Athindran Ramesh Kumar

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OUTLINE

Domain expertise in control engineering, machine learning and robotics. Focus of PhD is on safety certification using control theory. Taught several courses on machine learning and data science as a TA.

EDUCATION

Princeton University — NJ, USA
MA + PhD, Electrical and Computer Engineering — *Sep.2018 - Sep 2023*
Advisor: Prof. Peter J. Ramadge — **GPA : 3.93/4.0**

- Key Courses: Machine learning and Pattern Recognition, Modern Control, Safe Robotics, Theoretical Machine Learning, Optimization for Machine Learning, Reinforcement Learning.
- M.A. degree in Electrical Engineering awarded.
- Ph.D. dissertation not complete. Other requirements met and retained candidacy.
- **GRE:** 331/340 (Quantitative: 169/170, Verbal: 162/170, Writing: 4.5/6)
- **TOEFL:** 113/120 (Reading: 30/30, Listening: 29/30, Speaking: 28/30,Writing: 26/30)

University of Illinois at Urbana-Champaign — Illinois, USA
MS (fully funded by Dept.), Electrical and Computer Engineering — *Aug. 2013 - Aug 2015*
Advisor: Prof. Grace Gao — **GPA : 3.95/4.0**

- Key Courses: GNSS systems, Computer Vision, Convex Optimization.

Indian Institute of Technology, Madras — Chennai, India
B.Tech, Electrical Engineering — *Aug. 2009 - July 2013*
Advisor: Prof. Radhakrishna Ganti — **GPA : 9.27/10.0**

SCHOLASTIC ACHIEVEMENTS

- Awarded full-tuition waiver and stipend for MS degree program at University of Illinois, Urbana-Champaign.
- Received first-year fellowship at Princeton University for PhD program.
- Outstanding merit in Mathematics from Srinivas Ramanujan academy of Maths talent awarded in 2008.
- Ranked 294 out of 1,000,000 students in AIEEE and 1561 out of 800,000 students in JEE.

SELECT PUBLICATIONS

Journal Papers

- **A.R. Kumar**, K. -C. Hsu, P. J. Ramadge and J. F. Fisac, "Fast, Smooth, and Safe: Implicit Control Barrier Functions through Reach-Avoid Differential Dynamic Programming," in IEEE Control Systems Letters, doi: 10.1109/LCSYS.2023.3292132.
- Heng, Liang, **A.R. Kumar**, and Grace Gao. "Private proximity detection using partial GPS information." IEEE Transactions on Aerospace and Electronic Systems 52.6 (2016): 2873-2885.

Conference and Workshop Papers

- **S. Liu, A.R. Kumar**, Jaime F. Fisac, Ryan P. Adams, Peter J. Ramadge. "ProBF: Probabilistic Safety Certificates with Barrier Functions." Presented at SafeRL workshop at NeurIPS 2021.
- **A.R. Kumar** and Peter J. Ramadge. "Learning to Control Using a Convex Combination of Controllers." 2021 American Control Conference (ACC). IEEE, 2021.
- **A.R. Kumar**, Balaraman Ravindran, and Anand Raghunathan. "Pack and detect: Fast object detection in videos using region-of-interest packing." Proceedings of the ACM India Joint International Conference on Data Science and Management of Data. 2019.
- **A.R. Kumar**, Liang Heng, and Grace X. Gao. "GPS privacy: Enabling proximity-based services while keeping GPS location private." Proceedings of the 27th International Technical Meeting of the Satellite Division of the Institute of Navigation (ION GNSS+ 2013),(Tampa, FL). 2014.

Patents

- **Athindran R,** Navinnath P, Klutto Milleth "Frequency Assignment for SINR and Throughput Management in Battlefield Communication", India Patent granted 27th June 2024, Application No.: 201741038059.

PROFESSIONAL EXPERIENCE

- **Aurora Tech** — Pittsburgh, PA
  Software Engineer II — *October 2023 - present*
  - Software Engineer in Control team.
- **Aurora Tech** — Pittsburgh, PA
  Software Intern - Controls — *May - Aug 2022*
  - Analysis and deployment of improvements to longitudinal control of autonomous trucks.
- **Nokia Bell Labs** — Murray Hill, NJ
  Research Intern — *Jun - Aug 2021*
  - Reinforcement learning algorithms for a multi-link robotic arm in simulation.
- **Center of Excellence in Wireless Technology** — Chennai, India
  Research Engineer — *Apr 2016 - June 2018*
  - Frequency planning in a communication system.
- **IIT Madras** — Chennai, India
  Project Associate — *Nov 2015 - Mar 2016, Jul 2017 - Jul 2018*
  - Wrote a proposal seeking funding for the 5G mmWave cellular project at IIT Madras.
  - Efficient deep learning for video processing.
- **Google Inc.** — Mountain View, CA
  Software Intern - Street View — *May - Aug 2014*
  - Implemented ambiguity resolution algorithms in Python on GPS carrier phase data obtained from receivers installed on Street View cars to achieve sub-meter accurate positioning.

ACADEMIC SERVICE

Teaching Experience

- Three-time TA for ECE 435-535 (Machine learning course with strong math foundations)
- TA for ECE 364 (Applied ML course) and SML 201 (Intro to Data Science)
- Performed as TA for 11 semesters

Reviewing Service

- Conferences: ICLR 2021, CISS 2022, NeurIPS 2022, L4DC 2023, ICML 2023, NeurIPS 2023, ICLR 2024
- Journals: IEEE Transactions on Control Systems Technology (IEEE-TCST)
- Top reviewer for NeurIPS 2023

SELECT PROJECTS

–Safety Guarantees for Autonomous Control– — Princeton University, NJ

Guide: Prof. Peter Ramadge — *Jul 2019 - Aug 2023*

- Safety certification for autonomous control systems.
- Learning residual dynamics using probabilistic models.

–Efficient Deep Learning for Videos– — IIT Madras, Chennai

Guide: Prof. B. Ravindran and Prof. Anand Raghunathan (Purdue University) — *Jul 2017 - Jul 2018*

- Published **ACM India Joint International Conference on Data Science and Management of Data 2019.**

–Direct Position Tracking using the Vector Correlator– — University of Illinois, Urbana-Champaign

Guide: Prof. Grace Gao — *Aug 2014 - Aug 2015*

- Proposed a novel direct position tracking loop for GPS using the Unscented Kalman Filter (UKF).

–Object recognition at a road intersection– — University of Ulm, Germany

Guide: Dr. Klaus Dietmayer — *Apr 2012 - Aug 2012*

- Developed a labeling tool used by the Ko-FAS team for sensor data fusion.

PROGRAMMING SKILLS

- C++ - Python - Matlab - PyTorch - JAX - Tensorflow