

# Dr. Joseph T. Foley

*Mechanical, Automation and Security Designer...*

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## Education

- 2000-2007 **Doctor of Philosophy in Mechanical Engineering**, *Massachusetts Institute of Technology.*
- 1998-1999 **Master of Engineering in Computer Science and Electrical Engineering**, *Massachusetts Institute of Technology.*
- 1994-1999 **Bachelor of Science in Computer Science and Electrical Engineering**, *Massachusetts Institute of Technology.*

## Doctor of Philosophy Dissertation

- title *Security Approaches for Radio Frequency Identification Systems*
- supervisor Professor Sanjay Sarma
- description Describes preventative measures and protection from the privacy invasion potential associated with ubiquitous Radio Frequency Identification (RFID) while still maintaining capabilities to track items and prevent theft. The unified RFID protection system is called TinFoil.

## Master Thesis

- title *An Infrastructure for Electromechanical Appliances on the Internet*
- supervisor Professor Sanjay Sarma
- description Design and implementation of an Radio Frequency Identification(RFID) and Internet enabled appliance. The design focused on general methods applicable to a wide variety of intelligent devices. Fundamental development of ONS and EPC technologies.

## Published Work

- 2009 **Micro artificial muscle fiber using NiTi spring for soft robotics**, *S. Kim, E. Hawkes, K. Cho, M. Jolda, J. Foley, and R. Wood*, IEEE/RSJ International Conference on Intelligent Robotics and Systems (IROS) 2009 Proceedings..
- 2008 **The Impact of Reliability on Wind Turbine Life Cycle Analysis**, *J. Foley, T. Gutowski*, 2008 IEEE International Symposium on Electronics and the Environment (ISEE).
- 2001 **The Networked Physical World: An Automated Identification Architecture**, *D. Engels, J. Foley, J. Waldrop, S. Sarma, D. Brock*, IEEE Workshop on Internet Applications (WIAPP) 2001, pp 76-77.

## Invited Talks and Presentations

- 2011 **Digital Manufacturing and Personal Sustainability**, *Joe Foley*, Alþjóðlegi Umhverfisdagurinn (World Environment Day), Reykjavík University, June 5.
- 2010 **Exploitable Assumptions**, *A. Brooks, E. Schmiedl, J. Foley*, DEFCON 2011.

- 2007 **U.S. Industrial Energy Use: Making Less with More?**, Jeffrey Dahmus, Alissa Jones, Lynette Cheah, Matthew Branham, Joseph Foley and Young Song, MIT Energy Conference Poster Session, March 9 2007.
- 2006 **Security Approaches for Radio Frequency Identification Systems**, Dr. Joseph T. Foley, EPCglobal US Conference, Los Angeles, October 19.
- 2003 **Happy Trails: Automated Lifting Trailer**, MIT 2.009 Team Purple '99, Lemelson Inventor Conference, Washington DC, USA.
- 2002 **AutoID Technology Demonstration**, Distributed Information System Center MIT, Cambridge University, UK.

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## Intellectual Property

- 2011 **Google Code “arduino-roomba”**, Joe Foley.  
Library for interfacing an Arduino and iRobot Create/Roomba. GPL2.
- 2009 **US Patent Pending “Manufacture of Inverted SMA Springs”**, M. Jolda and J. Foley, *iRobot Patent* .
- 2007 **US Patent Pending “Tag Anti-Counterfeit Systems”**, Joe Foley & Sanjay Sarma, MIT TLO 10695.
- 2000 **US Patent 7,765,253 “Object Name Service”**, Joseph Foley, Erik Nygren, & Sanjay Sarma. MIT TLO 9789.

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## Collaboration

- 2011-Current **RU-LHÍ Music, Art, Software, Engineering Collaboration**, *RU Lead*, Reykjavik University and Listaháskolinn Islands.  
Co-teaching T-428-EMIR, Gagnvirk rafvélræn list “Electromechanical Interactive Art” with faculty in RU Computer Science, LHÍ Music, and LHÍ Visual Arts. This class will create teams of engineers, programmers, musicians, and visual artists to create collaborative inter-disciplinary interactive art.
- 2011 **“Emerging and Imposing Spaces” (“Vaxandi og uppþrengjandi rými”)**, *co-organized with Sigrún Harðardóttir*, RU and LHÍ, Electro-mechanical Interactive Art.  
Visual Arts class “Interactivity” LHÍ & RU VT HUN1013 “Design” cooperated to produce 7 unique art installation works shown at LHÍ. Selected pieces shown at Hreindirland Festival 2011 and covered by RÚV 2.
- 2010–Current **Faculty Advisor**, *RU and Hakkavélin*, Hackspace.
- 2003–2004 **Internet Engineering Task Force (IETF) ONS Working Group**, *founding member*, AutoID Center MIT, Verisign, & EPC Global.
- 2005 **ONS 1.0**, *architect*, AutoID Center MIT & OATsystems.

