

Alexander James Wallar

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- Summary** Alex Wallar is a PhD student in the Computer Science and Artificial Intelligence Laboratory at MIT. His research focusses optimizing vehicle distributions and fleet sizes for ride-sharing systems in order to maximize system efficiency. He is a recipient of the Lemelson Presidential Fellowship, the MIT Diversity Fellowship, and the Shell-MIT Energy Fellowship. He received his masters degree in Electrical Engineering and Computer Science from MIT in 2017 with a focus on applications of constrained optimization for mobility-on-demand systems. He received his Bachelors degree in Computer Science from the University of St. Andrews in 2015 with first class honours.
- Education**
- Ph.D. Electrical Engineering and Computer Science Sept 2017 – present
Massachusetts Institute of Technology, Cambridge, MA
Advisor: Prof. Daniela Rus
- S.M. Electrical Engineering and Computer Science Sept 2015 – June 2017
Massachusetts Institute of Technology, Cambridge, MA
Advisor: Prof. Daniela Rus
GPA: 5.0/5.0
- B.Sc. (Honours) Computer Science Sept 2012 – June 2015
University of St Andrews, St Andrews, Scotland
First Class Honours Degree Classification
Direct Entry Into Second Year
- Experience**
- Lead Software Engineer July 2017 – present
Enki Cards, Cambridge
- Lead the development of the front-end and back-end for Enki Cards, a startup in Cambridge creating 3D foldable greeting cards
- Research Scientist Intern May 2016 – Aug 2016
Research and Development Group
Amazon Robotics, Boston
- Analyzed and developed algorithms for drive prioritization in order to reduce floor congestion
- Research Scientist (Contractor) Jan 2015 – Aug 2015
Distributed Autonomous Systems Group
Naval Research Laboratory, Washington DC
- Developed algorithms for multi-agent persistent surveillance of risk sensitive areas
- Research Intern May 2014 – Aug 2014
Distributed Autonomous Systems Group
Naval Research Laboratory, Washington DC
- Developed algorithms for persistent surveillance and collision avoidance
- NSF Research Intern May 2013 – Aug 2013
Experiment Research in Wireless Networking Group
University of Notre Dame, South Bend
- Created a JavaScript library for in-browser eye tracking and gaze prediction

Publications

1. **A. Wallar**, J. Alonso-Mora, and D. Rus (2018): Optimizing Vehicle Distributions and Fleet Sizes for Mobility-on-Demand. *conference, submitted*
2. B. Araki, I. Gilitschenski, T. Ogata, **A. Wallar**, W. Schwarting, Z. Choudhury, S. Karaman, and D. Rus (2018): Range-based Cooperative Localization with Nonlinear Observability Analysis. *conference, submitted*
3. **A. Wallar**, M. van der Zee, J. Alonso-Mora, and D. Rus (2018): Vehicle Rebalancing for Mobility-on-Demand Systems with Ride-Sharing. *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, *accepted*
4. **A. Wallar**, B. Araki, R. Chang, J. Alonso-Mora, and D. Rus (2017): Foresight: Remote Sensing For Autonomous Vehicles Using a Small Unmanned Aerial Vehicle. *Field and Service Robotics*, pp. 591 – 604
5. J. Alonso-Mora, **A. Wallar**, and D. Rus (2017): Predictive Routing for Autonomous Mobility-On-Demand Systems with Ride-Sharing. *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, pp. 3583 – 3590
6. J. Alonso-Mora, S. Samaranayake, **A. Wallar**, E. Frazzoli, and D. Rus (2017): On-demand High-capacity Ride-sharing via Dynamic Trip-vehicle Assignment. *Proceedings of the National Academy of Sciences*, vol. 114, no. 3, pp. 462 – 467
7. **A. Wallar**, E. Plaku, and D. Sofge (2015): Reactive Motion Planning for Unmanned Aerial Surveillance of Risk-Sensitive Areas. *IEEE Transactions on Automation Science and Engineering*, vol. 12, issue 3, pp. 969 – 980
8. D. Sofge, N. Sydney, **A. Wallar**, and K. Sullivan (2015): Mobile Autonomous Navy Teams for Information Surveillance and Search (MANTISS). *Naval Research Laboratory Review*, pp. 155–157
9. **A. Wallar** and E. Plaku (2014): Path Planning for Swarms in Dynamic Environments by Combining Probabilistic Roadmaps and Potential Fields. *IEEE Symposium on Swarm Intelligence*
10. **A. Wallar**, E. Plaku, and D. Sofge (2014): A Planner for Autonomous Risk-Sensitive Coverage (PARCov) by a Team of Unmanned Aerial Vehicles. *IEEE Symposium on Swarm Intelligence*
11. **A. Wallar** and E. Plaku (2014): Path Planning for Swarms by Combining Probabilistic Roadmaps and Potential Fields. *Springer LNAI Towards Autonomous Robotic Systems*, vol. 8069, pp. 417 – 428

Patents

1. J. Alonso-Mora, S. Samaranayake, **A. Wallar**, and D. Rus (2018): System for On-Demand High-Capacity Ride-Sharing Via Dynamic Trip-Vehicle Assignment and Related Techniques. *U.S. Patent Application 15/877,935*
2. J. Alonso-Mora, D. Rus, and **A. Wallar** (2018): On-Demand High-Capacity Ride-Sharing Via Dynamic Trip-Vehicle Assignment with Future Requests. *U.S. Patent Application 15/941,449*

Theses

1. **A. Wallar** (2017): On-demand High-capacity Ride-sharing via Dynamic Trip-Vehicle Assignment with Rebalancing. S.M. Thesis. Massachusetts Institute of Technology
2. **A. Wallar** (2015): Generating Safe Trajectories in Stochastic Dynamic Environments by Leveraging Information About Obstacle Motion. Undergraduate Thesis. University of St Andrews

Awards

- Shell-MIT Energy Fellowship, MIT, 2018 – 19
- Finalist, MIT \$100K Pitch Competition, 2018
- School of Engineering Lemelson Presidential Fellowship, MIT, 2015 – 16
- Office of the Dean of Graduate Education Diversity Fellowship, MIT, 2015 – 16
- Travel Award, IEEE Symposium Series on Computational Intelligence, 2014
- Dean's List, University of St Andrews, 2012 – 15
- Best Poster Prize, University of Notre Dame NSF REU Conference, 2013
- Winner, J.P. Morgan Code for Good Hackathon, 2013
- Second place, KCL Tech Society HackKing's Hackathon, 2014

Developer Skills

Languages: Python, C++, Java, JavaScript, Matlab, Go, C#

Tools: ROS, OpenCV, ZeroMQ, Flask, NumPy, SciPy, Scikit-Learn, Keras, InfluxDB, RethinkDB, three.js

Courses

Massachusetts Institute of Technology: Advances in Computer Vision, Advanced Algorithms, Computer Networks, User Interface Design and Implementation, Airport Systems

University of St Andrews: Foundations of Computation (Accelerated), Advanced Programming Projects, Advanced Computer Science, Discrete Mathematics, Software Engineering, Data Encoding, Operating Systems, Computational Complexity, Artificial Intelligence, Component Technology, Major Software Team Project, Video Games, Artificial Intelligence Practice, Logic and Software Verification, Knowledge Discovery and Data Mining, Distributed Systems, Constraint Programming, Major Software Project