

# Varun Agrawal

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## Education

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**Georgia Institute of Technology** December 2025

Ph.D. Computer Science

Advisor: Dr. Frank Dellaert

- Thesis: Proprioceptive State Estimation for Legged Robots with Probabilistic and Hybrid Kinodynamics
- Thesis Committee: Seth Hutchinson, Sehoon Ha, Maurice Fallon (University of Oxford), Robert Griffin (IHMC & University of West Florida)

**Georgia Institute of Technology** August 2019

M.S. Computer Science

Advisor: Dr. James Hays

- Thesis: Visual Attribute Labelling in Images
- Specialization: Computational Perception and Robotics

**Sardar Vallabhbhai National Institute of Technology** May 2013

B.Tech in Computer Science & Engineering

## Publications

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15. “Proprioceptive State Estimation for Legged Robots without Contact Sensing using Hybrid Factor Graphs”  
**Varun Agrawal**, Frank Dellaert  
*In submission*
14. “Variable Elimination in Hybrid Factor Graphs for Discrete-Continuous Inference Estimation”  
**Varun Agrawal**, Frank Dellaert  
*ArXiv preprint, 2026* [[link](#)]
13. “RepoAuditor: A New Approach to Auditing Open Source Repositories”  
**Varun Agrawal**, Mathieu Tanneau, David Brownell, Jeffrey Young  
*US Research Software Engineering Conference (USRSE) 2025*
12. “A Group Theoretic Metric for Robot State Estimation Leveraging Chebyshev Interpolation”  
**Varun Agrawal**, Frank Dellaert  
*IEEE International Conference on Robotics and Automation (ICRA), 2024*
11. “Clustering user preferences for personalized teleoperation control schemes via trajectory similarity analysis”  
Jennifer Molnar, **Varun Agrawal**, Sonia Chernova  
*Frontiers in Robotics and AI (2024)*
10. “Constraint Manifolds for Robotic Inference and Planning”  
Yetong Zhang, Fan Jiang, Gerry Chen, **Varun Agrawal**, Adam Rutkowski, Frank Dellaert  
*IEEE International Conference on Robotics and Automation (ICRA), 2023*
9. “Proprioceptive State Estimation of Legged Robots with Kinematic Chain Modeling”  
**Varun Agrawal**, Sylvain Bertrand, Robert Griffin, Frank Dellaert  
*IEEE-RAS International Conference on Humanoid Robots (Humanoids), 2022*
8. “Deep IMU Bias Inference for Robust Visual-Inertial Odometry with Factor Graphs”  
Russell Buchanan, **Varun Agrawal**, Marco Camurri, Frank Dellaert, Maurice Fallon  
*IEEE Robotics and Automation Letters (RAL), 2022*
7. “iMHS: An Incremental Multi-Hypothesis Smoother”  
Fan Jiang, **Varun Agrawal**, Russell Buchanan, Maurice Fallon, Frank Dellaert

ArXiv preprint, 2021 [\[link\]](#)

6. “Continuous-time State & Dynamics Estimation using a Pseudo-Spectral Parameterization”  
**Varun Agrawal**, Frank Dellaert  
*IEEE International Conference on Robotics and Automation (ICRA), 2021*
5. “Masked reconstruction based self-supervision for human activity recognition”  
Harish Haresamudram, Apoorva Beedu, **Varun Agrawal**, Patrick L Grady, Irfan Essa, Judy Hoffman, Thomas Plötz  
*International Semantic Web Conference (ISWC), 2020*
4. “Unbiasing Semantic Segmentation For Robot Perception using Synthetic Data Feature Transfer”  
Jonathan Balloch, **Varun Agrawal**, Irfan Essa, Sonia Chernova  
*arXiv preprint, 2018*
3. “TextureGAN: Controlling Deep Image Synthesis with Texture Patches”  
Wenqi Xian\*, Patsorn Sangkloy\*, **Varun Agrawal**, Amit Raj, Jingwan Lu, Chen Fang, Fisher Yu, James Hays  
*Conference on Computer Vision and Pattern Recognition (CVPR), 2018 (Spotlight)*
2. “Adaptive Industrial Robot Control for Designers”  
Shani Sharif, **Varun Agrawal**, Larry Sweet  
*35th Education and Research in Computer Aided Architectural Design in Europe Conference (eCAADe), 2017*
1. “Web-based Tools For Supporting Student-driven Capstone Design Team Formation”  
**Varun Agrawal**, Amit Jariwala  
*124th ASEE Annual Conference and Exposition, 2017*

