Tyson Hilmer

Contact Information	Tyson Hilmer *N/A web version* *residing in* Germany	*N/A web version* tyson.hilmer@gmail.com **tysonhilmer.com**

Objective

Placement in a research position with emphasis on development and analysis of instrumentation.

Research Interests

Signal analysis, EM theory, digital signal processing, instrumentation R&D, physical theory.

Education

University of Hawaii at Manoa, Honolulu, Hawaii USA

M.S. Physical Oceanography **12/2010**

- Thesis Topic: *Radar Sensing of Ocean Wave Heights*
- Adviser: Professor Pierre Flament
- Area of Study: HF Oceanographic Radar; second-order interaction theory and algorithms
- Coursework: physical, geological, chemical, and biological oceanography, geophysical fluid dynamics, hydrodynamics, ocean waves, ordinary and partial differential equations, linear algebra, vector calculus, spectral analysis, numerical methods, statistics
- Cumulative GPA: 3.45

B.S. Global Environmental Science **12/2005**

- Graduated with High Honors
- Thesis Topic: *Measuring Breaking Wave Heights using Video*
- Adviser: Professor Mark Merrifield
- Designed and implemented oceanographic imaging system as part of PILOT experiment
- Coursework: physical oceanography, two years of calculus, physics, meteorology, modelling natural systems, earth system databases, biogeochemical systems, honors seminar.
- Cumulative GPA: 3.64

Awards and Honors

University of Hawaii

- Marine Science Undergraduate Research Fellowship 2003
- twice recipient of NOAA-Sea Grant Academic Scholarship 2004, 2005
- Dean's List; 4 semesters, 2004-2005
- Member of Phi Sigma and Tau Sigma Honor Societies

Hawaii Pacific University

- Dean's List; 4 semesters, 2002-2003

Research Experience

Radar Consultant, Radio Oceanography Laboratory **04/2012 to 04/2012**

- Collaborative effort between the University of the Philippines and the University of Hawaii. Assisted the United States Marines Experimentation Center in conducting an HF radar demonstration during the United States Republic of the Philipines Balikatan joint exercises in April 2012.
- Developed and implemented software for radar ship detection in realtime. Wrote

software to integrate targets and database into Google Earth. Provided training for local personnel in operation and data analysis.

Research Assistant, Radio Oceanography Laboratory 01/2008 to 02/2011

- Applied knowledge of electromagnetic scattering theory to develop updated algorithms for oceanographic radar. Improved interference rejection, calibration, and optimal time-domain filtering for parameter extraction. A main achievement was to adapt the beamforming algorithm for propagation of EM waves over complex terrain, showing that the ground-trapped EM wave follows terrain slope.
- Implemented and evaluated analog-to-digital conversion software for the prototype Least-Expensive-Radar (LERA), using hybrid cross-platform software. Demonstrated lossless direct-to-disk acquisition with realtime display and operational parameters.
- Updated processing software; including translation and documentation of large Fortran library. Implemented quality controls, and automated the processing chain.

Research Assistant, UH Sea Level Center 01/2006 to 12/2007

- Solely implemented an oceanographic imaging system for measurement of wave height and swash zone. Developed novel algorithms for delineation of wave height and swash line. Integrated data set with LIDAR bathymetry and ortho-rectification for analysis of coastal evolution. Created complete software system for setup, control, real-time display, web-based status logs and data products. Transisted hardware and software from analog CCTV to digital gigE, higher resolutions, and bandwidth. Wrote auto-exposure function, C++ acquisition driver. Deployed stations in Ipan, Guam and Waimea, Hawaii. Managed 3+ TB data set. The system continues to function under new management and multiple new stations.
- Designed and implemented complete recording system for Imagenex 881A class of imaging and profiling sonars. Adapted serial instruments to ethernet, and established real-time administration to Kilo-Nalu cabled observatory. Wrote software for complete setup, control, and real-time data and parameter display.
- Added additional variance data product to the Sea Level Center's satellite-linked stations. Programmed and tested BASIC code written for Sutron Xlite dataloggers.
- Wrote Matlab import and visualization package for Nortek Aquadopp Profilers (ADCP). Wrote import functions for Seabird pressure sensors, QuikSCAT satellite data, and CDIP buoy data.

Undergraduate Researcher 08/2003 to 12/2005

- Completed Scripps Institution of Oceanography, Marine Physical Laboratory Internship. Researched Langmuir circulation with emphasis on signal processing techniques for phased-array Doppler sonar.
- Completed UH-SOEST, Marine Science Research Fellowship. Researched nutrient concentrations and anthropogenic alteration of nutrient limitation within tropical streams.

Publications

Hilmer, T. *Radar Sensing of Ocean Wave Heights.* Master's thesis, University of Hawaii, Honolulu, HI, 2010.

Conference Publications

Hilmer, T. *Imaging of Wave Transformations at Ipan Reef.* In: Proceedings of the 2006 Ocean Sciences Meeting, February, 2006. Poster abstract.

Mathematical Expertise

Complex analysis, linear algebra, EM and ocean wave equations, spectral analysis (including MEM and directional spectra), FIR/IIR filtering, eigen analysis. HF beamforming (including MUSIC), waveforms, and modulation.

Technical Skills

Extensive hardware and software experience in digital signal processing, analog and digital electronics, networking, and information technology

MATLAB experience: linear algebra, spectral analysis, filtering, non-linear and linear regression, statistics, visualization. Primarily for analysis, processing, and instrument control. Linking external libraries and other low-level utilities.

Instrumentation: HF oceanographic radars, Nortek Aquadopp profilers (ADCP), Seabird pressure sensors, Datawell Waverider buoys, machine vision cameras, autonomous and remote data acquisition

Programming: Fluent in Matlab/Octave and UNIX shell scripting, conversational in C++, FORTRAN, BASIC, and HTML.

Computer Applications: LaTeX, most common productivity packages, many task-specific utilities, GIS using ESRI or alternatives; typically for experiment logistics and world registration, relative kinematic GPS post processing, and webpages/wikis for research group interaction

Operating Systems: current and proficient with Linux, OS X, and Windows

Field Work: Hundreds of hours of scientific field work. Deployment of nearshore underwater instrumentation using small and medium craft. Certified scientific diver (100', lead diver, Rescue, First-Aid, and Nitrox) with 40+ science dives in challenging conditions. Construction of multiple large, shore-based oceanographic radar stations with 100x meter antenna arrays in remote locations.

Practical Skills: electronics repair, auto mechanic, construction, and general tinkering

References

Available upon request