Pratap Tokekar

Phone:	+1 (540) 231-5096	Virginia Tech
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Education

University of Minnesota, Minneapolis, U.S.A.
Ph.D. in Computer Science, 2008–2014.
Advisor: Volkan Isler.
Thesis: *Placement and Motion Planning Algorithms for Robotic Sensing Systems.*

College of Engineering Pune, University of Pune, India.
Bachelor of Technology in Electronics & Telecommunication, 2004–2008.

Employment

Assistant Professor, Fall 2015–Present.
Dept. of Electrical & Computer Engineering, Virginia Tech.

Post-Doctoral Researcher, September 2014–July 2015.
GRASP Laboratory, University of Pennsylvania.
Supervisor: Vijay Kumar.

Research Assistant, January 2009–August 2014.
Dept. of Computer Science, University of Minnesota.
Advisor: Volkan Isler.

Visitor, Max-Planck Institute for Biological Cybernetics, Tübingen, Germany. May 2013.
Host: Antonio Franchi.

Teaching

Instructor, Department of Electrical & Computer Engineering, Virginia Tech.

ECE 4984/5984: (Advanced) Robot Motion Planning.	Spring 2017
ECE 2500: Computer Organization and Design.	Spring 2016, Fall 2016
ECE 6504: Advanced Topics in Robotics.	Fall 2015

Teaching Assistant, Department of Computer Science, University of Minnesota.

Computer Vision,	Spring 2011, Spring 2014
Introduction to Intelligent Robotics,	Fall 2012

Publications

(Authors marked by * are my advisees.)

Journal Articles

Under Review

[J13] L. Zhou* and **P. Tokekar**. Active Target Tracking with Self-Triggered Communications in Multi-Robot Teams. *Submitted to Autonomous Robots Special Issue on Distributed Robotics, 2017.*

[J12] **P. Tokekar**, A. K. Budhiraja* and V. Kumar. Algorithms for Visibility-Based Monitoring with Robot Teams. *Submitted to IEEE Transactions on Robotics, 2016.*

Published

[J11] J.L. Susa Rincon, **P. Tokekar**, V. Kumar, and S. Carpin. Rapid Deployment of Mobile Robots under Temporal, Perfomance, Perception, and Resource Constraints. *IEEE Robotics and Automation Letters (RAL), 2017.* Note: to appear.

[J10] P. Dames, **P. Tokekar** and V. Kumar. Detecting, Localizing, and Tracking an Unknown Number of Moving Targets Using a Team of Mobile Robots. *International Journal of Robotics Research (IJRR)*, 2017. Note: to appear.

[J9] G. Christie, A. Shoemaker, K. Kochersberger, **P. Tokekar**, L. McLean, and A. Leonessa. Radiation Search Operations using Scene Understanding with Autonomous UAV and UGV. *Journal of Field Robotics*, 2017. Note: to appear.

[J8] **P. Tokekar**, J. Vander Hook, D. Mulla and V. Isler. Sensor Planning for a Symbiotic UAV and UGV System for Precision Agriculture. *IEEE Transactions on Robotics*, 32(6):1498–1511, 2016.

[J7] **P. Tokekar** and V. Isler. Polygon Guarding with Orientation. *Elsevier Computational Geometry: Theory & Applications.* 58:97–109, 2016.

[J6] J. Vander Hook, **P. Tokekar** and V. Isler. Algorithms for Cooperative Active Localization of Static Targets with Mobile Bearing Sensors under Communication Constraints. *IEEE Transactions on Robotics*, 31(4):864–876, 2015.

[J5] **P. Tokekar**, N. Karnad and V. Isler. Energy-Optimal Trajectory-Planning for Car-like Robots. *Autonomous Robots*, 37(3): 279–300, 2014.

[J4] J. Vander Hook, **P. Tokekar** and V. Isler. Cautious Greedy Strategy for Bearing-Only Active Localization: Analysis and Field Experiments. *Journal of Field Robotics*, 31(2): 296–318, 2014.

[J3] **P. Tokekar**, E. Branson, J. Vander Hook and V. Isler. Tracking Aquatic Invaders: Autonomous Robots for Monitoring Invasive Fish. *IEEE Robotics and Automation Magazine*, 20(3): 33–41, 2013.

[J2] P. A. Plonski, **P. Tokekar** and V. Isler. Energy-Efficient Path Planning for Solar-Powered Mobile Robots in Complex Environments. *Journal of Field Robotics*, 30(4):583–601, 2013.

