

DEBORAH ELLEN GOSHORN

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Experience

2008 – Present Naval Postgraduate School

Monterey, CA

Faculty Research Associate, Modeling, Virtual Environments and Simulation (MOVES) Institute

Research in Systems Engineering Department

- **Chief Engineer** for “Watchman” Smart Environment (Smart Camera Network, Camera/Microphone/Speaker Kiosk, external (wireless IP) and internal (blue-tooth) robots and tethered blimps) for Human Behavior Classification (Abnormal/Normal behavior detection, Automatic student mustering, Smart human computer interaction for enabling smart environments) In addition, engineering network security for both fixed camera sensor network as well as the mobile wireless sensor network (on robots).
- Behavior analysis for intrusion detection/prevention systems for network security in sensor networks.

Research in Modeling, Virtual Environments and Simulation (MOVES) Institute

- Researching and implementing US Marine Posture recognition algorithms
- Researching and implementing syntactical modeling for posture recognition error recovery

Teaching Experience at NPS

- Co-Instructor** – Capabilities Engineering (Distance Learning), SE3250 Summer 2009
- Co-Instructor** – Fundamentals of Systems Engineering, SE3100 Spring 2009
- Tutoring** - Statistics for (1) Capabilities Engineering (2) Fundamentals of SE Summer & Spring 2009
- Co-Instructor** – Artificial Intelligence Systems Engineering II Winter 2009
- Co-Instructor** – Artificial Intelligence Systems Engineering I Fall 2008

Thesis Advising Experience at NPS

- Co-Advisor** – LCDR David Schaeffer, Systems Engineering - *A Systems Engineering Survey of Artificial Intelligence and Smart Sensor Networks in a Network-Centric Systems Environment*
- Co-Advisor** – LT Phillip Stubblefield – *The Utilization of an Autonomous Mustering and Pier Monitoring System will enhance Situational Awareness and Pier Security for the USS FREEDOM (LCS) class of ships*
- Other advising** – LCDR Clay Davis – with automating models & costs for abnormal & normal human behaviors
 - LT Jason Dunnahoo – with push/pull autonomous robots & mobile devices in smart environments
 - LT Michael Tozzi – with push/pull autonomous robots and blimps for abnormal behavior detections

2008 – Present Monterey Peninsula College

Monterey, CA

Adjunct Faculty - Math Department, Physical Science Division

- Instructor** – Beginning Algebra, Math 261 Fall 2009
- Instructor** – Elementary Statistics, Math 16 Spring 2009, Fall 2009
- Instructor** – Elementary Statistics, at Marina Education Center, Math 16 Spring 2009
- Instructor (Part-time)** – Introduction to MATLAB, ENGR 17 Spring 2009
- Instructor (Part-time)** – Introduction to C++, CSIS 10A Spring 2009

2004 – 2008 Space and Naval Warfare (SPAWAR) Systems Center, San Diego

San Diego, CA

2007-2008 **Computer Scientist** (Navy Civilian at SPAWAR)

- Implementing computer vision techniques for US Marine detection and posture recognition.

2004-2006 **Engineer & Data Analyst** (Contractor to SPAWAR via SDSU Research Foundation)

- Created Bayesian models for decision making process between analysts for Person of National Interest (PONI) hunt
- Geospatial vote consensus modeling for region of interests based on probabilistic votes
- Engineer on DSP rapid prototyping system to enhance Naval communications.
- Researching novel statistical methods for serially correlated time series data
- Assistant coordinator for Science & Engineering Apprenticeship Program (SEAP) &
- Assistant coordinator for Naval Research Enterprise Intern Program (NREIP)
- Lecturer in Pattern Analysis Seminar at SPAWAR Systems Center, SD - 2006
- Issued secret security clearance – November 2005

2004 **Naval Research Enterprise Intern Program (NREIP)** (Intern at SPAWAR)

