Arun Lakshmanan

217 979 5708
lakshma2@illinois.edu
www.arunlakshmanan.com

Technical Summary

Highlights Extensive robotics development on ground robots and quadrotors, including implementation of low-level control in **C**++ on embedded systems, trajectory generation and navigation using **ROS/Python**, computer vision based obstacle avoidance using **OpenCV**.

Languages Python, C, C++, C#, Bash, TeX

Libraries NumPy, SciPy, Matplotlib, scikit-learn, OpenCV

Software MATLAB, Simulink, `git`, Processing, Unity

Operating Systems & Middleware Linux (Ubuntu), ROS (Indigo)

Hardware mbed LPC1768, Odroid XU4, Beaglebone Black, AutoQuad 6, CrazyFlie 2.0

Education and Academic Experience

Aerospace Engineering,
Master of Science
University of Illinois at Urbana-Champaign
2014 – *expected* 2016
Urbana, IL

Relevant Coursework *Advanced Robotics Planning, Nonlinear & Adaptive Control, Virtual Reality, Control System Theory & Design, Introduction to Robotics*, and *Digital Control Systems*

Research Working with Prof. Naira Hovakimyan in optimal trajectory generation for robotic agents in urban environments.

Mechanical Engineering,
Bachelor of Technology
VIT University
2010 – 2014
Vellore, India

Relevant Coursework *Numerical Methods, Finite Element Analysis, Dynamics of Machinery*, and *Computational Fluid Dynamics*

Research Worked under Prof. Satyajit Ghosh on modeling accreted ice on aircraft structures for light passenger aircrafts.

Abroad Worked at the University of Stratclyde in Scotland on space-related projects and participated at the Scottish Space School. (Jun 2012)

Research Assistant
Summer 2015 – (Current)

- Optimal trajectory generation for robots in congested environments.
- Integration of quadrotors in public safety applications.

Teaching Assistant
Spring 2015

- Taught a course on numerical methods in the Computer Science department.
- Mentored students on different numerical analysis methods and their implementation in *Python*.

Research Experience

Optimal trajectory generation
Jan 2016 – (Current)

- Optimal control formulation to minimize perceived discomfort of humans in the vicinity of robotic agents.
- Contructed a virtual reality enivronment to simulate robot dynamics.

Line-of-sight based collision avoidance
Sep 2015 – Dec 2015

- Implementation of a novel trajectory generation algorithm using line-of-sight rate.
- Identifying nearby obstacles based on heirarchical clustering of feature points.

Quadrotors in Public Safety Applications
May 2015 – Aug 2015

- Developed an external monocular vision based localization system trained to detect flying quadrotors to be used in firefighting scenarios.

Nonlinear controller for path following
Sep 2014 – May 2015

- Implementation of L1 navigation guidance logic on differential wheeled robots.
- Designed an Extended Kalman Filter for state estimation.

Publications

[1] Marinho, Lakshmanan, Cichella, Widdowson, Cui, Jones, Sebastian, Goudeseune. **VR Study of Human-Multicopter Interaction in a Residential Setting**. *Virtual Reality (VR), IEEE*. IEEE, 2016.

[2] Lele, Lakshmanan. **Optimization of Extreme-Weather Forecasting Systems in Developing Nations**. *International Research Journal of Earth Sciences*, 2015.