Richard A. Coogle

CONTACT INFORMATION

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RESEARCH INTERESTS

Target tracking, electronic warfare, field robotics, behavior-based robotics, and task assignment algorithms.

EDUCATION

Georgia Institute of Technology, Atlanta, GA USA

Ph.D., Electrical and Computer Engineering (graduation date: December 2014)

- Thesis Topic: *Using Multiple Agents In Uncertainty Minimization of Ablating Target Sources*
- Thesis Proposal: *Uncertainty in Robotic Goal Seeking for Environmental Monitoring Applications*
- Advisor: Professor Ayanna M. Howard
- Area of Study: Robotics

M.S.E.C.E., Electrical and Computer Engineering, May 2009

B.S., Computer Engineering, May 2003

- *Magna cum Laude*, With Honors in Engineering
- Emphasis on Embedded Systems

AWARDS

Robotis

- DARwIn-OP Humanoid Application Challenge at ICRA, First place, 2013

ACADEMIC EXPERIENCE

Georgia Institute of Technology, Atlanta, GA USA

Graduate Student **January 2006 to December 2014**

Includes M.S. and Ph.D. research and course work.

Undergraduate Teaching Assistant **May 2002 to August 2002**

- Lab Teaching Assistant for ECE 2021: Digital Design Lab
  - Summer 2002 (one section)
  - Assisted students with laboratory assignments, where sophomore undergraduate students learn the basics of designing digital circuits using discrete components and hardware description languages, as well as using laboratory equipment such as logic analyzers.

Undergraduate Student **August 1999 to May 2003**

Conference Publications

Coogle, R.A.; Howard, A.M., "Robotic Resource Allocation for the Observation of Ablating Target Sources," *Proceedings of the 2014 Conference on Systems, Man, and Cybernetics*, vol. 1, pp. 1660-1665, October 2014.

Park, H.W.; **Coogle, R.A.**; Howard, A.M., "Using a Shared Tablet Workspace for Interactive Demonstrations during Human-Robot Learning Scenarios," *2014 International Conference on Robotics and Automation*, vol. 1., pp. 1-8, IEEE, June 2014.

Coogle, R.A.; Howard, A.M., "A multiagent robotic system for in-situ modeling and observation of icebergs," *2013 American Geophysical Union Fall Meeting.* December 2013. Presentation abstract.

Coogle, R.A.; Howard, A.M., "The iceberg observation problem: using multiple agents to monitor and observe ablating target sources," *2013 Conference on Systems, Man, and Cybernetics*, pp. 1-6, 13-16 October 2013.

Parker, L.T.; **Coogle, R.A.**; and Howard, A. M., "Estimation-informed, resource-aware robot navigation for environmental monitoring applications," *2013 International Conference on Robotics and Automation*, vol. 1, pp. 1033-1038, IEEE, May 2013.

Coogle, R.A.; Smith, L.D.; Blair, W.D., "Mitigating the bias in converted bistatic radar measurements using the unscented transform," *2013 IEEE Aerospace Conference*, pp. 1-7, 2-9 March 2013

Coogle, R.A.; Smith, L.D.; Blair, W.D., "Debiased coordinate conversion of bistatic radar measurements," *2012 IEEE Radar Conference (RADAR)*, pp. 0383-0388, 7-11 May 2012.

Coogle, R.A.; Glass, J.D.; Smith, L.D.; Blair, W.D., "Tracking with MIMO radar: A baseline solution," *2012 IEEE Aerospace Conference*, pp. 1-9, 3-10 March 2012.

Coogle, R.A., "Tracking with MIMO radar: A baseline solution," *Proceedings of the 2011 ONR Workshop on Target Tracking.* June 2011. Presentation abstract.

Coogle, R.A.; Glass, J.D.; Smith, L.D.; Miceli, P.; Register, A.; West, P.; Blair, W.D., "A MIMO radar benchmarking environment," *2011 IEEE Aerospace Conference*, pp. 1-10, 5-12 March 2011.

Coogle, R.A.; West, P., "MIMO Radar Benchmark: Performance Metrics," *Proceedings of the 2010 ONR Workshop on MIMO Radar.* May 2010. Presentation abstract.

Professional Experience

Georgia Tech Research Institute, Atlanta, Georgia USA

Senior Research Engineer **January 2010 to Present**

- As GRA: Investigator for the MIMO Radar Benchmark; a MATLAB simulation for evaluating the use of multiple-input/multiple-output (MIMO) radar techniques. Primary work involves the development of performance metrics to determine radar resource utilization.
- Developed C versions of algorithms used for electronic warfare.
- Led analysis and modeling effort for electronic warfare techniques and algorithms.
- Conducted research into the nature of the biases resulting from converted measurements in bistatic radar.
- Investigator for an IR&D effort (HUNT4EW) to determine the feasibility and practicality of using electronic warfare on unmanned aerial vehicles (UAVs). Primary duty was developing the sensor models used in the simulation.
- Worked on anchoring the Ballistic Missile Defense (BMD) Benchmark's sensor utilization to real radar data.

