JOHANNA HANSEN

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EDUCATION

McGill University, Montreal, QC *2016 – 2021*
Ph.D. in Computer Science in the *Mobile Robotics Lab*
Thesis work on *Model-Based Decision Making in Robotic Systems*
under the supervision of Dr. Gregory Dudek and Dr. Joelle Pineau

University of Texas at San Antonio, San Antonio, TX *2012 – 2015*
Graduate coursework (30 hours) in Electrical Engineering, *Digital Signal Processing*

Texas State University, San Marcos, TX *2007 – 2011*
B.S. in Electrical Engineering, *Networking and Communication*
Capstone Project on *Identifying Devices in the Power Grid by their Current Signatures*
B.S. Resource and Environmental Geography

Selected Coursework: Machine Learning, Reinforcement Learning, Robotics, Digital Signal Processing, Numerical Estimation, Communication Systems, Networking, Data Compression and Error Coding, Geographic Information Systems, Physical Geography, Environmental Resource Management

ACADEMIC PAPERS

Hansen, J., Manjanna, S., Quattrini, L. A., Rekleitis, I., Dudek, G., *Autonomous Marine Sampling Enhanced by Strategically Deployed Drifters in Marine Flow Fields*, MTS/IEEE OCEANS, 2018, *(Top 20 Student Submission)*.

Hansen, J., Dudek, G., *Coverage Optimization with Non-Actuated, Floating Mobile Sensors using Iterative Trajectory Planning in Marine Flow Fields*, IEEE International Conference on Intelligent Robots (IROS), 2018.

Hansen, J.*, Kastner, K.*, Courville, A., Dudek, G., *Planning in Dynamic Environments with Conditional Autoregressive Models*, International Conference on Machine Learning (ICML), workshop on Prediction and Generative Modeling in Reinforcement Learning, 2018.

Henderson P., Chang, W.D., Shkurti, F., **Hansen, J.**, Meger, D., Dudek G., *Benchmark Environments for Multitask Learning in Continuous Domains*, International Conference on Machine Learning (ICML), workshop on Lifelong Learning, 2018, https://arxiv.org/abs/1708.04352.

Manjanna, S., **Hansen, J.** , Quattrini, L. A., Rekleitis, I., Dudek, G., *Collaborative Sampling Using Heterogeneous Marine Robots Driven by Visual Cues*, Canadian Conference on Computer and Robot Vision (CRV), 2017.

Quattrini L. A., Rekleitis, I., Manjanna, S., Kakodkar, N., **Hansen, J.**, Dudek, G., Bobadilla, L., Anderson, J., and Smith, R., *Data Correlation and Comparison from Multiple Sensors over a Coral Reef with a Team of Heterogeneous Aquatic Robots*, International Symposium on Experimental Robotics (ISER), 2016.

Hansen, J., Fourie, D., Kinsey, J., Pontbriand, C., Ware, J., Farr, N., Kaiser, C., and Tivey, M., *Autonomous Acoustic-Aided Optical Localization for Data Transfer*, MTS/IEEE OCEANS, 2015.

Pontbriand, C., Farr, N., Fourie, D., **Hansen, J.**, Kinsey, J., Pelletier, J., and Ware, J., *Wireless Data Harvesting Using the AUV Sentry and WHOI Optical Modem*, MTS/IEEE OCEANS, 2015.

Hansen, J., Wilden, G., Abbott, B., and Green, R., *The Ultrasonic Culvert Inspection System (UCIS): A Low-Cost Device for Conduit Inspection*, 2014 Transportation Research Board 93rd Annual Meeting.

EXPERIENCE

NASA Jet Propulsion Lab (JPL) June 2019–Sept 2019
Research Intern, Mobility and Robotics Section *Pasadena, CA*

- Developed a lightweight model which learned to switch between terrain-relative and direct localization experts to facilitate autonomous rover sample tube collection for the Mars Sample Return Project.
- Built a specialized dataset resembling Mars deployment conditions for evaluating specific algorithmic failures

McGill University Jan 2016–current
Graduate Researcher, Mobile Robotics Lab *Montreal, QC*

- Research on model-based planning and reinforcement learning with generative models for mobile robots
- Collaborated with ecologists to facilitate automatic classification and modeling of zooplankton in Canadian lakes
- Research on strategic marine sampling with custom low-cost floating sensors and autonomous boats
- Built system for portable underwater localization using low-cost USBL/GPS components
- Developed technique for calculating total iceberg volume using images captured above the waterline and sonar reflections below water

Woods Hole Oceanographic Institution (WHOI) Jan 2014 – Sept 2015
Autonomous Underwater Vehicle Engineer, National Deep Submergence Facility *Woods Hole, MA*

- Software/Data/Electrical Engineer for deep-diving autonomous underwater vehicles (AUVs) working in research and ship-board operational environments.
- Assisted in all aspects of at-sea operations including deployments, hardware repair, and dive planning.
- Primary data scientist at-sea for geophysical, acoustic, and image processing.
- Developed automated spatio-temporal processing pipeline for high-resolution multibeam, sidescan sonar, and optical data maps.
- Assisted in overhaul of navigation (GPS/USBL/LBL/DR) processing and visualization.
- Developed user-interfaces (QT), vehicle control code (C++), data processing code (Python/Matlab), and device drivers primarily in Linux.

Southwest Research Institute (SwRI) Jan 2012 – Dec 2013
Engineer, Automation and Data Systems Division *San Antonio, TX*

- Software/Electrical Applied Research Engineer for research, commercial, and government clients.
- Primary end-to-end software engineer building a mapping sensor consisting of acoustic transducers, DSP, camera, and embedded computer with remote control and interpretation.
- Developed sampling, filtering, visualization scheme for live acoustic data.
- Wrote beamforming calibration routine to tune for errors in sensor fabrication.