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## Teaching

- September 2011-February 2012 **Advisor/Consultant**, *Icelandair Technical Services, Design Department*, Building 8, 235 Keflavik Airport, Iceland.  
Designing and prototyping ATmega/Arduino avionics interface to convert and filter data between A757 and A429 data buses. This interface will allow real-time monitoring of flight data, with particular focus on the accelerometer inputs. Co-advising a bachelor’s student in this project with Þorgeir Pállson of RU.
- January 2012-May 2012 **Part-time Lecturer**, *Reykjavik University*, Reykjavik 101, Iceland.  
Teaching VT HUN1013 (Hönnun) Mechanical Design. Co-teaching T-420-HON (Hönnun X): integrated project class developing a walking robot for doing prosthesis gait testing at Össur HF. See collaboration section for information on T-428-EMIR.

- August 2011-December 2011 **Part-time Lecturer**, *Reykjavik University*, Reykjavik 101, Iceland.  
Teaching T-865-MADE "Precision Machine Design", developing low-cost precision lab equipment to be used by RU bioengineering department. Teaching T-411-MECH "Mechatronics 1", building affordable circuit prototyping and automation education using the Arduino architecture.
- January 2010-May 2010 **Part-time Lecturer**, *Reykjavik University*, Reykjavik 101, Iceland.  
Taught VT HUN1013 (Hönnun) Mechanical Design, which produced designs for research equipment and interactive art installations. (See collaborations). Co-taught T-420-HON (Hönnun X): class project that developed an aluminum smelter pot inspection robot for Rio Tinto Alcan.
- September 2005-January 2006 **Teaching Assistant**, *CSCI-E-170: Computer Security and Privacy*, Harvard Extension School, Cambridge, MA.  
Lectures, problem set generation, and grading on security material.
- September 2002-August 2005 **Head Instructor**, *MIT Faculty Pistol & Rifle Club*, Cambridge, MA.  
Revised NRA pistol safety curriculum to integrate international target pistol trends. Taught Marksmanship and Pistol Safety course every semester.
- September 1999-December 1999 **Teaching Assistant**, *MIT 2.007 Introduction to Mechanical Design*, Cambridge, MA.  
Revised curriculum, developed control system and scoring system for "Ballcano" robotics competition.

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## Research Grants

- June 2011-September 2011 **Advisor**, *Rannis Student Innovation Fund (Nýsköpunarsjóður námsmanna)*, Menntavegur 1, Reykjavik 101, Iceland.  
Grant: "CNC foam-cutter for micro air vehicle wings" for student research salary during summer. Advised software and mechanical undergraduates in the design and construction of a high-precision, low-cost computer-controlled (CNC) hot-wire foam cutter for the prototyping of small-scale foam-composite aircraft wings. Materials funded from RANNIS "Flapping-wing Unmanned Air Vehicle".

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## Experience

- January 2010-Current **Specialist**, *Reykjavik University*, Menntavegur 1, Reykjavik 101, Iceland.  
Research into simplified robotics infrastructure to solve sensing problems and improve rapid prototyping capabilities. Also developing cross-discipline programs and classes with Iceland Academy of the Arts (LHÍ)
- June 2011-September 2011 **Consultant**, *3Z ehf.*, Menntavegur 1, Reykjavik 101, Iceland.  
Designed and implemented prototype zebrafish embryo dispensing robot for pharmacology and toxicity studies.
- September 2010-March 2011 **Consultant**, *Brass Drift, Inc.*, Emeryville, CA.  
Designed custom low-cost flexure locking mechanism for an electronic security box.
- September 2010-January 2011 **Consultant**, *MIT Biomimetic Robotics Lab*, Cambridge, MA USA & Reykjavik, Iceland.  
Finite element analysis of advanced structural composites used to develop a high speed quadruped robot for Professor Sangbae Kim.
- November 2007-August 2010 **Senior Research Scientist**, *iRobot G & I Research*, Bedford, MA.  
Designing new robotics concepts and mechanisms in the DARPA ChemBots program. iRobot research & development in government and industrial applications/proposals.
- November 2006-November 2007 **PostDoctoral Research Associate**, *MIT*, Cambridge, MA.  
"Energy Efficiency in Manufacturing" Investigated energy usage in the manufacturing industries and created wind turbine reliability simulator.
- January 2004-March 2004 **Web software engineer**, *SigMantra LLC*, Bedford, MA.  
Developed social-media website "Uffinity" for connecting recently graduated young-professionals to others offering employment.

