## Alexander James Wallar

Email: wallar@mit.edu , Website: http://wallar.me

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**Summary**


I am a Ph.D. student in the Distributed Robotics Laboratory at MIT where I have been awarded the School of Engineering Lemelson Presidential Fellowship and the Office of the Dean of Graduate Education Diversity Fellowship. Previously, I was a student contractor in the Distributed Autonomous Systems Group at the Naval Center for Applied Research in Artificial Intelligence. I received a First Class Honours degree in computer science from the University of St Andrews in Scotland. I am an American citizen.


**Education**

S.M/Ph.D. Electrical Engineering and Computer Science — September 2015 – present
Massachusetts Institute of Technology — Cambridge, MA, USA

Working under the supervision of Dr. Daniela Rus as part of the Distributed Robotics Laboratory working on algorithms for multi-agent collision avoidance in cluttered dynamic environments. Receiving the School of Engineering Lemelson Presidential Fellowship and the Office of the Dean of Graduate Education Diversity Fellowship.

B.Sc. (Honours) Computer Science — September 2012 – June 2015
University of St Andrews — St Andrews, Scotland

First class honours degree. Direct entry into second year.
Dissertation Title: Generating Safe Trajectories in Stochastic Dynamic Environments by Leveraging Information About Obstacle Motion.

International Baccalaureate Diploma — September 2011 – June 2012
George Mason High School — Falls Church, Virginia

Extended Essay Title: To What Extent Can Numbers of Different Bases be Used to Hide Information Effectively?

**Experience**

Graduate Student — September 2015 – Present
Massachusetts Institute of Technology — Cambridge, MA, USA

Working as part of the Distributed Robotics Laboratory working on collision avoidance in cluttered dynamic environments

Student Contractor — January 2015 – August 2015
Naval Research Laboratory — Washington DC, USA

Worked as part of the Distributed Autonomous Systems Group at the Naval Center for Applied Research in Artificial Intelligence developing algorithms for multi-agent surveillance and persistent monitoring. Also developed middlewares that provide abstractions for controlling multi-agent systems

Undergraduate Research Assistant — August 2013 – August 2015
The Catholic University of America — Various Locations

Worked as part of the Computational Robotics Laboratory developing algorithms for swarm manipulation that seek to enable a group of unmanned aerial vehicles to provide surveillance over a given region. Also created path planning algorithms for swarms that generate paths through cluttered dynamic environments.

Research Intern — May 2014 – August 2014
Naval Research Laboratory — Washington DC, USA

Was selected as part of the Naval Research Enterprise Internship Program. Worked as part of the Distributed Autonomous Systems Group at the Naval Center for Applied Research in Artificial Intelligence and developed algorithms for surveillance of risk sensitive areas by a team of UAVs.

Research Assistant — February 2014 – October 2015
School of Computer Science, University of St Andrews — St Andrews, Scotland

Worked with Dr. Juan Ye to develop computer vision techniques to produce haptic feedback from two dimensional images.

Research Assistant — September 2013 – June 2014
School of Psychology, University of St Andrews — St Andrews, Scotland

Configured a novel experimental setup that involves three active-shutter 3D displays of different sizes that can be viewed simultaneously through beam splitters.

Research Intern — May 2013 – August 2013
University of Notre Dame — Notre Dame, USA

Was selected as part of the National Science Foundation Research Experience for Undergraduates program. Developed web applications for concussion detection. Also developed a framework for in browser eye tracking and gaze prediction.

High School Research Intern — July 2012 – August 2012
The Catholic University of America — Washington DC, USA

Created an interface for controlling an iRobot Create using voice commands spoken to an Android enabled device. Also developed algorithms for swarm path planning that enabled a group of robots to move from an initial configuration to a goal configuration.

