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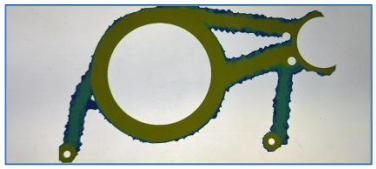
Projects

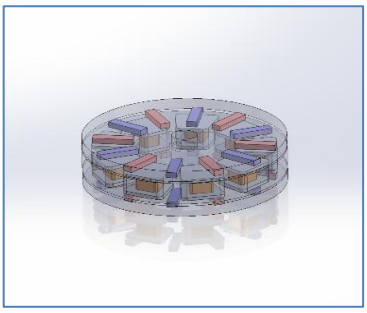


Formula Racing UC Davis, Mechanical Engineer

- Reduced production time as far as 92% (from 6 hours to 30 minutes) via the introduction of CNC machining.
- Designed components with up to a 10% decrease in mass, whilst maintaining a Factor of Safety above 2 to ensure durability using SolidWorks FEA and Topology Optimization.
- Manufactured parts on the Manual Lathe and Mill within stricter tolerances as tight as 0.005” to guarantee perfect assembly.
- Created production drawings for submission to FSAE design contests judged by the Society of Automotive Engineers (SAE).
- Spearheaded the drivetrain sub-team’s collaboration in research and implementation of hardware for a 4-wheel drive hub motor system that has shown a 1 second improvement across endurance and autocross lap time simulations.

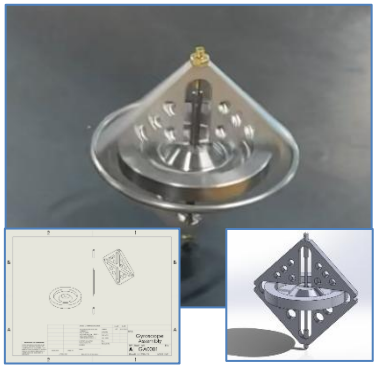
Computer Vision Arcade Machine

- Optimized rapid prototyping production, utilizing Topology Optimization to achieve mass reduction and a 33% decrease in material costs as well as a ~50% decrease in production time from part to part.
- Engineered high-precision movement mechanisms - including winching gates and rack-and-pinion disposal systems - applying GD&T standards to ensure proper fits and clearances such that performance reliability was improved to 95+%.
- Constructed a hardware assembly, integrating Raspberry Pi, camera module, and motors consistent with the mechanical design.



Hub Motor Project

- Engineered high-performance hub motor components in CAD, utilizing Ansys Maxwell to simulate torque generation and prevent magnetic disturbances for optimized electromagnetic efficiency.
- Developed an iterative design-to-manufacture workflow, leveraging rapid prototyping to validate simulation data through physical testing before transitioning to final metal fabrication.
- Architected the hardware control strategy for future torque-vectoring capabilities, integrating microcontrollers to manage power distribution and replicate high-performance EV dynamics.

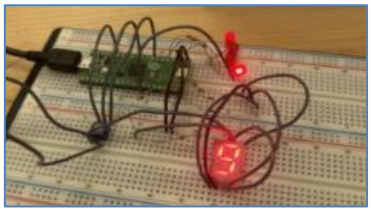


Metal Gyroscope

- Designed the complete gyroscope assembly in SolidWorks, performing interference checks and tolerance analysis.
- Created production drawings with implemented GD&T standardization and consideration, to ensure seamless assembly between the press-fit spindle and machined frame.
- Manufactured a high-precision metal gyroscope utilizing Fusion 360 CAM to program complex toolpaths for a vacated frame geometry and a custom-banked rotor surface to optimize mass distribution and ensure minimal rotational friction.
- Performed multi-process fabrication techniques, including CNC milling, precision turning, and structural welding of an outer ring successfully to produce a total spinning time of 2+ minutes.

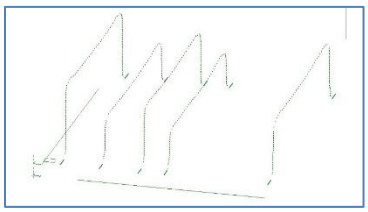
Precision Manufacturing

- Applied manufacturing expertise encompassing hands-on machining, including CNC, manual lathe, and mill operations, alongside rapid prototyping techniques.
- Implemented CAM to enhance production accuracy and automate manufacturing workflows.
- Applied FEA to parts under load, analyzing chances for material reduction whilst maximizing factors of safety.



Signal Conditioning

- Designed and assembled a precision signal conditioning circuit, utilizing a Wheatstone Bridge and operational amplifiers to translate analog sensor data into a visual 7-segment LED output.
- Calibrated the hardware assembly to ensure accurate sensor readings, mapping tiny analog voltage changes to a visible digital output through precise component selection.
- Coded Boolean logic into the Raspberry Pi via Python to harness the 7-segment LED.



Micro-Vu Precision Measurement

- Facilitated graduate-level Directed Energy Deposition (DED) research by executing precision measurement workflows to validate material transformations and geometric accuracy in metal additive manufacturing.
- Synthesized raw DED process data into high-fidelity visualizations, performing comparative analysis to validate material performance for cross-institutional research presentations.

FER 2013 Machine Learning Coding Competition Attempt

- Engineered a facial expression classifier using Python and NumPy, achieving a 97% training accuracy on the FER2013 dataset through optimized label merging and data preprocessing.
- Diagnosed system performance by analyzing Confusion Matrices and loss curves, identifying a 42% accuracy gap to understand model overfitting during validation.
- Developed custom visualization tools to output predictive certainty bar charts and randomized validation samples, effectively communicating model reliability and error distributions.

Skills

CAD: SolidWorks, Creo Parametric, Autodesk Fusion360.
Analysis: Finite Element Analysis, HSMWorks, Matlab, C/C++, Python, Microsoft Excel, NumPy, Scikit-learn.
Machining: CNC Mill, Manual Lathe, Manual Mill, 3D Printing & Rapid Prototyping, Drill Press, Marvel Saw, Belt Sander.
Languages: English, Mandarin, German