- Engineer on DSP rapid prototyping system to enhance Naval communications.
- Created GUI automating DSP rapid prototyping system. Gave high-level demonstrations (including PEO C4I, PMW 770 & PMW 180, ONR 313, and various technical groups).
- Presented poster/research results at the *2004 Naval-Industry R&D Partnership Conference*

2006 – 2007 University of California, San Diego

La Jolla, CA

Teaching Assistant - (Upper Division) Computer Science Computational Statistics, Winter 2007

Teaching Assistant – Differential Equations (lecture and lab) Fall 2006 and Winter 2007

EDUCATION

Ph.D.*, Computer Science, (in process) University of California, San Diego (UCSD), La Jolla, CA 2009/10
The Systems Engineering of a Secure Net-Centric Distributed Intelligent System of Systems for Human Behavior Classifications * PhD Dissertation Outline Attached

C.Phil., Computer Science, UCSD, La Jolla, CA Spring 2009
Enhancing Low-Level Classifiers Including Parts-based Object Recognition Classifiers on Field Programmable Gate Arrays (FPGAs) for AI Systems Engineering

M.S., Statistics UCSD, La Jolla, CA Fall 2007

M.Eng., Electrical and Computer Engineering, UCSD, La Jolla, CA June 2006
(Digital Signal Processing & Communications)

B.S., Computer Engineering, UCSD, La Jolla, CA, June 2004
B.A., Applied Mathematics

HONORS/SCHOLARSHIPS

- 2007 - Invitation for Visiting Researcher at Stanford University, Electrical Engineering (Wireless Sensor Network Lab, Environment Discovery/Behavior Analysis)
- 2006 – 2010 Science, Mathematics and Research for Transformation (SMART) scholarship recipient (for M.S. in Statistics and Ph.D. in Computer Science)
- 2005 – 2006 Passed all qualifying exams for the Ph.D. program at UCSD Department of Mathematics: Statistics (Ph.D. level), Applied Algebra (Ph.D. level), Complex Analysis (Qual level)
- 2005 – 2006 Science, Mathematics and Research for Transformation (SMART) scholarship recipient (for M.Eng. in Electrical and Computer Engineering)
- Tau Beta Pi Engineering Honor Society member since 2002

PUBLICATIONS (CHRONOLOGICALLY ORDERED)

