DIWAKAR KHADKA

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PROFESSIONAL SUMMARY

PhD candidate in Electrical Engineering (Control Systems & Robotics) at Wright State University with a 4.0 GPA. Research focus: fault-tolerant control of autonomous systems, currently developing robust camera-LiDAR control architectures for the QCar2 autonomous vehicle platform. Hands-on experience commissioning and programming industrial robots (Franka Emika FR3, Universal Robots UR5), integrating Intel RealSense depth cameras for real-time pick-and-place, building conveyor-based vision sorting systems, and designing PLC/HMI programs using Allen-Bradley hardware. Strong foundation in advanced control theory, electrical design, Python, and MATLAB/Simulink.

EDUCATION

PhD in Electrical Engineering *Dayton, OH | Aug. 2024 – Present*

Wright State University | Specialization: Control Systems & Robotics | Cumulative GPA: 4.0 / 4.0

Thesis: Fault-Tolerant Control of Autonomous Systems (QCar2 Camera + LiDAR platform)

Coursework: Continuous Control Systems, Advanced Robotics, Discrete Linear Systems, Machine Learning, Power Electronics I, Computer Vision & Pattern Recognition, Random Processes | In Progress: Foundations of AI, Deep Learning

Bachelor of Engineering, Electrical & Electronics Engineering *Nepal | Aug. 2018 – May 2023*

Kathmandu University | Specialization: Power & Control | CGPA: 3.74 / 4.0

TECHNICAL SKILLS

Robotics: Franka Emika FR3, Universal Robots UR5, Quanser QArm & QCar2 — commissioning, programming, teach-in

Vision & AI: Intel RealSense depth camera, 3D object detection, point cloud processing, camera calibration, LiDAR fusion

PLC / HMI: Allen-Bradley Studio 5000 / RSLogix 5000, LogixPro, ladder logic, structured text, HMI (FT View)

Control Design: PID, LQR, EKF, fault-tolerant control, state-space modeling, frequency-domain analysis, MATLAB / Simulink

Programming: Python, MATLAB, C, C++, Arduino — deployed on physical hardware

Electrical: Control panel wiring (24 VDC / 110 VAC), motor control circuits, fuse & wire sizing, AutoCAD, schematic reading

Software & Tools: ROS-compatible Python workflows, ETAP, HelioScope, PVsyst, ArcGIS, Microsoft Office Suite

EXPERIENCE

Graduate Researcher — Fault-Tolerant Autonomous Systems | Wright State University*Dayton, OH | Aug. 2024 – Present*

- Developing fault-tolerant control architecture for QCar2 autonomous vehicle using camera and LiDAR sensor fusion in Python and MATLAB; designed automatic sensor-failure detection with safe fallback modes ensuring stable operation under partial sensor loss
- Commissioned Franka Emika FR3 robot cell from scratch — mechanical setup, wiring, software configuration, camera-robot calibration, and validated pick-and-place operation using Intel RealSense depth camera for real-time 3D pose estimation
- Programmed Universal Robots UR5 independently for camera-guided object handling: object detection pipeline, workspace mapping, teach-in sequences, and hardware/software fault resolution
- Designed and built a conveyor-based automated sorting system: vision detection, real-time object classification, and lane diversion logic — all wired and validated on physical hardware

Teaching Assistant — Industrial Controls & Automation Lab (EE 4120L/6120L) | Wright State University
Dayton, OH | Jan. 2025 – Present

- Instructed PLC programming using Allen-Bradley Studio 5000/RSLogix and LogixPro: ladder logic, motor control, HMI design, conveyor control, garage door automation, and flexible manufacturing cell simulation
- Diagnosed electrical and programming faults live in lab; maintained all hardware; delivered clear technical instruction to 20+ students per section

Teaching Assistant — Continuous Control Systems Lab (EE 4130L/6130L) | Wright State University*Dayton, OH | Aug. 2024 – Dec. 2024*

- Led MATLAB/Simulink labs on PID/PD/PI controller design and tuning for DC motors and electromechanical systems; instructed step response analysis, stability evaluation, and frequency-domain design

Teaching Assistant — Introduction to Robotics Lab (EE 4560L) | Wright State University*Dayton, OH* | *Aug. 2024 – Dec. 2024*

- Taught forward/inverse kinematics, trajectory generation, and workspace identification using Quanser QArm hardware; guided students through hardware commissioning and real-time control

Electrical Engineer | Wind Power Nepal *Kathmandu, Nepal* | *June 2023 – Aug. 2024*

- Performed fault analysis and load flow studies on industrial distribution feeders (ETAP); diagnosed overloading/voltage instability faults and implemented corrective solutions
- Designed rooftop solar PV systems using HelioScope and PVsyst; site surveys, equipment selection, single-line diagrams, and installation commissioning

Engineering Intern — Transmission Line Design | Jade Consult Private Limited*Kathmandu, Nepal* | *Jan. 2023 – Feb. 2023*

- Contributed to 132 kV and 400 kV transmission line routing using AutoCAD and ArcGIS; supported power evacuation studies and electro-mechanical design calculations

KEY PROJECTS

QCar2 Autonomous Vehicle: Fault-Tolerant Camera + LiDAR Control *Aug. 2024 – Present*

- PhD thesis project — developing and validating fault-tolerant vehicle control with automatic sensor-degradation detection; optimizing lane-keeping performance across varied environments in Python and MATLAB

UAV LQR Autopilot + Extended Kalman Filter (MATLAB/Simulink) *Jan. 2025 – Mar. 2025*

- Designed LQR controllers for quadrotor UAV attitude, altitude, and position; linearized 12-state nonlinear EOM numerically; EKF sensor fusion eliminated ~30 deg drift seen in gyro-only approach

Franka FR3 + Intel RealSense: Vision-Guided Pick-and-Place (Python/C++) *Aug. 2024 – Present*

- Full cell commissioning and deployment: 6-DOF pose estimation from point clouds, grasp sequence programming, and repeatable physical validation

Conveyor-Based Automated Vision Sorting System (Python) *Aug. 2024 – Present*

- Closed-loop physical system: real-time depth-camera detection, object classification, and automated diverter actuation on running conveyor hardware

Microcontroller-Driven MPPT System for PV Efficiency *Sep. 2022 – May 2023*

- Designed and fabricated 33 uH inductor and buck-boost converter with full electrical calculations; validated MPPT algorithm in MATLAB — peer-reviewed publication at USC Conference 2023

PUBLICATIONS & CERTIFICATIONS

Microcontroller-Driven MPPT System for Enhanced PV Efficiency — USC Conference 2023 [Author]

Load Flow Analysis for Scaling Electric Cooking in Nepal — 16th Intl. Conference on Power System Technology, 2024 [Co-Author]

Certifications: Power System Analysis Using ETAP | Python (Google) | Electric Vehicle Design | How to Write & Publish a Scientific Paper (Ecole Polytechnique) | EV Electronics (Coursera)