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Professional Experience

- **2003-Present**. Argonne National Laboratory
  - Engine research engineer, involved in setup of test cells for various applications ranging from a 5 kW Kohler spark ignited generator to a Cummins QSK19G natural gas engine capable of producing 350 kW
  - Principal engineer assigned to coordinate the seamless operation of a single cylinder spark ignited natural gas engine to study the effects of nitrogen enrichment using air separation membranes and laser ignition as an alternative to the century-old spark plug
  - Engineering planning and design, fabrication, establishing safety protocols, installation, system integration, commissioning, organizing and scheduling safety reviews and design reviews, and ensuring quality assurance standards for every engine test cell installation
  - Involved in each task at various levels along with the design of experiments, testing, analysis, and reports
  - Write proposals, technical publications and reports, invention disclosures, and patent applications as well as giving oral presentations of technical information related to the project to sponsors and potential collaborators
  - Principal Investigator of Flexible Fuel Turbine System: This is a new U.S. Department of Energy (DOE) funded project which involves research in micro-turbines fueled by a variety of gaseous fuels for stationary power generation. It adds a very novel element to Argonne's experimental capabilities vis-à-vis micro-turbine platform. With a vibrant collaborative effort comprising Capstone Turbine, Packer Engineering, and University of California at Irvine, Argonne's contribution is critical for the success of this project. Responsibilities include installation and commissioning of a 65 kW micro-turbine system in Test Cell # 2 in the Distributed Energy Research Center (DERC) facility of the Energy Systems Division. Since this is a "ground zero" installation, it involves copious engineering planning, design, fabrication, procurement, installation, management, integration, safety measures, scheduling safety reviews and authoring safety plans as well as successful commissioning. Phase II responsibilities include design of experiments, testing, analysis and submission of periodic reports and presentations to the sponsor.
  - Principal Engineer for Cummins QSK19G engine test cell: A new test cell capable of accommodating up to 600 hp engines (double ended configuration) started in August 2009. Responsible for identifying, evaluating and procuring several critical systems such as real time dynamometer controller, Fourier transform infrared spectroscopy based emissions measurement system, test cell design, etc., as well as assigning tasks to support staff and technicians.

- Principal Investigator of Nitrogen Enriched Combustion in natural gas engines: This project presents an effective alternative to EGR in engines by utilizing air separation membranes to reduce combustion temperatures and produce lower NO_x emissions. This project has been a major success story, with a patent awarded recently, resulting in interest from engine manufacturers.
- Research Engineer for Advanced Laser Ignition System project: This project has been the bread and butter of the advanced reciprocating engine systems program funded extensively by DOE. Recommendations were made to the principal investigator who developed a laser ignition system regarding engine test matrix, operational boundaries and combining nitrogen enrichment strategy.
- Co-Principal Investigator for Homogeneous Charge Radical Ignition (HCRI): This project is a proof-of-concept demonstration through a Technical Service Agreement with HCRI Technologies International to experimentally investigate the effects of internally generated “radicals” on the chemical-kinetics mechanism for compressed natural gas combustion operating under ultra-lean fuel conditions.
- Engineering Consultant to Integrated Fuels Technologies (IFT) Inc. (2008-2009): IFT Inc. sought engineering consultation to set up its mobile engine lab for testing nitrogen enrichment using air separation membranes. A John Deere 4.3L diesel engine was utilized for this purpose which corroborated the patent claims on a diesel platform. Proposals to two diesel engine related solicitations were submitted along with IFT.
- Project Engineer for Omnivorous Flex-fuel engine (2006-present): The goal of this project is to optimize an automotive engine to run on different gasoline/alcohol fuels using ionization sensors. Set up and successfully commissioned the engine. Provided technical support related to test cell functionality. Schedule dynamometer availability for various projects related to this engine.
- Test Engineer - Work for Others (WFO) Projects (2003-2005):
  1. A suite of experiments were performed at Electro-Motive Diesel to measure the amount of particulate matter upstream and downstream of the turbocharger of locomotive engine in a unique situation.
  2. Experiments to measure the efficiency of a particulate filter developed by StrionAir Inc. were performed on a caterpillar single cylinder diesel engine.
  3. Assisted senior Argonne staff with Bio/Sun-diesel testing on a caterpillar diesel engine to measure the improvement in performance and reduction in emissions compared to regular diesel fuel.
- Facilities Development Engineer: Interact with vendors for equipment purchase, installation, and execution. Vendors include DyneSystems Inc., EngineTech, Horiba, Altronic Inc., Hi-Techniques Inc., Wineman Technologies, National Instruments, etc. Work with Plant Facilities Personnel and take active role in building the DERC.

- **2002**. Product Development Engineer, Caterpillar Fuel Systems, Inc.
  - Planning, developing and designing test matrices
  - Product testing of diesel fuel injectors (hydraulically and mechanically actuated, HEUI & MEUI), engine compression brakes and valve actuators
  - Developed data reduction tools to help analyze results
  - Participated in test bench setup and instrument calibration
  - Implemented statistical methods (Regression Analysis and ANOVA) to study product variability, reliability and predictability evaluation

    - Monitored performance and endurance testing to ensure good repeatability, reliability and durability for Advanced Combustion Emission Reduction Technology
    - Correlated simulated test benches with engine data
    - Trained test technicians with data capturing and reduction
    - Analyzed test results and made recommendations for improvement
- **2001**. Summer Internship, Detroit Diesel Corporation.
    - Development of analytical tools for data reduction
    - Processing and analysis of raw data
    - Determining critical modes of engine operation
    - Implementing troubleshooting techniques in test cells
    - Heat release analysis, comparing different engine calibrations and injector performance
    - Experimenting in transient and steady state conditions
    - Hybrid electric vehicles
    - NO_x reduction techniques such as urea injection
- **1999-2001.** Graduate Research Assistant, University of Alabama.
    - Planning, obtaining, documenting and coordinating test procedures and test data
    - Analyzing and interpreting test data
    - Implementing optimized combustion strategies for a CAT 3401 lubrication oil single cylinder natural gas engine
- **2000.** Graduate Teaching Assistant, University of Alabama.

Education

- MS, Mechanical Engineering, The University of Alabama, 2002
- BS, Mechanical Engineering, Andhra University, India, 1999

Professional Memberships

- Member, Society of Automotive Engineers
    - Paper reviewer for SAE Congress and conferences
- Member, American Society of Mechanical Engineers
    - Regular paper author, session co-chair, and paper reviewer
- Honored Member - Cambridge Who's Who
- Reviewer - International Journal of Engine Research
- Reviewer - Energy Efficiency and Conservation Block Grant
- Reviewer (Subject Matter Expert) - Laboratory Directed Research & Development

Publications & Patents

- Journal Publications: 3
- Peer-Reviewed Conference Publications: 8
- Technical Reports: 2
- Patents: 1
- Invention Disclosures: 3