

# Dr. Shravan Vudumu, Ph.D.

Technical Manager, Controls and Systems Engineering, Data Analytics

✉ [svudumu3@gatech.edu](mailto:svudumu3@gatech.edu)  [linkedin.com/in/shravanvudumu](https://www.linkedin.com/in/shravanvudumu) ☎ 1-573-201-6157

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## SUMMARY

Technical Manager with a doctorate degree in Mechanical Engineering and master's degree in Management. Over thirteen years of work experience in a multinational corporation developing control algorithms for complex systems and implementing model based designs. Proven ability to coach, lead and manage teams to perform engineering data analysis, simulation based product development, optimize electromechanical devices with embedded software and resolving technical challenges. Successfully coached engineers globally. Expanding skills with master's degree in Data Analytics specializing in Business Data Analytics and Machine Learning. No work authorization required.

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## EDUCATION

### Georgia Institute of Technology, USA

*Master of Science in Data Analytics*

*Aug 2023 - Present*

- Specialization: Business Data Analytics, Machine Learning

### University of Illinois, Urbana - Champaign, USA

**GPA: 4.0/4.0**

*Master of Science in Management*

*Aug 2022 - July 2023*

- Specialization: Business Data Management and Communication

### Missouri University of Science and Technology, USA

**GPA: 4.0/4.0**

*Ph.D. Mechanical Engineering*

*Aug 2006 - July 2010*

- Dissertation title: "Experimental and Computational Investigations of Hydrogen Safety, Dispersion and Combustion for Transportation Applications"

### Indian Institute of Technology - Madras, India

**GPA: 8.0/10.0**

*M.Tech Energy Technology and B.Tech Mechanical Engineering*

*Aug 2001 - May 2006*

- Thesis title: "Modeling of a Diesel Engine for Speed Control". Minor: Industrial Engineering

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## WORK EXPERIENCE

### Cummins Inc., Columbus, Indiana, USA

*Aug 2010 - Present*

- Controls, Software and Electronics Engineering - Technical Manager
- Dynamic Systems and Controls (DS&C) - Technical Manager
- Dynamic Systems and Controls (DS&C) - Technical Advisor

### Management and Technical Coaching Experience

- Managed a team of engineers, group leads and contractors to successfully deliver Cummins' Controls Performance Features and data analysis deliverables for multiple diesel and spark ignition engine programs for on-highway and off-highway applications with wide range of air handling system architecture complexities.
- Supervised multiple engine development programs by managing deadlines and prioritizing tasks. Effectively addressed roadblocks by identifying root cause and implementing a robust seven-step problem solving process. Fostered a collaborative team environment through stakeholders coordination. Skilled in project leadership.
- Coached and developed local Brazil and China control systems calibration and validation engineering talent that was needed to maintain Cummins' technology leadership in critical international markets. Built communication bridges with global engineering teams (China, India, UK, and Brazil). This included on-site support at East Asia Research and Development Center in China and at Cummins-Dongfeng joint venture research facilities.
- Aided in the development and restructuring of Cummins' technical documents, requirements and engineering practices to ensure global adoption and for engine development integration. Promoted adherence to the process.
- Co-ordinated Simulation Based Product Development and next generation engine architecture evaluation efforts in Cummins' East Asia Research and Development Center in China. Provided expertise to define scope, assess model capabilities, evaluate complex engine system architectures and to resolve technical challenges.
- Led the development of Cummins' AUTOSAR air handling controller by understanding stakeholder voices, developing technical requirements, facilitating cross functional collaboration, analyzing performance data and by participating in the delivery of embedded software. Managed engineers for design calibration and validation.
- Proactively addressed resource gaps by collaborating with global technical teams, HR, universities and consultancy firms to secure top talent (technical contributors, group leads, interns and contractors) and avoided delays on key Cummins' controls and systems engineering deliverables. Empowered engineers to launch successful careers.

