

KLAUS OKKELBERG

8488 Cherry Oak Ct, Mobile AL 36695 • 484-226-8020 • klaus.okkelberg@gmail.com

OBJECTIVE

Electrical engineer seeking challenging employment opportunities at the U.S. Army Corps of Engineers

EDUCATION

Georgia Institute of Technology, Atlanta, GA 2014 – 2018

Ph.D. coursework in Electrical and Computer Engineering, 85 graduate credits

Emphasis: Systems/Controls and Telecommunications

GPA: 3.8/4.0

University of New Orleans, New Orleans, LA 2014

M.S.E. in Electrical Engineering

Thesis topic: Nonlinear filtering for battery state estimation and health management

GPA: 4.0/4.0

The Pennsylvania State University, University Park, PA 2011

B.S. in Electrical Engineering

Schreyer Honors College Scholar (Representing the top 1% of Penn State students)

Honors thesis topic: Nonlinear control system for nuclear magnetic spectroscopy

GPA: 3.6/4.0

EXPERIENCE

Georgia Tech, Atlanta, GA

Graduate Researcher with Dr. Maysam Ghovanloo, **40 hours/week**

Aug. 2014 – Present

- Examined a Multimodal Speech Capture System (MSCS) for speech therapy and accent reduction, using aural, visual and magnetic modalities to track articulator motion
- Designed portable, prototype systems using Solidworks and 3D-printed them
- Optimized magnetic sensor calibration and localization algorithms over $4 \times 4 \times 10$ cm area corresponding to tongue's range of motion
 - Reduced RMS error from >15 mm to 1.8 mm for stationary system, comparable to state-of-art electromagnetic articulography (EMA) at hundredth of cost
 - Achieved 4.6 mm RMS error for portable, headset system
- Created joint calibration and localization algorithm (global opt.) for handling nonlinear noise from local EMF or flexing of headset system
- Trained hybrid system of deep neural network (DNN) and support vector machines (SVM) for silent speech recognition of ~ 100 words/phrases
 - Speaker-independent recognition, using single-magnet modality
 - Top-3 classification error $<3\%$ and top-1 error of 13%
- Developed speech scoring algorithm based on information fusion of modalities that outperforms audio-only scoring in speaker-independent testing
- Extended IPA vowel diagram with consonant phoneme locations

Xilinx, Inc., San Jose, CA

Intern, **40 hours/week**

June 2014 – Aug. 2014

- Improved computer mathematical modeling of physical, 16 nm (UltraScale+) field-programmable gate array (FPGA) devices through Cadence modeling and Matlab/Verilog simulation
 - Focused on simultaneous switching noise
 - Increased accuracy of model to physical result by 20%
- Created new automated tool for inspecting multiple chip designs
 - Improved simulation speed over previous tool by a factor of 15

EXPERIENCE (CONTINUED)

University of New Orleans, New Orleans, LA

Research Assistant with Dr. Huimin Chen, *20 hours/week*

July 2012 –
May 2014

- NASA-funded Masters through Ames Research Center Scholarship
- Studied accuracy and speed of various nonlinear filters for estimating battery state of charge
- Researched use of Extended Kalman Filter for highly nonlinear systems through stochastic gradient estimation
- Proposed adjustments to the Unscented Kalman Filter and the Cubature Kalman Filter that increase filtering stability and accuracy

Pennsylvania State University, University Park, PA

Research Assistant with Dr. Jeffrey L. Schiano, *10 hours/week*

Mar. 2010 –
May 2011

- Researched a marginal oscillator with a nonlinear feedback element for use in nuclear magnetic spectroscopy
- Studied sampled-data implementation in the presence of thermal noise
- Optimized speed of simulation model by a factor of 100

SELECTED PUBLICATIONS

“Joint Magnetic Calibration and Localization Based on Expectation Maximization for Tongue Tracking,” IEEE Transactions on Biomedical Engineering, 2017.

“Comparison of Nonlinear Filtering Methods for Battery State of Charge Estimation,” University of New Orleans, 2014.

“Conversion Gain and Sensitivity in Marginal Oscillators: Continuous and Sampled-Data Negative Resistance Converters,” The Pennsylvania State University, 2011.

PROJECTS

- Optimal load balancing for high voltage power distribution system
- Model Predictive Control (MPC) method for steering rocket propulsion system
- Studied high-gain adaptive observer for monitoring of battery state of charge and for detection of short circuits
- Compared signal and channel estimation methods for CP-OFDM communications
- Analyzed performance of MIMO configurations for LTE-Advanced
- GoPro-based underwater fish recognition and tracking using FAST SURF feature matching and dark channel prior transmission map estimation
- Video jitter removal and stabilization using point feature matching and phase correlation
- Image reconstruction from incomplete, quantized measurements using discretized solution of Euler-Lagrange equation
- Vehicle tracking on changing terrain using dual nonlinear filtering of state and operating parameters
- Investigation of resonant tunneling through a double-barrier diode
- Quantum interference visibility in an oscillating macroscopic mirror
- High-speed adaptive decision feedback equalization for SerDes communications

NOTES

Software: Matlab, Simulink, PSPICE, Multisim, Mathematica, AutoCAD, Solidworks, Abaqus, GIT

Programming: Matlab, Fortran, C/C++, Java, Python, Visual Basic, Perl, Tcl/Tk, LabView, LaTeX

Web Development: HTML, CSS3, Javascript, AJAX, PHP, Python, Apache, MySQL

Leadership: Organized local cycling group, created student running club, president of table tennis club

Volunteering: Habitat for Humanity, Chevron Soap Box Derby, Shell Eco-Marathon, Shell Oil/Viva Technology competition mentor for underprivileged students in New Orleans, Bike Around the Bay, Penn State philanthropy for children with cancer (THON), dog fostering

Work Authorization: US Citizen