## Awards

### Fellowships & Grants

- School of Engineering Lemelson Presidential Fellowship, MIT
- Office of the Dean of Graduate Education Diversity Fellowship, MIT
- Symposium Series on Computational Intelligence Travel Grant, IEEE

### Academic Prizes & Recognition

- Best Paper Award Nominee, Symposium Series for Computational Intelligence, IEEE
- Dean's List 2012 – 2015, University of St Andrews
- Best Poster Prize, University of Notre Dame

**Hackathons**

- Second place, KCL Tech Society HackKing's Hackathon
- Finalist, Barclays Openminds Hackathon
- First place, J.P. Morgan Code for Good Hackathon
- Second place, University of Edinburgh Security Appathon
- Third place, University College London Hackin' the City

**Positions of Responsibility**

- Class Representative, University of St Andrews — September 2014 – May 2015
- President, St Andrews Computing Society — May 2013 – June 2014

**Technical Interests**

Swarm Robotics, Emergent Behaviour, Complex Systems, Autonomous Systems, Path Planning, Aerial Robotics, Artificial Intelligence, Computational Intelligence, Evolutionary Algorithms, Robotic Middleware, Stochastic Planning, Sampling Based Motion Planning, Evolutionary Robotics, Swarm Intelligence, Consensus Filtering, Mapping, Surveillance, Search & Rescue, Game Theory, Computational Geometry, Collision Avoidance

**Programming Languages**

Python, C, C++, Java, JavaScript, Matlab, Go, C#, Maple, Mathematica, Haskell

**Programming Libraries**

ROS, OpenCV, ZeroMQ, Flask, NumPy, Matplotlib, OpenKinect, SciPy, Scikit-Learn

**Publications**

**Peer-reviewed**

1. **Wallar A**, Plaku E, and Sofge D (2014): **"Reactive Motion Planning for Unmanned Aerial Surveillance of Risk-Sensitive Areas."**, IEEE Transactions on Automation Science and Engineering, in press
2. Sofge D, Sydney N, **Wallar A**, and Sullivan K (2015): **"Mobile Autonomous Navy Teams for Information Surveillance and Search (MANTISS)."**,Naval Research Laboratory Review, in press
3. **Wallar A** and Plaku E (2014): **"Path Planning for Swarms in Dynamic Environments by Combining Probabilistic Roadmaps and Potential Fields."**, IEEE Symposium on Swarm Intelligence
4. **Wallar A**, Plaku E, and Sofge D (2014): **"A Planner for Autonomous Risk-Sensitive Coverage (PARCov) by a Team of Unmanned Aerial Vehicles."**, IEEE Symposium on Swarm Intelligence
5. **Wallar A** and Plaku E (2014): **"Path Planning for Swarms by Combining Probabilistic Roadmaps and Potential Fields."**, Springer LNAI Towards Autonomous Robotic Systems, vol. 8069, pp. 417 – 428

**Theses**

1. **Wallar A** (2015): **"Generating Safe Trajectories in Stochastic Dynamic Environments by Leveraging Information About Obstacle Motion"**, Undergraduate Thesis, University of St Andrews

**Posters & Presentations**

1. Sydney N, **Wallar A**, Sofge D (2015): **Distributed Information-Theoretic Target Detection Using Physics-Inspired Motion Coordination**, 8th International Symposium on Resilient Control Systems, Philadelphia, USA
2. **Wallar A**, Plaku E, and Sofge D (2014): **Risk Sensitive Surveillance with Optimal Sensor Quality for Distributed Robotic Systems**, Entrepreneur First UnHacked, London, UK
3. **Wallar A**, Poellabauer C, Sazonovs A, and Flynn P (2014): **Camgaze.js: A JavaScript Library for Eye Tracking and Gaze Prediction**, Edinburgh University Young Scientific Researchers Association (EUYSRA) Conference, Edinburgh, UK
4. **Wallar A**, Choi C, and Sazonovs A (2013): **Bowtie: In-browser Mobile Aided Sensor Acquisition using HTML5**, Scottish Informatics and Computer Science Alliance (SICSA) DemoFest, Glasgow, UK
5. **Wallar A**, Poellabauer C, Sazonovs A, and Flynn P (2013): **Camgaze.js: A JavaScript Library for Eye Tracking**, Scottish Informatics and Computer Science Alliance (SICSA) DemoFest, Glasgow, UK