- Juan Wachs, Mathias Kolsch, Deborah Goshorn *Human Posture Detection for Intelligent Vehicles* Journal of real-time image processing - Special Issue on Real-Time Vision-Based Motion Analysis and Intelligent Transportation Systems, Springer 2009 (submitted)
- Deborah Goshorn, Rachel Goshorn, Joshua Goshorn, Lawrence Goshorn. *Abnormal Behavior Classification and Alerting through Detection, Identification, Prediction, and Reaction (DIPR) System Applied to a Multi-Camera Network*. Workshop on Behavior Monitoring and Interpretation: Moving Objects in a Three Dimensional World, 3D GeoInfo, Ghent, Belgium. November 2009
- Deborah Goshorn, Juan Wachs, Mathias Kolsch *The Multi-level Learning and Classification of Multi-class Parts-based Representations of U.S. Marine Postures*. Iberoamerican Congress on Pattern Recognition (CIARP2009) Mexico
- Deborah Goshorn, Junguk Cho, Mathias Kolsch, Rachel Goshorn, Ryan Kastner *Multiview Posture Recognition on FPGAs for Enabling Smart Homes* International Conference on Distributed Smart Cameras (ICDSC-09) Como, Italy, Aug/Sep 2009 (submitted)
- Joshua Goshorn, Deborah Goshorn Rachel Goshorn, Lawrence Goshorn, *Embedded Architecture Model for Intelligent Sensor Network with Applications to Vision Utilizing Multi-Core DSP Platforms*. International Conference on Distributed Smart Cameras (ICDSC-09) Como, Italy, Aug/Sep 2009 (submitted)
- Juan Wachs, Deborah Goshorn, Mathias Kolsch. *Recognizing Human Postures and Poses in Monocular Still Images*. International Conference on Image Processing, Computer Vision, and Signal Processing. (IPCV09) Las Vegas, Nevada. July 2009
- Bridget Benson, Junguk Cho, Deborah Goshorn, Ryan Kastner. *Field Programmable Gate Array (FPGA) Based Fish Detection Using Haar Classifiers*. American Association of Underwater Sciences symposium. March 2009.
- Deborah Goshorn, *The Enhancement of Low-Level Classifications in Sequential Syntactic High-Level Classifiers* Computer Science PhD Research Exam, UCSD. August 2008
- Rachel E. Goshorn, Deborah E. Goshorn, Joshua L. Goshorn, Lawrence A. Goshorn *Behavior Modeling for Detection, Identification, Prediction, and Reaction (DIPR) in AI Systems Solutions* for Journal on Ambient Intelligence and Smart Environments (JAISE) (Springer Handbook) ISSN:1876-1364
- Rachel Goshorn, Deborah Goshorn, Joshua Goshorn, Lawrence Goshorn *Abnormal Behavior-Detection Using Sequential Syntactical Classification in a Network of Clustered Cameras*. 2nd ACM/IEEE International Conference on Distributed Smart Cameras (ICDSC-08) Stanford University, California. September 2008.
- Rachel Goshorn, Deborah Goshorn, Mathias Kolsch. *The Enhancement of Low-Level Classifications for Ambient Assisted Living*. 2nd Workshop on Behavior Monitoring and Interpretation, BMI'08, collocated with German Conference on Artificial Intelligence, Kaiserslautern, Germany. September 2008.
 - Rachel Goshorn, Deborah Goshorn, *Vision-Based Syntactical Classification of Hand Gestures to Enable Robust Human Computer Interaction*, 3rd Workshop on "Artificial Intelligence Technologies for Ambient Intelligence" (AITAmI'08), collocated with the 18th European Conference on Artificial Intelligence (ECAI'08) Patras, Greece. August 2008.

- Deborah Goshorn *Learning the Time-Delay Manifold for Robust Speaker Localization*. International Conference on Applications in Nonlinear Dynamics (ICAND'07) Poipu Beach, Koloa (Kauai) (poster presentation) September 2007.
- Evan Ettinger, Shankar Shivappa, Deborah Goshorn, Yoav Freund, *Learning the Time-Delay Manifold for Robust Speaker Localization*. Twenty-First Annual Conference on Neural Information Processing Systems (NIPS 2007) (demo) and Technical Report, UCSD 2007
- Rachel Goshorn, Joshua Goshorn, Deborah Goshorn, Hamid Aghajan, *Architecture for Clusterbased Automated Surveillance Networks for Detecting and Tracking Multiple Persons*, 1st ACM/IEEE International Conference on Distributed Smart Cameras (ICDSC-07) Vienna, Austria. September 2007.
- Rachel Goshorn, Deborah Goshorn *Using a TI C6701 DSP Rapid Prototyping System for Nonlinear Adaptive Filtering to Mitigate Interference*. Device Applications of NonLinear Dynamics (DANOLD) Conference, Catania, Italy. 2-6 October 2005.
- Deborah Goshorn, *Mitigation of Narrowband Interference in UHF Satellite Communications using DSP Rapid Prototype*. Naval-Industry R&D Partnership Conference, Washington DC, August 2004. (poster session)

GRADUATE COURSEWORK

MS-Electrical and Computer Engineering – GRADUATE COURSEWORK

- ECE 161B-Digital Signal Processing
- ECE 251AN-Digital Signal Processing I
- ECE 251BN-Digital Signal Processing II
- ECE 251CN-Filter Banks and Wavelets
- ECE 171A-Linear Control System Theory
- ECE 250-Random Processes
- ECE 256A-Time Series Analysis & Application I
- ECE 275A-Parameter Estimation I
- ECE 275B-Parameter Estimation II
- ECE 271A-Statistical Learning (audit)

