DILEEP KUMAR, Ph.D.

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Professional Summary

- Control and Systems 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, integration, and validation), vehicle dynamics, motor control, path-tracking, and energy efficiency optimization**, with strong experience in **power electronics, embedded systems, 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

- **System Engineering:** System Requirements, Architecture, Design, and Integration.

- **Control Engineering:** PID, Loop Shaping, Active Disturbance Rejection Control, Disturbance Observer, Disturbance Rejection, and Motor Control.

- **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, and Energy Efficiency Analysis.

- **Embedded Systems:** STM32, dsPIC, ESP32, Raspberry Pi, HW-SW Co-Design

- **Protocols & Tools:** CAN, SPI, I2C, USART, CANoe

- **Software & Simulation:** MATLAB, Simulink, C/C++, Python, Octave, Bash, 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 ADRC- and DOBC-based control strategies for speed and torque tracking of in-wheel 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 Path-Tracking Control of 4WIS4WID Electric Vehicles," under review.

3. D. Kumar, A. Kumar, N. Gupta, R. Kumar, "Control & Simulation of Smart Backup System for Photovoltaic Array," IEEE ICARET, 2013.