Rumit Kumar

Roboticist and Control Law Design Engineer

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EXPERIENCE

University of Cincinnati, Ohio

Research Assistant   **September 2016 - Present**

- Position, attitude, and fault-tolerant control of the tilt-rotor quadcopter using PID and sliding mode control techniques
- Development of flight software and hardware implementation using Pixhawk Pilot Support Package (PSP) by Mathworks
- Computation and analysis of traffic flow parameters using computer vision and deep learning techniques. Traffic videos were obtained by DJI Matrice-100/210, tethered DJI Matrice-100 UAVs using Zenmuse Z3, Z30, X5S cameras
- Surveying and validation of GPS-RTK systems for 3D terrain reconstruction using photogrammetry
- Telehealth aerial robot for medical logistic operations and assisting patients during a quarantine situation

Aeronautical Development Establishment, Bangalore

Senior Research Fellow   **November 2012 - July 2015**

- **Projects**: Rustom-I MALE UAV, Rustom-II HALE UAV
- Development of aircraft mathematical dynamic models using actual wind tunnel data, aircraft structures and propulsion data
- Control law design of aircraft using Root locus, Bode, and Nyquist methods, six-DOF and Monte-Carlo simulations
- Performance evaluation of inertial navigation system, aircraft sensors and actuators on three-axes motion simulator
- Verification and validation by Hardware in the loop (HIL) testing of duplex flight software using OPAL-RT simulators
- Development of flight telemetry and post flight data analysis

EDUCATION

University of Cincinnati, Ohio   GPA: 3.92/4.0

Ph.D. in Aerospace Engineering   **August 2017 - April 2021**

Research: Flight Dynamics & Fault-Tolerant Control, Ground and Aerial Robotics, Computer-Vision & Deep-Learning Techniques

University of Cincinnati, Ohio

MS in Aerospace Engineering   **August 2015 - April 2017**

Academic Courses: Modern Control, Decision Engineering, Advanced Flight Mechanics, Analytical Dynamics, Flight Testing, Optimization Methods, Systems Engineering, Complex Systems, Robot Control and Design, Optimal Control, Unmanned Aerial Systems

SKILLS

Programming: Python, MATLAB and Simulink, OpenCV, TensorFlow

Software: RT-Lab, Motive, Gazebo SITL, PX4, APM, QGC, ROS, MS Office, LaTeX

Hardware: Pixhawk Autopilot, Piksi GPS-RTK Module, Decawave UWB Radios, Raspberry-pi, OptiTrack Mocap, Intel RealSense, Nvidia Jetson

Robots: Tilt-rotor UAV, DJI Flamewheel quadcopter, 3DR experimental quadcopter for SLAM, tethered DJI Matrice-100 drone, DJI Matrice-100/210 drones

Control Design: PID control, Time and frequency domain control system design, Pole placement control, LQR and LQG control, State estimation, Back-stepping control, Sliding mode control

AWARDS

Top Publications in Robotics and Control conferences: IROS, ACC, DSCC

Graduate Student Research Fellowship, University of Cincinnati, 2020

Graduate Student of the Month, University of Cincinnati, June-2020

Most Collaborative Team and Project Award, Kent State University, 2019

Best Presentation Award in Student Lightening Talks, AIAA Intelligent Systems Workshop, 2019

Best Technical Presentation Award, AIAA, Dayton - Cincinnati, Aerospace Science Symposium, 2017

Best Student Paper Award, Robotics Technical Committee, ASME, 2016

Graduate Incentive Award, University of Cincinnati, 2015-20

LANGUAGES

English, Hindi, German