames, however, the team aims to use microfabrication techniques to produce higher-quality patterned frames that will produce more controlled results. In addition, the team was tasked to create a detailed production manual for these devices for future student researchers to follow. Once these steps are perfected, these frames will be used to study the thin film refraction of soap films.

I was super passionate about this project, and I felt that it gave me unique exposure to microfabrication techniques. For more information, you can visit our symposium website here: [2024 BEACoN Research Symposium](#)