

# Harish Panneer Selvam

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## PROFESSIONAL SUMMARY

Data Science Researcher at the National Renewable Energy Laboratory, specializing in technoeconomic analyses, data engineering, & algorithm development for commercial road, rail, and marine vehicles. Part-time Senior Software Engineer at Exergi Predictive LLC, developing energy management, dead-reckoning, and digital twin solutions for military robotic combat & tactical vehicles. Skilled in edge-based AI pipelines, securing research funding, publishing impactful research, and maintaining open-source tools with 10,000+ downloads.

## TECHNICAL SKILLS

- **Programming & DevOps:** Python, Rust, C++, Linux, Git, Bash, Docker, CI/CD (GitHub Actions), REST API, Django, AWS
- **Machine Learning & Data:** PyTorch, TensorFlow, scikit-learn, pandas, NumPy, SQL (PostgreSQL), Python ETL
- **Domain Tools:** Arduino, Raspberry Pi, MATLAB/Simulink, Edge computing (Jetson), CANedge data logging (J1939, OBDII)

## EXPERIENCE

**Researcher II - Data Science**, National Renewable Energy Laboratory (NREL), Golden, CO 2023–Present

- Led development of the T3CO technoeconomic tool and data-logging workflows, supporting 30+ DOE and industry projects.
- Modernizing FleetREDI pipelines and dashboards with AI for enhancing FleetDNA, the largest public commercial vehicle dataset.
- Engineered novel algorithms for operational and energy analyses to drive fleet decarbonization and scheduling improvements.
- Maintain PyPI packages (T3CO, T3CO-Go, DriveCAT+) and develop internal tools, cumulatively exceeding 10,000 downloads.

**Senior Software Engineer (Part-time)**, Exergi Predictive LLC, Saint Paul, MI 2021–Present

- Helped secure a \$2.5M SBIR grant & led energy management software development for next-gen robotic combat vehicles.
- Developed a Python-based synthetic drive-cycle generator that expanded energy assessment scenarios indefinitely
- Implemented AWS-hosted REST APIs for vehicle digital twins, achieving 95% accuracy in field energy prediction during trials.
- Developed a dead-reckoning algorithm in GPS-denied environments using dynamic CAN data for off-road tactical vehicles.

**Artificial Intelligence Engineer**, Ford Motor Company (via HTC Global), Dearborn, MI 2021–2023

- Modernized the Digital Manufacturing suite for 10,000+ users, reducing production planning cycle times by 30%.
- Enhanced an AI-driven knowledge-graph-based NLP rules engine with Python modules, increasing extraction accuracy by 40%.
- Optimized Oracle PL/SQL queries to halve response times, boosting data analytics throughput and operational efficiency.

**Research Specialist & Teaching Assistant**, University of Minnesota, Minneapolis, MN 2019–2021

- Developed interpretable DNN and LSTM models under NSF grant, improving vehicle emissions prediction accuracy by 60%.
- Implemented ensemble learning (Random Forest, XGBoost) for battery energy forecasting, increasing reliability by 20%.
- Authored graduate-level tutorials and reviewed 110+ publications to support data-driven engineering education.

## EDUCATION

**Master of Science in Mechanical Engineering** University of Minnesota Twin Cities, Minneapolis, Minnesota 2019–2021  
(Minor: Electrical & Computer Engineering)

**Bachelor of Technology in Chemical Engineering**, Indian Institute of Technology (IIT) Madras, Chennai, India 2015–2019

## PUBLICATIONS & PATENTS

- **Machine Learning-Based Energy Use Prediction**, US Patent Application 18/539,710 (2025)
- **Neural Network-Based Electric Vehicle Range Prediction for Smart Charging Optimization**, Journal of Dynamic Systems, Measurement, and Control, 144(1):011110 (2022)
- **Prediction of NOx Emissions from Compression Ignition Engines Using Ensemble Learning-Based Models with Physical Interpretability**, SAE Technical Paper Series (2021)
- **A Survey on Solving & Discovering Differential Equations Using Deep Neural Networks**(2023)
- **Physics-Based Artificial Intelligence Models for Vehicle Emissions Prediction**, Master's Thesis (2021)
- **Physics-Based ML Framework for Predicting NOx Emissions from Comp. Ignition Engines Using OBD Data** (2025)

## PROJECTS

- **Energy & Wastewater Treatment Plan:** Developed market strategy and three-year financial forecasts for an energy storage and wastewater treatment product as part of coursework at the University of Minnesota Twin Cities in 2020.
- **Formula SAE Racing:** Led a cross-functional 45-member team at IIT Madras to design, prototype, test, and drive three competitive student racecars, culminating in several awards, including the Engineering Design and Fuel Efficiency awards