## Experience

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- Graduate Research Assistant**, GT Center for Scientific Software Engineering September 2025 – Current
- Worked on building a natural language search engine for wildlife images on [iNaturalist](#).
  - Benchmarked vector databases to identify the best one for filter-enabled search.
  - Worked with teams from MIT and iNaturalist to enable production quality quality & deployment.
- Intern**, GT Center for Scientific Software Engineering May 2025 – July 2025
- Built [RepoAuditor](#), a tool for auditing software repositories for better scientific software.
  - Presented this work at [USRSE 2025](#).
- Graduate Research Assistant**, BORG Lab – Atlanta, GA Jan 2019 – Current
- Worked on algorithms for proprioceptive state estimation of legged robots using probabilistic inference.
  - Co-maintainer of GTSAM, an industrial strength library for robot state estimation.
  - Published in ICRA, RA-L, and Humanoids.
- Research Intern**, Skydio – Redwood, CA May 2021 – July 2021
- Worked a new landmark-less Structure-from-Motion algorithm.
  - Used ray angles as the constraint instead of pixel reprojection error.
- Research Intern**, Institute for Human Machine Cognition (IHMC) – Pensacola, FL May 2020 – Aug 2020
- Built a proprioceptive state estimation framework for humanoid robots.
  - Worked with NASA’s Valkyrie and Boston Dynamic’s Atlas robots.
  - This work was published in Humanoids 2022.
- Software Engineering Intern**, Argo AI – Pittsburgh, PA May 2018 – Aug 2018
- Worked on developing deep learning based object detection framework for autonomous driving.
  - Our framework is capable of performing object detection at 100 fps.
  - Built upon Pytorch and numpy.
- Software Engineer**, Microsoft Inc. – Hyderabad, India July 2013 – June 2015
- Selected for MACH (Microsoft Academy for College Hires) 2013.

- Worked with Bing Entertainment Segments team building a toolkit to help with query analytics.
- Helped define new segment for TV shows.
- Worked on the B2B pipeline for volume licensing sales. Improved query times by 8x.
- Improved test suite for volume licensing services, leading to better reliability and bugfixes.

**Software Engineer Intern**, Microsoft – Hyderabad, India May 2012 – Aug 2012

- Worked with the Strategic Enterprise Services (SESIT) team.
- Built a dashboard to monitor various operational processes using Microsoft technologies and C.

**Chief Editor**, Renesa (Institute Newsletter) - SVNIT August 2011 – May 2012

- Co-chief editor with Dr. Kailasham Ramalingam.
- Organized a team of students to deliver news about the institute every 6-8 weeks.
- Proof-reading and editing submissions, writing for specific columns.

**President**, ACM Student Chapter - SVNIT August 2011 – May 2012

- Organized over a dozen events, seminars, and workshops over the academic year.
- Hosted eminent guest speakers such as Dr. Anu Vaidyanathan and Dr. Rekha Bachwani.
- Grew the chapter from 9 to over 50 students.

## Awards

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<b>CRIDC Outstanding Poster Award</b> [ <a href="#">link</a> ]	2024
<b>Marshall D. Williamson Fellowship</b> : For outstanding 2 <sup>nd</sup> year MSCS student.	2017
<b>Microsoft Cybersecurity Hackathon</b> : Winner.	2014
<b>Microsoft Hyderabad Team Trivia Competition</b> : Winner.	2014
<b>Govt. of India STEM Scholarship</b> : Awarded for all undergraduate years.	2009-2013
<b>InCTF</b> : Team ranked top 5 nationally in India.	2013

## Teaching Experiences

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| • CS 6475 Computational Photography Teaching Assistant               | Fall/Spring 2019-2025 |
| • CS 7632 Game AI Teaching Assistant                                 | Summer 2023/24        |
| • CS 3630 Introduction to Robotics and Perception Teaching Assistant | Summer 2022           |
| • CS 6476 Computer Vision Teaching Assistant                         | Fall 2017/18          |

## Academic Service

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### Journal Reviewer

- IEEE Transactions on Robotics (T-RO)
- IEEE Robotics and Automation Letters (RA-L)

### Conference Reviewer

- IEEE International Conference on Robotics and Automation (ICRA)
- IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)
- IEEE-RAS International Conference on Humanoid Robots (Humanoids)
- The IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR)
- The European Conference on Computer Vision (ECCV)
- International Conference on Computer Vision (ICCV)

## Other

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- 2<sup>nd</sup> degree black belt in Taido, recognized by [World Taido Federation](#).
- Finisher in 6 marathons with a personal best of 4:00:35.
  - Publix Atlanta Marathon 2023, 2024, 2025, 2026
  - Marine Corps Marathon 2023, 2025
- In-Training Certified Coach and Run Lead with Atlanta Track Club for the following training programs:
  - In-Training for Publix Atlanta Marathon 2024, 2025, 2026
  - In-Training for AJC Peachtree Road Race 2024, 2025
  - In-Training for Fall Marathons 2024, 2025