

# KLAUS OKKELBERG

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## OBJECTIVE

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

## EDUCATION

**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: 3.8/4.0

## EXPERIENCE

**Georgia Tech**, Atlanta, GA

**Graduate Researcher** with Dr. Maysam Ghovanloo

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
- Extended IPA vowel diagram with consonant phoneme locations
- 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
- Trained hybrid system of deep neural network (DNN) and support vector machines (SVM) for silent speech recognition of  $\sim 100$  words/phrases
  - Speaker-independent recognition, using single-magnet modality
  - Top-3 classification error  $<3\%$  and top-1 error of 13%

**Graduate Teaching Assistant**

Aug. 2015 – Dec. 2016

- GaTech ECE 3030, Physical Foundations of Computer Engineering (physics of MOSFET operation)
- GaTech ECE 2031, Digital Design Lab, part of the school's Undergraduate Professional Communication Program (UPCP)
  - Course on programming FPGAs for control of three-wheeled robots
  - Provided writing assistance to all undergraduate students in the Electrical and Computer Engineering department as part of UPCP
- Graduate TA for GaTech Math 4221, Stochastic Processes

**Xilinx, Inc.**, San Jose, CA

**Intern**

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

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

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