MS-Statistics-Mathematics – GRADUATE COURSEWORK

- MATH 281A- Mathematical Statistics I (Classical Parametric Statistics)
- MATH 281B-Mathematical Statistics II (Bayesian Statistics)
- MATH 281C-Mathematical Statistics III (Non-parametric Statistics)
- MATH 282A-Applied Statistics I
- MATH 282B-Applied Statistics II
- MATH 285-Stochastic Processes
- MATH 220A-Complex Analysis I
- MATH 220B-Complex Analysis II
- MATH 220C-Complex Analysis III
- MATH 202B-Applied Algebra I
- MATH 202B2C-Applied Algebra II
- MATH 280A-Probability Theory (audit)
- MATH 181E-Time Series for Financial Data

PhD-Computer Science and Engineering – GRADUATE COURSEWORK

- CSE 200 – Algorithms and Analysis
- CSE 202 – Computability and Complexity
- CSE 221 – Operating Systems
- CSE 240A- Computer Architectures
- CSE 252A – Computer Vision I
- CSE 252C – Computer Vision III
- CSE 290 – Active Learning Seminar
- CSE 291 – Machine Learning
- CSE 291 – Adaptive Signal Processing
- CSE/LIGN 256 – Statistical Natural Language Processing
- CS 4920 – Statistical Pattern Recognition and Computer Vision (Naval Postgraduate School, Monterey)

ADDITIONAL (CURRENT) GRADUATE COURSEWORK at SANS INSTITUTE

- SEC 301: Intro to Information Security (in process)
- SEC 440: 20 Critical Security Controls: Planning, Implementing, and Auditing (in process)
- SEC 558: Network Forensics (in process)
- SEC 502: Perimeter Protection In-Depth (in process)
- SEC 503: Intrusion Detection In-Depth (in process)
- SEC 617: Wireless Ethical Hacking, Penetration Testing, and Defenses (in process)

UPPER-DIVISION UNDERGRADUATE COURSEWORK

BS Computer Engineering-Electrical and Computer Engineering – UNDERGRADUATE COURSEWORK

- ECE 101-Linear Systems Fundamentals
- ECE 102-Introduction to Active Circuit Design
- ECE 107-Electromagnetism
- ECE 108-Digital Circuits
- ECE 109-Engineering Probability & Statistics
- ECE 111-Advanced Digital Design Project – *Implemented the Rijndael cipher (encryption/decryption) in Verilog*
- ECE 153-Probability & Random Processes
- ECE 154A-Communication Systems I (Analog Communications)
- ECE 154B-Communication Systems II (Digital Communications)
- ECE 154C-Communication Systems III (Information Theory)
- ECE 161A-Introduction to Digital Signal Processing
- ECE 171B-Linear Control System Theory (Multiple Output-Multiple Input)
- ECE 172A-Intro to Intelligent Systems – Vision & Machine Intelligence
- ECE 174-Introduction to Linear & Nonlinear Optimization

BS Computer Engineering-Computer Science & Engineering – UNDERGRADUATE COURSEWORK

- CSE 105-Introduction to Theory of Computation
- CSE 101-Design & Analysis of Algorithms
- CSE 100-Advanced Data Structures
- CSE 140-Component & Design of Technical/Digital Systems
- CSE 140L-Digital Systems Lab
- CSE 141-Introduction to Computer Architecture
- CSE 141L-Project in Computer Architecture (Lab)
- CSE 120-Principles of Computer Operating Systems
- CSE 131A-Compiler Construction I
- CSE 131B-Compiler Construction II

BA-Applied Mathematics – UNDERGRADUATE COURSEWORK

- MATH 109-Mathematical Reasoning
- MATH 120A-Elements of Complex Analysis
- MATH 120B-Applied Complex Analysis
- MATH 110-Introduction to Partial Differential Equations
- MATH 183-Statistical Methods
- MATH 142A-Advanced Calculus I
- MATH 142B-Advanced Calculus II
- MATH 170A-Numerical Linear Algebra
- MATH 170B-Numerical Analysis
- MATH 173-Mathematics Software-Scientific