[J1] **P. Tokekar**, D. Bhadauria, A. Studenski and V. Isler. A Robotic System for Monitoring Carp in Minnesota Lakes. *Journal of Field Robotics*, 27(6):779–789, 2010.

Conference Proceedings (Refereed)

Published

[C17] L. Zhou* and **P. Tokekar**. Active Target Tracking with Self-Triggered Communications. *IEEE International Conference on Robotics and Automation (ICRA), 2017.* Note: To Appear.

[C16] Y. Sung* and **P. Tokekar**. Algorithm for Searching and Tracking an Unknown and Varying Number of Mobile Targets using a Limited FoV Sensor. *IEEE International Conference on Robotics and Automation (ICRA), 2017*. Note: To Appear.

[C15] A. Premkumar*, K. Yu*, and **P. Tokekar**. A Geometric Approach for Multi-Robot Exploration in Orthogonal Polygons. *Workshop on Algorithmic Foundations of Robotics (WAFR)* 2016.

[C14] Z. Zhang*, and **P. Tokekar**. Non-Myopic Target Tracking Strategies for Non-Linear Systems *IEEE Conference on Decision and Control (CDC)* 2016.

[C13] V. Isler, N. Noori, P. Plonski, A. Renzaglia, **P. Tokekar** and J. Vander Hook. Finding and Tracking Targets in the Wild: Algorithms and Field Deployments. *IEEE International Symposium on Safety, Security, and Rescue Robotics (SSRR)* 2015.

[C12] P. Dames, **P. Tokekar** and V. Kumar. Detecting, Localizing, and Tracking an Unknown Number of Moving Targets Using a Team of Mobile Robots. *International Symposium on Robotics Research (ISRR)* 2015.

[C11] **P. Tokekar** and V. Kumar. Visibility-based Persistent Monitoring with Robot Teams. *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)* 2015.

[C10] J. Das, G. Cross, C. Qu, A. Makineni, **P. Tokekar**, Y. Mulgaonkar and V. Kumar. Devices, Systems, and Methods for Automated Monitoring enabling Precision Agriculture. *IEEE International Conference on Automation Science and Engineering (CASE)* 2015.

[C9] **P. Tokekar**, V. Isler and A. Franchi. Multi-Target Visual Tracking with Aerial Robots. *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, 2014.

[C8] **P. Tokekar** and V. Isler. Polygon Guarding with Orientation. *IEEE International Conference on Robotics and Automation (ICRA)*, 2014.

[C7] **P. Tokekar**, J. Vander Hook, D. Mulla and V. Isler. Sensor Planning for a Symbiotic UAV and UGV System for Precision Agriculture. *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, 2013.

[C6] **P. Tokekar** and V. Isler. Sensor Placement and Selection for Bearing Sensors with Bounded Uncertainty. *IEEE International Conference on Robotics and Automation (ICRA)*, 2013.

[C5] J. Vander Hook, **P. Tokekar** and V. Isler. Cautious Greedy Strategy for Bearing-based Active Localization: Experiments and Theoretical Analysis. *IEEE International Conference on Robotics and Automation (ICRA)*, 2012.

[C4] **P. Tokekar**, J. Vander Hook and V. Isler. Active Target Localization for Bearing Based Robotic Telemetry. *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, 2011.

[C3] **P. Tokekar**, N. Karnad and V. Isler. Energy-Optimal Velocity Profiles for Car-like Robots. *IEEE International Conference on Robotics and Automation (ICRA)*, 2011.

[C2] D. Bhadauria, V. Isler, A. Studenski and **P. Tokekar** (in alphabetical order). A Robotic Sensor Network for Monitoring Carp in Minnesota Lakes. *IEEE International Conference on Robotics and Automation (ICRA)*, 2010.

[C1] **P. Tokekar**, V. Bhatawadekar, D. Fehr and N. Papanikolopoulos. Experiments in Object Reconstruction with a Robot-mounted Laser Range-finder. *17th Mediterranean Conference on Automation and Control*, 2009.

Book Chapters (Refereed)

[B2] P. A. Plonski, **P. Tokekar** and V. Isler. Energy Efficient Path Planning for Solar Powered Mobile Robots in Complex Environments. *Experimental Robotics. Springer Tracts in Advanced Robotics.* Proceedings of the *International Symposium on Experimental Robotics (ISER)*, 2012.

[B1] J. Vander Hook, **P. Tokekar**, E. Branson, P. Bajer, P. Sorensen and V. Isler. Local-Search Strategy for Active Localization of Multiple Invasive Fish. *Experimental Robotics. Springer Tracts in Advanced Robotics.* Proceedings of the *International Symposium on Experimental Robotics (ISER)*, 2012.

