

DILEEP KUMAR, Ph.D.

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Professional Summary

- A Control System Engineer with expertise in **control system analysis, design and implementation, and systems and software engineering** of electric vehicles.
- Skilled in **Systems Engineering** (requirements, architecture, design, and integration), **vehicle dynamics**, motor control, path-tracking, and energy efficiency optimization, with strong experience in power electronics, embedded systems, motor control, and model-based design (MATLAB/Simulink).
- Proven track record in **cross-functional collaboration**, delivering robust **electric powertrain systems** and driving innovation from **research to industry applications**.

Education

- **Ph.D., Electrical Engineering (Control & Automation)** IIT Kanpur (2015–2023)
CGPA: 8.0/10
- **M.Tech, Electrical Engineering (Control Systems)** NIT Patna (2010–2012)
CGPA: 8.25/10
- **B.Tech, Electronics & Communication Engineering** SMVD University (2006–2010)
CGPA: 7.62/10

Technical Skills

- **Control Engineering:** PID, Loop Shaping, Active Disturbance Rejection Control, Disturbance Observer, Disturbance Rejection, Motor Control, and Speed and Torque Control.
- **System Engineering:** System Requirements, Architecture, Design, and Integration.
- **Power Electronics:** Motor Controllers (H-Bridge, Inverter), DC/DC & AC/DC Converters, Solar MPPT.
- **Electric Vehicles:** Vehicle/Tire Dynamics, Path Tracking Control, In-Wheel Motors, DC/BLDC motors, and Energy Efficiency Analysis.
- **Embedded Systems:** STM32, dsPIC, ESP32, Raspberry Pi, HW-SW Co-Design
- **Protocols & Tools:** CAN, CAN-FD, SPI, I2C, USART, CANoe, OBD.
- **Software & Simulation:** MATLAB, Simulink, Embedded C/C++, Python, Octave, LaTeX.

Professional Experience

1. **Lead Engineer – Electric Powertrain System & Software** M&M, 12/2023–Present
 - Worked as a software technical delivery lead, collaborating across systems and software teams to deliver **robust electric powertrain software**.
 - Working with system engineering team to perform energy efficiency analysis of an electric vehicle and to develop a software tool for **determining tank-to-wheels efficiency** and **predicting vehicle range**.

- 2. Assistant Professor – Electrical Engineering** NIMS University, Jaipur, 08/2012–07/2015
- Taught Classical & Modern Control, Power Electronics, Embedded Systems, and MATLAB.
 - Supervised undergraduate projects in control systems, embedded systems, motor control, and power electronics.

Research & Project Experience

1. Ph.D. Research – IIT Kanpur

- Developed solutions to improve the performance of autonomous 4WIS4WID EVs during path-tracking control.
- Analyzed and determined tank-to-wheels and well-to-wheels efficiency of battery electric vehicles, resulting in a publication in an SAE journal.
- Gained in-depth understanding of vehicle modeling, tire modeling, stability analysis, and performance evaluation.
- Designed active disturbance rejection control (ADRC) and disturbance observer-based control strategies for speed and torque tracking of DC and BLDC motors.

Control Systems, Power Electronics & Embedded Systems Related Experiences:

- Gained deeper understanding of designing and implementing motor control systems while working at the “Control Systems Laboratory” of IIT Kanpur for about 3 years.
- Built a 48V inverter for a 250W BLDC motor using the DRV8320S gate driver.
- Developed a solar MPPT system for a 100W PV panel driving a DC motor load.
- Programmed STM32, dsPIC, ESP32, Arduino, and Raspberry Pi for applications in motor control, CNC machines, and 3D printing.

2. M.Tech Research – NIT Patna

- Analysis, modeling, and simulation of a smart battery-backup system incorporating an MPPT algorithm to supply power to AC and DC loads.

3. B.Tech Project – SMVDU J&K

- Developed and demonstrated a multi-node data acquisition system using C and Assembly on 8051 microcontroller.

Scientific Contributions

- Oral Presentation: Institute Research Symposium (IRS'23), IIT Kanpur.
- Organizing Member: Indian Control Conference (ICC'18), IIT Kanpur.
- Organizer: QIP Course on “Frequency Domain Control System Design & Experiments” (2017).

Publications

1. D. Kumar, V. Jain, R. Potluri, “Energy Efficiency of Battery Electric Vehicles with In-Wheel Motors,” SAE Int. Journal of Sustainable Transportation, Energy, Environment & Policy, 2022.
2. D. Kumar, R. Potluri, “On Optimal Tire Usage in the Path-Tracking Control of Four-Wheel Independent Steering Four-Wheel Independent Drive Electric Vehicles”, SAE Int. Journal of Connected and Automated Vehicles, 2025.
3. D. Kumar, A. Kumar, “Control and Simulation of Smart Backup System for Photovoltaic System in MATLAB.” International Journal of Engineering Research & Technology (IJERT) ISSN: 2278-0181, Vol. 3, 2014. IEEE ICARET, 2013.