

# Athindran Ramesh Kumar

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Princeton, NJ

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## OUTLINE

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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

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### Princeton University

NJ, USA

*MA + PhD (fully funded by Dept.), Electrical Engineering*

*Sep.2018 - Dec 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 .

### 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

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- 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 10 lakh students in AIEEE and 1561 out of 8 lakh students in JEE
- Among Top 1% of the students in Zonal Informatics Olympiad 2009 and selected for Indian National Informatics Olympiad 2009
- Member of IEEE HKN

## SELECT PUBLICATIONS

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### Journal Papers

- **Athindran Ramesh 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, **Athindran Ramesh 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

- **Sulin Liu**, **Athindran Ramesh Kumar**, Jaime F. Fisac, Ryan P. Adams, Peter J. Ramadge. “ProBF: Probabilistic Safety Certificates with Barrier Functions.” Presented at SafeRL workshop at NeurIPS 2021.
- **Athindran Ramesh Kumar** and Peter J. Ramadge. “Learning to Control Using a Convex Combination of Controllers.” 2021 American Control Conference (ACC). IEEE, 2021.
- **Athindran Ramesh 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.
- **Athindran Ramesh 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.

### Patent Applications

- **Athindran R.**Navinnath P, Klutto Milleth “Method and system for managing bandwidth allocation in communication network”, India Provisional Pat. Application No. 201741038059, filed October 26, 2017

## PROFESSIONAL EXPERIENCE

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- **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
  - Literature survey and implementation of path loss models for rural environments.
  - Frequency planning in a communication system.
- **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.
  - Compared results obtained from NovAtel's Inertial Explorer with those obtained from the Python framework.

## ACADEMIC SERVICE

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### 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 during my grad school

### Reviewing Service

- Conferences: ICLR 2021, CISS 2022, NeurIPS 2022, L4DC 2023, ICML 2023, NeurIPS 2023

## SELECT PROJECTS

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### –Safety Guarantees for Autonomous Control–

Princeton University, NJ

Guide: Prof. Peter Ramadge

Jul 2019 - Present

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

### –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

### –Frequency Assignment in a Communication System–

CEWiT, IIT Madras, Chennai

Guide: Dr. Khuttoo Milleth

Aug 2016 - Jun 2018

- Filed a provisional patent and published at the National Conference on Communications 2018

### –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)
- Link to the MS thesis: <https://www.ideals.illinois.edu/handle/2142/88087>

### –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.
- Feature extraction followed by implementation of a pattern classifier using Gaussian mixture models to classify the different vehicles at an intersection.

## PROGRAMMING SKILLS

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