

# Pawan Sutar

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## SUMMARY

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Graduate Mechanical Engineer with multidisciplinary background, strong programming skills and expertise in Fluids and Heat, Numerical CFD, Controls and Testing. In search of a challenging technical opportunity to learn and add value.

## EXPERIENCE

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**Graduate Research Assistant**, Combustion and Propulsion Research Laboratory, IUPUI *Jan 2019 - Dec 2020*

- Master's Thesis: *Numerical Simulation of Pressure Wave Supercharger with Pockets Operating at Different Speeds*
- Quasi-one-dimensional simulation of wave rotor pressure wave supercharger with NASA in-house developed solver
- Developed an unsteady, one-dimensional numerical model in FORTRAN to simulate the effects of wall-recesses in Mazda Complex supercharger using simple lumped capacitance technique
- The numerical model algebraically solved Euler equations in integral form to estimate gas state in the wall-recesses
- Extended capability of in-house solver to incorporate the wall-recesses, which will allow the design of wall-recesses in future applications of wave rotors, including wave rotor combustors (wave turbines) and pulse detonation engines
- Developed a post-processing script in MATLAB to visualize and plot flow field, shock and expansion waves, pressure and temperature distribution, mass flow rates and velocity profiles
- Created automated makefiles to compile different subroutines and input-output control software, organized computational programs by eliminating hardcoded blocks and defining input parameters, troubleshooting and debugging code
- Validated one-dimensional supercharger design against the bench-top experimental data and published work
- Supervised computational research program for two years, responsible for analysis of acquired information, preparing and finalizing reports, proposals, reviewing technical papers and manuscripts, and laboratory management
- **Accomplishments:** Reduced dependency on expensive CFD software by developing user-friendly MATLAB script

**Energy Engineering Intern**, Industrial Assessment Center, Indianapolis *Sep 2018 - May 2019*

- Performing energy audits for small and medium sized companies (ASHRAE Level 1&2 audits)
- Metering and analyzing plant energy consumption by collecting data from site and utility bills
- Finding energy saving opportunities and intelligent usage techniques by analyzing mechanical and electrical systems
- Calculating and estimating cost, payback period and rate of return for each Energy Management Opportunities (EMO)
- Writing and editing official reports including plant and process description, best practices and description of EMOs
- **Accomplishments:** Participated in four industrial energy audits, contributed to the energy cost saving of over **\$50,000**

**R&D Engineer**, Potdar Electric Company, Kolhapur (India) *Jan 2018 - May 2018*

- Planned and executed comprehensive research strategies to develop 5 kW Free-Piston linear engine for hybrid vehicles
- Replaced crankcase compression by designing innovative auxiliary compression chamber with proper leakage sealings
- Redesigned complete ignition system to utilize IC engine spark plugs precisely for linear piston synchronization
- Implemented arduino-based fuel injection control system and data acquisition system, performed tests and data analysis

## PROJECTS

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### Self-Driving Vehicle Control

- Developed kinematic and dynamic bicycle models of a car with velocity and steering angle inputs
- Implemented controller in PYTHON and developed working simulation of an autonomous vehicle in Carla Simulator
- Integrated vehicle modeling and controller design into a complete autonomous vehicle control system
- Familiarity with Probabilistic Fault Trees, FMEA, HAZOP, FuSa-HARA, SOTIF and Waymo safety and testing

### CFD and FEA Domain

Concept-to-end HVAC System Development (CFD Analysis of duct system), Pressure-loss CFD Analysis of Cummins 6-cylinder Exhaust Manifold, FEA Analysis of Race Car Upright, Complex Flow and Conjugate Heat Transfer CFD

### Test Automation and Data Analysis using PYTHON

- Automation of web UI tests using Selenium WebDriver and PYTHON to locate elements, navigate pages, test user interactions with forms, drag-and-drop elements, and use waits to control test timing and execution.
- Evaluated cost benefits of using peak-shaving generators for Indianapolis Citizens Energy Group's DigIndy Tunnel dewatering pump station by analyzing 3 years of electricity usage data using PYTHON and SQL

## EDUCATION

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**Master of Science**, Mechanical Engineering  
Purdue University

*Aug 2018 - Dec 2020*  
GPA: 3.45

## SKILLS

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**Programming Languages:** PYTHON (4yrs), C++ (2yrs), FORTRAN (2yrs), Unix/Linux Shell Scripting (6yrs)

**Engineering Software:** MATLAB, Simulink, Carla Simulator, OpenFOAM, ANSYS Fluent, SOLIDWORKS

**Project Management Tools:** MS Office Suite, Standard SQL, GitHub, Visual Studio, Scrum Fundamentals Certified

**Certifications:** PYTHON for Data Science Professional (Numpy, Pandas, Matplotlib, OOP & ML), MATLAB for Scientific Computing, Python Selenium Automation and Testing, Embedded C, Introduction to Self-Driving Cars