

# DEBORAH ELLEN GOSHORN

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## Experience

### 2010 – Present Naval Postgraduate School

- **Faculty Research Assistant Professor**, Department of Information Sciences **Monterey, CA**
- **Chief Engineer** for “RapidPro VIRT”, sensor integration & situation interpretation for deployed persistent ISR for the USMC.
- **2008 – 2010 - Faculty Research Associate**, Modeling, Virtual Environments and Simulation (MOVES) Institute
  - Researching and implementing US Marine Posture recognition algorithms

### 2008 – 2010 UCSD CSE Ph.D. Research

**Monterey/San Diego, CA**

- **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 cybersecurity in sensor networks.
- 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*, JUNE 2009
- 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*, MARCH 2010
- Co-Advisor** – CDR Cleo (Clay) Davis – *The Systems Engineering in Enhancing Maritime Domain Awareness Utilizing a Maritime Smart Sensor Network*, JUNE 2010
- Other advising** – 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 Spring, 2010, Fall 2009
- Instructor** – Elementary Statistics, Math 16 Spring 2009, Fall 2009
- Instructor** – Elementary Statistics, at Marina Education Center, Math 16 Spring, 2010, 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** University of California, San Diego (UCSD), La Jolla, CA Spring 2010  
The Systems Engineering of a Net-Centric Distributed Intelligent System of Systems for Robust 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)

- Deborah Goshorn *The Systems Engineering of a Network-Centric Distributed Intelligent System of Systems for Robust Human Behavior Classifications*. PhD Dissertation. University of California, San Diego, 2010
- Deborah Goshorn, Shahnam Mirzaei, Junguk Cho, Ryan Kastner. *Field Programmable Gate Array Implementation of Parts-based Object Detection for Real Time Video Applications* International Conference on Field Programmable Logic and Applications. (FPL'10) Milano, Italy, Aug. 31st - Sep. 2nd, 2010
- Deborah Goshorn, Rachel Goshorn. *Cybersecurity in a Smart Environment Network-Centric System of Systems* The Corporation for Education Network Initiatives in California (CENIC) 14th annual conference, FULL SPEED AHEAD, March 2020.
- Deborah Goshorn, Rachel Goshorn *Cybersecurity in a Smart Environment Network-Centric System of Systems* CyberSecurity Workshop, Cyber Summit, Naval Postgraduate School October 2009
- 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
- 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*. 3rd Workshop on Behavior Monitoring and Interpretation, BMI'09, collocated with German Conference on Artificial Intelligence, Kaiserslautern, Germany. September 2008.
- 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* TR. August 2009
- 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*. 2<sup>nd</sup> 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*, 3<sup>rd</sup> 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) 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*, 1<sup>st</sup> 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.

# **The Systems Engineering of a Network-Centric Distributed Intelligent System of Systems for Robust Human Behavior Classifications**

Chapter 1 - PhD Dissertation Overview

## **Part 1 - Fundamental Technologies**

Chapter 2 - The Systems Engineering of Implemented System of Systems

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

## **Part 2 - Modeling Behavior Classifications with DIPR Application Models**

Chapter 4 - Abnormal/Normal Behavior Classification-I using DIPR Modeling

Chapter 5 - Automatic Personnel Mustering using DIPR Modeling

Chapter 6 - Human Computer Interaction and Ambient Intelligent Control using DIPR Modeling

Chapter 7 - Abnormal/Normal Behavior Classification-II using DIPR Modeling

## **Part 3 - Providing the Network-Centric Intelligent System of Systems Infrastructure**

Chapter 8 – Providing the Fixed Camera System Infrastructure

Chapter 9 – Providing the Command and Control System Infrastructure

Chapter 10 – Providing the Kiosk System Infrastructure

## **Part 4 - Researched Developed Technologies**

Chapter 11 - Low Level Classifiers for Detect

Chapter 12 - High Level Classifiers for Behavior Classifications

Chapter 13 - Theory of Enhancing Low Level Classifiers with High Level Classifiers

Chapter 14 - Learning in Detect, Identify, Predict, React Modeling

Chapter 15 – Field Programmable Gate Array Implementation of Parts-based Object Detection for Real Time Video Applications

Chapter 16 – Conclusion and Future Work

## **ADDITIONAL UCSD GRADUATE RESEARCH**

### **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.

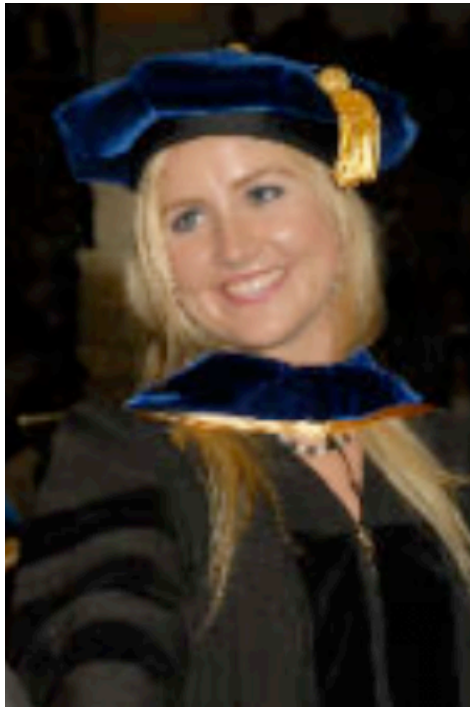
## **PROGRAMMING LANGUAGES**

- 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

## **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



#### UC SAN DIEGO PH.D. GRADUATION

#### 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.