Raghavendra S Navaratna (Raghav)

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Education

University of Illinois Urbana-Champaign (UIUC) — Champaign, USA
M.Sc. in Aerospace Engineering; ***GPA: 3.77/10*** — *Aug 2022 – Dec 2023 (Expected)*
Specialization: Control Systems and Dynamics

Dayananda Sagar College of Engineering (DSCE) — Bangalore, India
B.E. in Mechanical Engineering; ***GPA: 8.61/10.00*** — *Aug 2017 – May 2021*

Research Experience

University of Illinois Urbana-Champaign — Champaign, USA
Independent Study | *GitHub* — *Sep 2022 – Current*

- Worked in the Robotics Lab with Dr.Timothy Bretl and Holly Dinkel on NASA funded project - "Astrobee Robot Challenge" - to build a dual-arm robotic system to detect and manipulate wires aboard the ISS.
- Updated the ROS drivers for the robotic arms to execute simultaneous and synchronous trajectory of two independent robotic arms.
- Worked on incorporating a secondary robotic arm into the ROS URDF file.
- Simulated the trajectory using MoveIt motion planning tool and validated by testing with physical arms.
- Built a framework for using industrial robots in multi-arm setup.

Work Experience

Indian Institute of Science — Bangalore, India
UAV Project Intern — *Jun 2021 – Sep 2021*

- Worked in the Department of Aerospace Engineering on design and development of unmanned aerial vehicles.
- Performance and stability analysis.
- Structural design and fabrication of amphibious UAV.
- Involved in CFRP and FRP manufacturing of flying wing UAV.

Projects

Autonomous Precision Landing of Model Rockets | (Bachelor's Thesis) | *GitHub*

- Worked on detail design and development of rocket body and thrust vector control (TVC) system.
- Worked on aerodynamic, performance and stability analysis.
- Built a mathematical model to represent the dynamics of the rocket.
- Developed a PID and LQR-based controller to regulate attitude, altitude, and drift.

Balancing an Inverted Pendulum on a Cart | *GitHub*

- Explored classical control approach to stabilize the inverted pendulum.
- Designed a Proportional Integral Derivative (PID) controller, a Linear Quadratic Regulator (LQR) for position and orientation control, and integrated a Kalman Filter for state estimation.
- Physical modeling of the inverted pendulum using Simscape.

Grid World problem using Reinforcement Learning | *GitHub*

- An archetype problem to learn and understand basics of reinforcement learning.
- Established Markov states and used dynamic programming - value iteration method.
- Implemented and solved the problem on python using OOP concepts.

Simulation of Kármán Vortex Street of Bluff Bodies for Piezoelectric Energy Harvesters | *GitHub*

- Worked on the dynamics of coupled fluid-solid interaction, flow separation and boundary layer theory.
- Analyzed the effects of von Kármán vortex street on bluff bodies.
- Explored the possibilities of extracting energy from vortex induced vibrations on a piezoelectric material.

Extracurricular Activites

Team Arcis @DSCE Bangalore, India

Team Manager *Aug 2019 – Sep 2020*

- Primary responsibilities: planning, logistics, organizing and execution.
- Initiated participation of the team in AIAA – DBF.
- Worked on technical design report.
- Co-started a Research and Innovation Lab and co-built a subsonic wind tunnel.
- Participated in AIAA Design, Build, Fly, KANS, USA and SAE Aero Design West, CA, USA.

Team Arcis @DSCE Bangalore, India

Technical Engineer *Aug 2017 – Jul 2019*

- Worked on technical presentation and technical design report.
- Design, fabrication and testing of unmanned aerial vehicles (UAVs).
- Worked on technical design report.
- Co-started a Research and Innovation Lab and co-built a subsonic wind tunnel.
- Participated in SAE Aero Design West, CA, USA and SAE Aero Design India.

Awards & Achievements

Dayananda Sagar College of Engineering (DSCE): Best Project Award for - Bachelor's thesis

SAE Aero Design West: Secured 2^{nd} place in Micro Class in 2020

SAE Aero Design West: Secured 1^{st} place in Technical Presentation in 2019

Skills

Programming: C, C++, Python, MATLAB, XML, R

Technologies: ROS, Simulink, Git, Arduino, Catia V5, Blender

Languages: Kannada (Native), English (Professional)

MOOCs

Reinforcement Learning: DeepMind

Deep Learning Specialization: deeplearning.ai

Machine Learning: Stanford University

Fundamentals of Fluid-Solid Interaction: École Polytechnique

Design of Fixed Wing Unmanned Aerial Vehicles: IIT Kanpur