

Dileep Kumar, Ph.D.

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Professional Summary

- A **Control Systems Engineer** having Expertise in Control Systems Analysis & Design, Practical Control Systems, Motor Control, Disturbance Rejection, Power Electronics, Electric Drives, Electric Vehicles, Vehicle Dynamics, Mathematical Modeling, Embedded Systems, and MATLAB & Simulink.
- **Excellent Project Management and Problem-Solving Skills** Demonstrated by Leading the Electric Powertrain Software Development Team to Deliver High-Quality Software that Meets the Program Timeline for Mahindra Electric Vehicles.

Education

Ph.D. in Electrical Engineering (Control and Automation)	[2015 – 2023]
<i>Indian Institute of Technology Kanpur, India.</i>	CGPA 8.00/10.0
M.Tech in Electrical Engineering (Control Systems)	[2010 – 2012]
<i>National Institute of Technology Patna, India.</i>	CGPA 8.25/10.0
B.Tech in Electronics and Communication Engineering	[2006 – 2010]
<i>Shri Mata Vaishno Devi University, Jammu & Kashmir, India.</i>	CGPA 7.62/10.0

Industrial Experience [12/2023 – To date]: Mahindra & Mahindra

Lead Engineer – Electric Powertrain Software Development and Delivery

- Spearheading the Electric Powertrain Software Development and Delivery for Electric Vehicles.
- Collaborating with Cross-Functional Teams (VCU, MCU, IPDU, BMS, System Architecture, System Integration, Validation, Calibration, Functional Safety, and Homologation) to Ensure Seamless Development and Deployment.

Teaching Experience [08/2012 – 07/2015]: NIMS University, Jaipur

Assistant Professor – Electrical Engineering

- Taught Classical Control, Modern Control, Power Electronics, Embedded Systems, and MATLAB.
- Mentored Students in Research Projects related to Control and Power Electronics Applications.

Ph.D – Thesis and Experience Gained [07/2015 – 11/2023]: IIT Kanpur

Thesis: Energy Usage and Tire Usage in Electric Vehicles with In-Wheel Motors

- Evaluated existing Path-Tracking Control (PTC) algorithms of a Four-Wheel Independent Steering Four-Wheel Independent Drive (4WIS4WID) Electric Vehicle on the Basis of Optimal Tire Usage.
- Used Vehicle Dynamics, Tire Dynamics, Motor Dynamics, Vehicle load Disturbance, Steering and Driving Motor Control Systems in the PTC algorithms in Matlab/Simulink.
- Provided Speed-tracking and Torque-tracking Motor Control Systems for 4WIS4WID Electric Vehicles.
- Estimated Tank-to-Wheels (TTW) Energy Efficiency of Bikes, Microcars, Mid-size cars, Full-size cars, and Buses, resulting in one Publication.
- Involved in a Team to develop a Full-size Autonomous 4WIS4WID Electric Vehicle.
- Implemented Controllers (PID and Disturbance Observer) Digitally for Speed-tracking of a 24 V DC Motor and a 48 V In-Wheel BLDC Motor at the Control System Laboratory of IIT Kanpur.
- Proposed Active Disturbance Rejection Control (ADRC) and Disturbance Observer-based Control (DOBC) for Speed/Torque tracking under Speed-dependent Disturbances acting on an In-Wheel Motor.
- Implemented a 48 V Inverter for a 250W BLDC Motor using DRV8320S (Texas Instrument).
- Implemented Maximum Power-Point Tracker (MPPT) for 100 W Solar Panel with a DC Motor Load.

M.Tech – Thesis and Experience Gained [08/2010 – 05/2012]: NIT Patna

Thesis: *Modeling and Control of Emerging Generation Technologies-based Distributed Generation System*

- Developed a MATLAB and Simulink Model (Inverter with AC and DC loads) for a Smart Battery-Backup System for a Solar Panel by employing a Maximum Power-Point Tracker Algorithm.

B.Tech – Projects and Skills Gained [08/2006 – 06/2010]: SMVD University, J&K

Projects: *Demonstrations of Full-Duplex Communications Using 8051 μ C (Assembly and C), and VHDL*

- Data Acquisition System for Real-Time Full-Duplex Comm using 8051 and RS485 in Assembly and C.
- Full-Duplex Comm between Two Spartan-3e Kits with a Computer with various baud rates using VHDL.

Technical skills

Softwares: MATLAB and Simulink, Octave, Altium, Marlin, Latex, Linux, and Microsoft Project.

Embedded Systems: 8051, Arduino, STM32, dsPIC, ESP32, Raspberry PI and PICO, and Teensy.

Tools: USART, CAN, SPI, I₂C, QEI, Computer Networking, Server Design, and CANoe.

Programming: Embedded C/C++, Python, VHDL, HTML, Bash (Linux).

Expertise Areas: Control System Design, Loop Shaping, ADRC, Disturbance Observer, Motor Control, Disturbance Rejection, Power Electronics, Electric Drives, Energy Efficiency, Vehicle Dynamics, Optimization, Path-Tracking Control, Mathematical Modeling, Embedded Systems, Maximum Power-Point Tracker.

Training

- Redhat Enterprise Linux 5 (RHEL-5) in December 2007.

Fellowships

- Institute Fellowship by IIT Kanpur for 1 year in 2021.
- MHRD Scholarships in 2010 and 2015, respectively, for 2 years and 5 years.

Scientific Events Attended/Organized

- Oral Presentation at Institute Research Symposium (IRS'23) at IIT Kanpur in 2023.
- Organizing Student Member of Indian Control Conference (ICC) at IIT Kanpur in 2018.
- Organized a Short-Term QIP Course on “Frequency Domain Control System Design & Experiments” at IIT Kanpur in 2017.
- Oral Presentation at IEEE International Conference on Advanced Research in Engineering and Technology, ICARET-2013, at KL University Vijaywada in 2013.

Hobbies

- Badminton, Chess, Music, Embedded Hardware & Software.

Publications

1. **Dileep Kumar**, Vasu Jain, and Ramprasad Potluri, “Energy Efficiency of Battery Electric Vehicles with In-Wheel Motors”, SAE International Journal of Sustainable Transportation, Energy, Environment, & Policy, 4(13-04-01-0002), 2022.
2. **Dileep Kumar** and Ramprasad Potluri, “On Optimal Tire Usage in the Path-Tracking Control of 4WIS4WID Electric Vehicles” (Under review).
3. **Dileep Kumar**, Ashiwani Kumar, Neha Gupta and Ramesh Kumar, “Control and Simulation of Smart Backup System for Photovoltaic Array in MATLAB/Simulink.” IEEE International Conference on Advanced Research in Engineering and Technology, ICARET-2013, Vijayawada, Feb 2013.