- Developed user interfaces for simulation scenario planning.
- Investigator for the Multihypothesis Emitter Identification and Tracker (MHEIDT); a multihypothesis tracker (MHT) for performing emitter identification.
- Developer for the Triangulating MHT (TRIAM), an MHT that integrates several sensor sources, in particular, angle-only radar measurements.
- Integrated the TRIAM with GTRI's UAV autonomy stack, as part of the Low-Cost Cruise Missile (LCCM) Joint Capability Technology Demonstration (JCTD). In this role, it accepted direction finding (DF) measurements to triangulate ground emitters.
- Developed several radar sensor models for the NAVAIR Benchmark, as well as developing new functionality that extended the existing software.
- Currently leading a NAVAIR Benchmark effort for modeling radar sensors as part of the Advanced Anti-Radiation Guided Missile -Extended Range (AARGM-ER) program.
- Integrated an infrared search-and-track (IRST) capability into the Fortran 95 version of the TRIAM.

Northrop Grumman Technical Services, Warner Robins, Georgia USA

Software Engineer III **February 2005 to January 2010**

- Task lead for the SOF EISE DTS Automated Test development effort. Performed management duties as well as developed software for both Linux and for single-board computers, the latter specifically for driving Combat Talon II LRUs from a remote computer.
- Infrastructure developer for the EISE STAR Infrastructure (ESI) as part of the conversion of the SOF EISE software test laboratory at Robins Air Force Base to the DTS platform.
- Infrastructure developer for the porting of the Combat Talon II Special Operations Forces Extendable Integration and Simulation Environment (SOF EISE) to the DTS architecture.
- A primary investigator for the IR&D for the Dynamic Test Stand (DTS) infrastructure software, a simulation and LRU test platform.

Lockheed Martin Aeronautics, Warner Robins, Georgia USA

Embedded Software Engineer Asc. **December 2003 to February 2005**

- Developed software to interact with an embedded system (called DCT) used to pass MIL-STD-1553 data over an Ethernet connection.
- Developed a new Display Language (DILA) translator as a part of rehosting the MC-130P Combat Shadow OFPs to a new compiler.
- Developed software for a mock Control Display Unit (CDU) to be used in the MC-130E Combat Talon I Weapon System Trainer.
- Made various modifications to the AC-130H Gunship Part Task Trainer, including adding an AN/AAQ-26 FLIR simulation and a ballistics simulation.
- Developed an application interacting with an MS SQL Server containing the MC-130E Combat Talon I IDD data to generate database files for DDC's dataMARS application.

Southwest Research Institute Warner Robins, Georgia USA

Student Engineer **Summer 2000 & 2001**

- Developed an in-house tool using Visual Basic and MS Access for tracking database needs for prospective projects.
- Developed SQL queries and reports for the AIRCAT database, a tool for tracking maintenance of particular U.S. Air Force aircraft.

- Developed multi-platform open source file sharing solution.
- Performed testing of a tool that generated customized SQL queries for the AIR-CAT database.

Service

Editor for Student Research, IEEE Aerospace and Systems Society, Institute of Electrical and Electronics Engineers, 2011-2014

- Responsible for soliciting, reviewing, and editing "student highlights"; short articles for the AESS Systems Magazine describing student research and activities.

Reviewer, IEEE Aerospace and Systems Society, Institute of Electrical and Electronics Engineers, 2011-present

- Reviewer for regular articles for AESS Systems Magazine.
- Reviewer for regular articles for IEEE Transactions on Aerospace and Electronic Systems.

Technical Skills

Extensive hardware and software experience in all facets of electrical and computer engineering.

MATLAB experience: linear algebra, numerical methods, polynomials, statistics, visualization, full-scale simulation

Embedded Systems: Both software and hardware development for various microcontroller and microprocessor architectures. These include Microchip PIC, Atmel AVR, Parallax Basic Stamp, and embedded Motorola 68000 and Intel x86.

Programming: C, C++, OOP, Fortran 90+, Java, JavaScript, Perl, Visual Basic, bash shell scripting, GNU make, gcc toolchain, Visual Studio, SQL, DVCS (git), VCS (SVN).

Compilers and translation: Compiler theory; developed small compilers for special applications. Experience with lex, yacc/byacc, flex, and bison.

Networking and Communications: Experience writing networked applications using sockets and either TCP or UDP communications. Experience with MIL-STD-1553 and various inter-chip interfaces (SPI, I2C).

Web Development: HTML, CSS, and JavaScript experience.

Document Preparation Applications: TEX (LATEX, BIBTEX), most common productivity packages (for Windows and Linux platforms), Emacs.

Computer-Aided Design: Cadence OrCAD, PSPICE

Operating Systems: Microsoft Windows, various Linux distributions (Fedora, Redhat Enterprise, Ubuntu).

Avionics platforms: AC-130H Gunship, MC-130E Combat Talon I, MC-130H Combat Talon II, MC-130P Combat Shadow, and SCNS.

Mathematical Expertise

Analysis, Differential Equations, Linear Algebra, Numerical Methods.

Engineering Expertise

Control: Linear and Nonlinear Systems Theory, Feedback, Kalman filtering.

Communications and Signal Processing: Probability, Random Variables, Stochastic Processes, Estimation, Radar

Application Areas	Autonomous and Unmanned Vehicles, Modeling and simulation, Remote Sensing, Sensor Fusion, Target Tracking
References	Available upon request