Posters

[P1] J. Vander Hook, **P. Tokekar**, E. Branson, P. A. Plonski and V. Isler. Finding and Localizing Radio-Tagged Carp with an Autonomous Robotic Boat. *142nd Annual Meeting of the American Fisheries Society*, 2012.

Patents

- V. Isler, D. Mulla, **P. Tokekar** and J. Vander Hook. Symbiotic Unmanned Aerial Vehicle and Unmanned Ground Vehicle System. *US Patent 20,160,018,224 published in January 2016.*
- Vision-based Surveying of Apple Orchards with an Autonomous Aerial Vehicle. *US Provisional Patent 62/148,462 filed in April 2015.*

Funding

External

1. *NRI: Coordinated Detection and Tracking of Hazardous Agents with Aerial and Aquatic Robots to Inform Emergency Responders.* NSF. PI: Pratap Tokekar. $900,836. My share: $502,855. Period: 10/2016-09/2019.
2. *CRII: RI: Assignment, Routing, and Coordination of Diverse Robotic Sensors.* NSF. PI: Pratap Tokekar. $175,000. Period: 04/2016-03/2018.
3. *Robot Swarms and Human Scouts for Persistent Monitoring of Specialty Crops.* USDA/NRI. PI: Vijay Kumar (University of Pennsylvania). Subcontracted Co-PI: Pratap Tokekar (Virginia Tech). My share: $61,105. Period: 09/2015-08/2017.
4. *Agile Control Enables Indoor Inspection.* NSF I/UCRC Center for UAS. PI: Pratap Tokekar. $25,000. Period: 08/2016-08/2017.

Other

1. NVidia Hardware Grant 2016.
2. *Multi-Robot Exploration.* ICTAS Seed Funding, $5,000. 2016.
3. *Plume Detection and Tracking with Unmanned Systems.* With David Schmale III. ICTAS Seed Funding, $4,000. 2016.

Students Advised

Current Students

Ph.D. Advisees

- Yoonchang Sung. ECE (Fall 2016 – Present)
- Kevin Yu. ECE (Spring 2016 – Present)
- Zhongshun Zhang. ECE (Fall 2015 – Present)
- Lifeng Zhou. ECE (Fall 2016 – Present)

Masters Advisees

- Ashish Kumar Budhiraja. M.S. ECE (Fall 2015 – Present)
- William Gerhard. M.S. ECE (Spring 2017 – Present)
- Nahush Gondhalekar. M.S. ECE (Fall 2015 – Present)
- Aravind Preshant Premkumar. M.S. ECE (Fall 2015 – Present)

Undergraduate (Research Project/Independent Study

- Bishesh Baniya. M.E. (Spring 2016)
- Rohan Dani (Spring 2016 – Spring 2017)
- Dev Lakhia (Fall 2016)
- Collin Smith, ASEE SMART Scholarship Winner (Summer 2016 – Present)
- Madhav Patel (Fall 2016 – Spring 2017)
- Harnaik Dhami (Fall 2016 – Present)
- Sanyukta Somani (Spring 2017 – Present)

Visiting Students

- Varun Suryan (Intern; Fall 2016 – Present)

Ph.D. Thesis Committee Member

- Michael Fowler (Advisors: Charles Clancy & Ryan Williams). Electrical & Computer Engineering, Virginia Tech.
- Shuangfei Fan (Advisors: Jia-Bin Huang & Bert Huang). Electrical & Computer Engineering, Virginia Tech.
- Georgios Kontoudis (Advisor: Tomonari Furukawa & Kyriakos Vamvoudakis). Mechanical Engineering, Virginia Tech.
- Scott Gibson (Advisor: Dan Stilwell). Electrical & Computer Engineer, Virginia Tech.
- Gaurang Naik (Advisor: Jerry Park). Electrical & Computer Engineer, Virginia Tech.

- Yue Zhan (Advisor: Michael Hsiao). Electrical & Computer Engineer, Virginia Tech.
- Haseeb Chaudhry (Advisor: Kevin Kochersberger). Mechanical Engineering, Virginia Tech.
- Robert Griffin (Advisor: Alex Leonessa). Mechanical Engineering, Virginia Tech.
- Bijo Sebastian (Advisor: Pinhas Ben-Tzvi). Mechanical Engineering, Virginia Tech.
- Ryan Brown (Advisor: Al Wicks). Mechanical Engineering, Virginia Tech.
- Xiao Lin (Advisor: Devi Parikh). Electrical & Computer Engineering, Virginia Tech.
- Karim Abdelatty (Advisor: Kevin Kochersberger). Mechanical Engineering, Virginia Tech.
- Tamer Attia (Advisor: Kevin Kochersberger). Mechanical Engineering, Virginia Tech.
- John Peterson (Advisor: Brian Lattimer). Mechanical Engineering, Virginia Tech.
- Gordon Christie (Advisors: Kevin Kochersberger & Dhruv Batra). Electrical & Computer Engineering, Virginia Tech.