## Technical Contributions and Experience

- Engineered improvements and calibrated model-based air handling controller for multiple Cummins engines to achieve higher fuel economy, optimal transient performance, and reduced emissions in various driving conditions.
- Proven track record in development, calibration and data analysis of model-based controllers for complex systems, virtual sensors, electromechanical devices and diagnostics algorithms for different engine architectures.
- In-depth experience in collecting data from test cells and prototype vehicles with data acquisition systems, data analytics for performance and on-board diagnostic evaluations, and reporting outcomes to stakeholders.
- Developed MATLAB data analytics tools to visualize key findings from vehicles, test cells and emission cycles.
- Expertise in engine simulations to develop new control system design concepts for various advanced air handling system architectures using GT-POWER engine simulation software and Simulink tools.
- Skilled in applying engineering data analysis principles to evaluate the performance of intake air systems, EGR systems, heat exchangers, turbomachinery, smart sensors, device drivers, combustion, and engine emissions.
- Experience in developing embedded software designs and creating ECM builds. Successfully tested prototype software at unit and system level for validating functionality on open-loop and closed-loop test benches.
- Designed a new model-based on-board diagnostic (OBD) algorithm for the air handling subsystem to detect failures on low-cost engine platforms (a six-sigma project). Performed simulations, data analytics and system validation.
- Developed a model-based turbocharger protection design to prevent engines from failure (a six-sigma project).

## RESEARCH EXPERIENCE

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- Characterized the fluid dynamics of new/alternative transportation fuels to ensure their safe and proper use. **Research was funded by US Department of Transportation** (through Research and Innovative Technology Administration's National University Transportation Center) and the **Department of Defense' Defense Logistics Agency** (through Air Force Research Laboratory).
- **Played a key role in setting-up Missouri's first hydrogen fueling station** together with operating a hydrogen powered commuter bus to develop, demonstrate, and evaluate safe use of hydrogen-based technologies.
- Performed research on internal combustion engines powered by alternative and conventional fuels to characterize their unique performance, combustion, and emissions characteristics.
- **GM PACE** (General Motors - Partners for the Advancement of Collaborative Engineering Education) sponsored project for the integration of simulations into engineering curriculum.
- Developed mathematical diesel engine models for optimization of engine controllers and a critical data acquisition system to acquire real time engine data for model validations.

## PUBLICATIONS

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- As doctoral researcher, **published six international journal and conference papers** (IJHE, ASME, Energy).
- Published research documents for US DOT's repository and Cummins' internal technical documents for engineers.

## SOFTWARE SKILLS

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- **Data Analytics Software:** R, Python, Power BI, Tableau, SQL, Git version control, Excel, Arena, Minitab
- **Data Analytics Skills:** wrangling, modeling, machine learning, statistical analysis, optimization, visualization
- **Engineering Software:** MATLAB, Simulink, GT-POWER, data acquisition tools (Calterm, IndiCom, LabView)

## DATA ANALYTICS MASTER'S DEGREE PROJECTS

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|---|-------------------------------|
| • Data analytics of Divvy bikes, a ride sharing system in Chicago.                    | <i>Python, R</i>              |
| • Machine learning algorithms for evaluating credit applications.                     | <i>R, Git version control</i> |
| • Shortest path evaluations in road networks. Ingredient swap recommendations.        | <i>SQL, Python, RegEx</i>     |
| • Predicting house prices with machine learning. Time series analysis of inflation.   | <i>Python - pandas, numpy</i> |
| • Calorie conscious diet planning on budget. Optimizing airport check-in simulations. | <i>Python - pulp, simpy</i>   |
| • Remote diagnostics of vehicle data to predict maintenance issues.                   | <i>Power BI, Tableau</i>      |
| • Financial modeling, capital budgeting of firms and portfolio optimization.          | <i>Excel - Optimization</i>   |

## CERTIFICATIONS, HONORS AND ACHIEVEMENTS

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- Selected in **"Outstanding Under 35 Young Scientists Committee"** at "HySyDays 2007, Second World Congress of Young Scientists on Hydrogen Energy" organized by the Inter-University Research Center for Sustainable Development, Sapienza University of Rome, Italy.
- Recipient of the prestigious US Department of Transportation's (Research and Innovative Technology Administration) **National University Transportation Center (NUTC) assistantship**.
- Merit scholarship and tuition waiver (2001-06). Member of ASME, SAE, AIAA, IJHE (2009-10).
- Received **Six Sigma Green Belt** certification (July 2015).
- Completed **Systems Engineering Certification** sponsored by Cummins and University of Detroit-Mercy.
- Recipient of Cummins' **Business Impact Award for Leadership and Contributions** from Vice President.