- May 2000 - **Magic Mechanic**, *Emode, Inc.*, Cambridge, MA.  
 September 2000 Developed world's largest fully-indexed quote database. Developed and installed network security policies and equipment
- May 1997 - **Mechanical Design Engineer**, *Brute Force Games*, Cambridge, MA.  
 September 1997 Designed full immersion game simulator platform leveraging vection research.
- September 1996 **Network Programmer**, *MIT Network Operations*, Cambridge, MA.  
 - September 1999 Security operations and emergency paging system development.
- July **Network Administrator**, *Brooks Automation*, Lowell, MA.  
 1994-September 1994 Installation and configuration of network infrastructure, development of automated FAX document server.
- July **Intern**, *Solar Cell Lab, University of Massachusetts, Lowell*, Lowell, MA.  
 1993-September 1993 Programming of HPGLB-based electrical analyzer for solar cell efficiency

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## Pending, Unpublished, and Project Works, available upon request

### Manufacturing

- 2011 **Bio-tensegrity: A New Design Paradigm for Hyperdynamic Legged Robots**, *A. Ananthanarayanan, J. Foley, and S. Kim.*
- 2000 **System Analysis and Design of the Insight M3/M5 Tactical Illuminator**, *Vince E. Carballo, Miguel A. Chavez, Joe Foley.*
- 1998 **Cambridge Heart**, *Joe Foley, Marc Lebovitz, Ranjini Srikantiah, Victor Su.*
- 1998 **Low-Cost Pine Car Derby Timing System**, *Joe Foley*, Advanced Undergraduate Project, Advisor: Professor Alex Slocum.

### Design

- 2001 **Wireless Friends: Company Business Plan**, *Sofy Tarud, Joe Foley, Oscar Lopez, Omri Pedatzur.*
- 2001 **Automotive Diagnosis Assistant**, *Joe Foley, Ariel Segall.*
- 1999 **Kraken: Distributed Cooperative Web Caching**, *Joe Foley, Amy Vandiver, Ben Vandiver.*
- 1998 **Evolved PacMan: Genetic Algorithm for Design of Control Systems**, *Joe Foley & Mike Phillips.*
- 1996 **An Ad-Hoc FPGA - Xilinx Type**, *Joe Foley & Mark Roh.*
- 1996 **A Partly Read-Only, Portable Web Site**, *Joe Foley.*

### Security

- 2006 **ONS Deployment and Visibility Challenges**, *Dan Engles and Joe Foley.*
- 2004 **Flingetty: Secure Multiparty Computation for a Dating Match-Up System**, *Natan Cliffer, Joe Foley, Hongyi Hu.*
- 2003 **KLite: A RFID Tag Anti-Counterfeit System**, *Joe Foley.*
- 2003 **EPC Reductionism**, *Joe Foley.*
- 1996 **WhoRU: Anonymous Encrypted Remailer**, *Daniel Derksen, Joe Foley, Matthew Rimer.*

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## Languages

English **Native**

Spanish **Novice**  
Chinese **Novice**  
Icelandic **Elementary**

*High School education, 1990-1994*  
*MIT 2005*  
*Taking classes at University of Reykjavík*

## Skills

programming	JAVA, C/C++	scripting	PHP, Shell, python, perl
scientific	Matlab, Maple	Modeling	ProEngineer, SolidWorks
simulation	ABAQUS, CFDesigner	typography	L <sup>A</sup> T <sub>E</sub> X, PostScript
control	Arduino/Atmega, PIC	Rapid prototyping	FDM, Laser templates, silicone molding
OS	Linux, UNIX, Windows, OSX	administration	Apache, DNS, ONS
web design	PostNuke, Turbogears	database	MySQL, PostgreSQL