**The Systems Engineering of a Secure Network-Centric Distributed Intelligent
System of Systems for Human Behavior Classifications**
(Outline-August 2009)

Chapter 1 - PhD Dissertation Overview

Part 1 - Fundamental Technologies

Chapter 2 - Systems Engineering (SE) for System of Systems (SoS)

Chapter 3 - Detect-Identify-Predict-React (DIPR) Behavior Model Overview

Part 2 - Modeling Behavior Classifications as DIPR Applications

Chapter 4 - Abnormal/Normal Behavior Classification using DIPR Modeling

Chapter 5 - Automatic Human Personnel Mustering using DIPR Modeling

Chapter 6 - Human Computer Interaction Behaviors using DIPR Modeling

Chapter 7 - Network Intrusion Detection and Prevention Behaviors using DIPR Modeling

Part 3 - Building a Secure Network-Centric Smart Environment

Chapter 8 – Building a Smart Camera Network

Chapter 9 – Building an Executive Interface with Push/Pull Capabilities

Chapter 10 – Building a Human Computer Interactive Kiosk System

Chapter 11 – Building a Mobile Wireless Sensor Network with Robots

Chapter 12 – Building a Secure Network Perimeter

Part 4 - My Researched Developed Supporting Technologies

Chapter 13 - Low Level Classifiers for Detect

Chapter 14 - High Level Classifiers for Identify and Predict

Chapter 15 - Theory of Enhancing Low Level Classifiers using High Level Classifiers

Chapter 16 - Learning in DIPR Modeling

Chapter 17 - Future Work

Appendix

ADDITIONAL UCSD GRADUATE SCHOOL WORK (NOT INCLUDED IN DISSERTATION)

Machine Learning

- Manifold learning for high-dimensional data applied to microphone arrays for audio-based person location
- Natural language processing with part-of-speech taggers for Penn Treebank Wall Street Journal part-of-speech corpus
- Advanced neural network implementation for branch prediction in computer architectures
- Clustering methods using Normalized-Cuts algorithm, k-means, locality-sensitive hashing (LSH was only researched, not implemented), random projection trees

Computer Vision

- Handwritten digit recognition using various distance-metrics/shape context features/kernel-PCA; color histogram-based object recognition; prostate cancer detection in microarray tissue images
- Projecting images from multi-view cameras into one standard image, and more geometrical applications

Signal Processing

- Recovering single speaker audio from multiple speakers in background recording, statistical signal processing, GPS/satellite applications.

Probability and Statistics

- Non-parametric/semi-parametric/parametric/Bayesian/Classical statistical modeling, feature selection techniques, Time series analysis for financial data forecasting and much more, like theoretical statistical proofs.

Mathematics

- Representation theory for high-dimensional data representation, complex analysis for integration techniques, and more, as described in mathematics graduate coursework.

PROGRAMMING LANGUAGES

- C*, C++*, JAVA*, Fortran
- MATLAB*, MATLAB/Simulink*/Real-Time Workshop to Rapid Prototyping Board*,
- R, S-Plus*, MiniTab*
- Maple, Mathematica
- ExtendSim*, Core
- Visual Basic, PASCAL
- XQUERY, XML, HTML*
- VeriLog, PSPICE, Xilinx, LogicWorks, Assembly Code
- LaTeX*

* most experienced programming languages (yet)

FOREIGN LANGUAGES

- Spanish (Limited working proficiency)
- French (Elementary proficiency)
- Italian (Near Elementary proficiency)
- Love to learn languages, and desire to complete proficiency in aforementioned languages and others

PERSONAL ACTIVITIES

- Spending time with family, movies, riding my Ducati motorcycle on both the racetrack and the road, cross-country running, basketball, hiking, boating, ballet, singing, painting, taking dogs to the beach with family