Invited Talks

- *Autonomous Near Earth Sensing with Aerial, Ground, and Marine Robots*
  - UAS in Public Safety, Emergency, and Disaster Response - conference organized by VA Dept. of Emergency Management (February 2017).
  - Institute for Robotics and Intelligent Machines, Georgia Tech (February 2017).
  - Department of Systems and Information Engineering, University of Virginia (February 2017).
- *Systems, Algorithms, and Applications for Robotic Sensing.*
  - Computer Science Graduate Seminar, Virginia Tech (September 2015).
- *Multi-robot Routing Algorithms for Coverage in Rich Environments.* Invited talk at the "Beyond Geometric Constraints" workshop at ICRA 2015.
- *Systems, Algorithms, and Applications for Robotic Sensing.*
  - Arizona State University, New York University, University of Nebraska-Lincoln, University of Utah, Virginia Tech, Worcester Polytechnic Institute (February–March 2015).
- *Algorithms for Persistent Surveillance in Complex Environments.* Smart Adaptive Reliable Teams for Persistent Surveillance (SMARTS) MURI Annual Review Meeting. MIT (Dec 2014).
- *Sensing Planning for Robotic Environment Monitoring: Systems and Algorithms.*
  - University of Colorado, Boulder (March 2014), University of Pennsylvania (May 2014).
- *Robotic Sensor Networks for Environmental Monitoring.* Invited talk at the "Towards Fully Decentralized Multi-Robot Systems" workshop at ICRA 2013.

Service

- Guest Editor:
  - Special issue on "Active Perception" for Autonomous Robots journal, 2016.
  - Special issue on "Robotics in Agriculture" for Journal of Field Robotics, 2016.
- Associate Editor:
  - ICRA 2016, 2017.
- Workshop Organizer:
  - Workshop on Perception and Planning for Robotic Inspection, IROS 2017.
  - Workshop on Robotics in Agriculture, ICRA 2015.
- Program Committee:
  - International Symposium on Multi-robot and Multi-Agent Systems (MRS 2017).
  - Workshop on Algorithmic Foundations of Robotics (WAFR) 2016.
  - Robotics: Science & Systems (RSS) 2016.
  - ACM Symposium on Applied Computing, Track on Intelligent Robots and Multi-Agent Systems (IRMAS) 2015, 2016.
  - IEEE International Symposium on Safety, Security, and Rescue Robotics (SSRR) 2015, 2016.
  - AgriControl2016: The 5th IFAC Conference on Sensing, Control and Automation Technologies for Agriculture, 2016.
  - Second Workshop on Robotic Sensor Networks, part of Cyber-Physical Systems week, 2015.
- Session Co-Chair: ICRA 2012, ICRA 2017.
- Reviewer:
  - NSF Panelist 2016, 2017.
  - *Journals:* IEEE Transactions on Robotics, IEEE Robotics & Automation Magazine, IEEE Transactions on Automation Science & Engineering, IEEE/ACM Transactions on Networking, IEEE Journal on Selected Areas in Communication, IEEE Transactions on Parallel and Distributed Systems, Autonomous Robots, International Journal of Advanced Robotic Systems, Elsevier Adhoc Networks, Information Processing Letters, Annals of Mathematics and Artificial Intelligence (2017).
  - *Conferences:* IEEE/RSJ International Conference on Intelligent Robots and Systems, IEEE International Conference on Robotics and Automation, IEEE Conference on Automation Science and Engineering, Workshop on Algorithmic Foundations of Robotics, International Symposium on Robotics Research, Symposium on Computational Geometry (SoCG).
- Faculty Search Committee Member (Department of Mechanical Engineering at Virginia Tech). 2016-17.
- Volunteer: Student Activities at ICRA 2012, Math & Science Family Fun Fair 2011 organized by University of Minnesota.

Other

- Conference travel awards: ICRA 2011, IROS 2011, ICRA 2013, IROS 2013 (UMN GAPSA), ICRA 2014.
- Professional Membership: IEEE, IEEE Robotics and Automation Society.

Last updated: June 5, 2017