Lower Colorado River Authority (LCRA) Jan 2011 – Dec 2011
Engineering Coop, Telecommunications Department *Austin, TX*

- Designed and configured SONET, optical fiber, Ethernet, and microwave systems for critical communication infrastructure including power generation/distribution, dam and irrigation control, and emergency response coordination.
- Project lead for pilot irrigation control system using networked 900 MHz Radios.

OCEANOGRAPHIC RESEARCH CRUISES

Studies of Evolution and Ecology of Petroleum Systems, Gulf of Mexico Jun 2015
R/V Atlantis, Chief Scientist: Dr. David Valentine

· Primary software/data processing engineer for Sentry AUV working with multibeam, sidescan, and sub-bottom pipeline data.

Mapping, Exploration, and Sampling at Havre Volcano, Southwestern Pacific Mar 2015
R/V Revelle, Chief Scientist: Dr. Adam Soule

· Primary software/data processing engineer for Sentry AUV in collaboration with Jason ROV. Developed sidescan and sub-bottom pipeline for processing sonar signal using MB-System.

Monitoring Recovery of Pacific Seamounts, Hawaiian Islands Oct 2014
R/V Sikuliaq, Chief Scientists: Dr. Amy Baco-Taylor and Dr. Brendon Roark

· Primary software/data engineer processing subsea navigation and images. Developed classifier for seafloor images for easier processing.

Juan de Fuca Ridge, Northeastern Pacific Jul 2014
R/V Atlantis, Chief Scientists: Dr. James Kinsey and Dr. Maurice Tivey

· Lead software engineer for AUV optical communication system integration. Developed acoustic/optical search algorithm for finding an optical modem on the seafloor. Also provided navigation/data processing and visualization for science.

Iron Eaters of the Loihi Seamount, Hawaiian Islands Jun 2014
R/V Falkor, Chief Scientist: Dr. Brian Glazer

· Primary software/data engineer working with subsea navigation, scientific sensors, and images. Developed thematic map of iron location in images for easy inspection and planning.

Deep Water Supercoral in Low pH Environments, Gulf of Mexico Apr 2014
R/V Atlantis, Chief Scientist: Dr. Erik Cordes

· Primary software/data engineer working with subsea navigation, scientific sensors, and images.

Mineral Exploration, Southeastern Pacific Jan 2014
R/V Ka'imikai-O-Kanoloa, Chief Scientist: Dr. Carl Kaiser

· Learned AUV deployment, mission planning, data processing, and networking. Developed new initiative for robust data management.

PROFESSIONAL ACTIVITIES

Technical Skills

· *Software*: scientific and machine learning Python (PyTorch, NumPy, scikit-learn, Pandas, OpenCV and more), C/C++, Matlab, Bash, ROS, GIS on Linux, OSX, Windows
· *Hardware*: embedded systems, localization systems, marine instrumentation and sensing
· *Data*: geospatial and time series data, image processing, sonar, navigation
· *Languages*: English (native), Spanish (basic), French (learning)

Presentations

· 2019: Tutorial on Model-Based Reinforcement Learning at AI4Good Workshop
· 2019: GRIL Invited Workshop Presentation on Robotic Sampling in Aquatic Environments
· 2017: NIPS WiML Workshop Poster Presentation on Distributed Sensors

· 2015: CapePy Python Meetup Tutorial: Introduction to Machine Learning with Scikit-learn
· 2015: SciPy 2015 Talk: Characterizing the Seafloor with Python as a Toolbox
· 2015: BRATS Talk: Standardizing Machine Learning Tasks with Scikit-learn

Workshops and Professional Development

· 2016-2019: Barbados Marine Field Trials
· 2017: MILA Deep Learning and Reinforcement Learning Summer School
· 2017: McGill Innovation's AI for Social Good Summer Lab
· 2017: National Canadian Field Robotics Symposium and Field Trials
· 2016: IEEE Marine Robotics Summer School
· 2016: National Canadian Field Robotics Symposium and Field Trials
· 2013: SciPy: Scikit-learn, Cython, Geospatial Tutorials and Tracks
· 2013: SwRI Professional Course in Proposal Writing
· 2013: SwRI Professional Course in Promoting Research and Development
· 2012: SwRI Professional Course in Technical Writing
· 2012: SwRI Professional Course in Project Management
· 2010: NAUI Master Scuba Diver, Diving for Science Certified

Leadership and Volunteer Work

· 2018: NIPS WiML Volunteer
· 2017: ICML Volunteer
· 2015: Scikit-learn developer sprint in Paris
· 2015: Neural Information Processing Systems (NIPS), Volunteer
· 2015: Founder and Technical Organizer of WHOI-Software Technical Group
· 2015: CapePy Python Meetup Leader and Member
· 2014: Big-data, Robotics, Autonomy, Technology and Sensing (BRATS) Member
· 2013: South-Central CleanTech Open Incubator Judge, San Antonio and Austin TX

Selected Awards

· 2017: WiML NIPS Travel Grant
· 2016: McGill GREAT Travel Award
· 2012: UTSA M.S. COE Valero Research Fellowship Offer
· 2013: Internal Research and Development Funding, Primary Investigator
· 2007: Terry Foundation Scholarship (Complete Undergraduate Funding)
· 2007: Dick Walrath Foundation Scholarship
· 2007: American Quarter Horse Association Scholarship

TEACHING EXPERIENCE

Texas State University Jan 2010–Dec 2010

· Signals and Systems Teaching Assistant
· Electronics Teaching Assistant
· Microprocessors Lab Assistant
· Engineering Management Teaching Assistant