

# Kishor Jothimurugan

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## Research Interests

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My areas of interest include Deep Reinforcement Learning, Formal Methods and Machine Learning. In particular, I am interested in applying formal methods to improve reinforcement learning, verification of neural networks, and machine learning for program analysis.

## Education

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- **University of Pennsylvania** **Philadelphia, USA**  
○ *PhD candidate in Computer and Information Science, Current GPA 4.0/4.0* *2017–present*  
Advised by Prof. Rajeev Alur
- **Chennai Mathematical Institute** **Chennai, India**  
○ *B.Sc. (Honors) Mathematics and Computer Science, CGPA 9.77/10* *2014–2017*  
Ranked among top 3 students

### Relevant Courses.....

- **Graduate Courses:** Machine Learning (CIS 520), Advanced Machine Learning (CIS 620), Computational Learning Theory (CIS 625), Software Foundations (CIS 500), Software Analysis and Testing (CIS 700), Elements of Probability Theory (ESE 530).
- **Online:** Deep Learning and TensorFlow: Advanced Techniques Specializations on Coursera.

## Publications

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\* equal contribution, † authors in alphabetical order

### Conference Papers.....

- **A Framework for Transforming Specifications in Reinforcement Learning**,<sup>†</sup> Rajeev Alur, Suguman Bansal, Osbert Bastani, Kishor Jothimurugan. *Invited contribution (to appear), 2022.*
- **Compositional Reinforcement Learning from Logical Specifications**, Kishor Jothimurugan, Suguman Bansal, Osbert Bastani, Rajeev Alur. *Neural Information Processing Systems (NeurIPS), 2021.*
- **Compositional Learning and Verification of Neural Network Controllers**, Radoslav Ivanov\*, Kishor Jothimurugan\*, Steve Hsu, Shaan Vaidya, Rajeev Alur, Osbert Bastani. *International Conference on Embedded Software (EMSOFT), 2021.*
- **Abstract Value Iteration for Hierarchical Reinforcement Learning**, Kishor Jothimurugan, Osbert Bastani, Rajeev Alur. *Artificial Intelligence and Statistics (AISTATS), 2021.*
- **Space-efficient Query Evaluation over Probabilistic Event Streams**,<sup>†</sup> Rajeev Alur, Yu Chen, Kishor Jothimurugan, Sanjeev Khanna. *Logic in Computer Science (LICS), 2020.*

- **A Composable Specification Language for Reinforcement Learning Tasks**, Kishor Jothimurugan, Rajeev Alur, Osbert Bastani. *Neural Information Processing Systems (NeurIPS)*, 2019.

#### Workshop Papers.....

- **Specification-Guided Learning of Nash Equilibria with High Social Welfare**, Kishor Jothimurugan, Suguman Bansal, Osbert Bastani, Rajeev Alur. *Workshop on Safe and Robust Control of Uncertain Systems, NeurIPS 2021*.

#### Preprints.....

- **Learning Algorithms for Regenerative Stopping problems with Applications to Shipping Consolidation in Logistics**, Kishor Jothimurugan, Matthew Andrews, Jeongran Lee and Lorenzo Maggi.

## Internships and Summer Schools

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- *Research Intern at Nokia Bell Labs, Summer 2020*. An application of deep reinforcement learning to regenerative stopping problems.
- *SDE Intern at Amazon Web Services, Summer 2019*. Using machine learning to improve usability of taint analysis.
- *Marktoberdorf Summer School, Summer 2018*. Summer school on Engineering Secure and Dependable Software Systems.
- *Research Intern at LSV, ENS Cachan, Summer 2017*. Models for distributed reactive synthesis.

## Teaching

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- *Graduate TA (Spring 2019)*: Principles of Embedded Systems (CIS 540).
- *Graduate TA (Fall 2018)*: Automata, Computability and Complexity (CIS 262).
- *Undergraduate TA (Spring 2017)*: Discrete Mathematics.
- *Online TA*: Design and Analysis of Algorithms (NPTEL MOOC).

## Technical skills

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- **Programming Languages**: C++, Python, MATLAB, Java, Coq.
- **Tools**:  $\text{\LaTeX}$ , Git, Bash, Flow\*, StableBaselines.
- **Frameworks**: Tensorflow, Pytorch, Pandas, Soot.

## Academic Achievements

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- Selected for summer student exchange program between CMI and ENS Paris (Awarded to top 3 students).
- Qualified for ACM ICPC India Regionals 2016 (Chennai and Coimbatore).

## Languages

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**Fluent**: English, Hindi, **Native**: Tamil.