

Kirk R. Busche

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EDUCATION:

Ph.D. Student in Electrical and Computer Engineering

August 2016 - Present

University of Illinois Urbana-Champaign

College of Engineering

GPA: 3.92

Relevant Coursework: Pattern Recognition, Digital Signal Processing II, Vector Space Signal Processing, Topics in Image Processing, Random Processes, Optimization for Computer Vision

Bachelor of Electrical Engineering

September 2012 - May 2016

Minors: Product Design, Math

University of Minnesota-Twin Cities

College of Science and Engineering

Honors: Summa Cum Laude with High Distinction

RESEARCH EXPERIENCE:

Video Segmentation (UIUC)

January 2017 - Present

- Worked with Professor Minh Do to develop online, unsupervised video object segmentation algorithm for the DAVIS dataset using clustering of dense optical flow (partnership with Sandia National Laboratories)

VLSI Design and Evaluation of a Massive MIMO Detection Algorithm (UMN)

September 2015 - May 2016

- Worked with Professor Gerald Sobelman on surveying and evaluating proposed massive MIMO detection algorithms and implementing one in Verilog for VLSI (project for Honors Thesis)

RESEARCH INTERESTS:

- Efficient sensor fusion for autonomous vehicles
- Real-time video tracking and segmentation
- Intuitive exploitation of sequential nature of videos for perception tasks

PRIOR WORK EXPERIENCE

Research Assistant (UIUC - advisor: Prof. Minh Do)

August 2017 - Present

- Developed online algorithm for unsupervised video object segmentation based on clustering of dense optical flow
- Investigated real-time trackers based on discriminative correlation filters

Graduate Student in Critical Systems Department (Southwest Research Institute)

May 2017 - August 2017

- Trained and tested convolutional neural networks for methane leak detection and segmentation to be implemented on an NVIDIA Tegra embedded platform
- Implemented a parallelized data simulator from MATLAB code in Python to generate training and testing datasets
- Trained several shallow, efficient networks for preliminary investigation for an internal research project

Introduction to Electronics Lab Teaching Assistant (UIUC)

August 2016 - Present

- Led basic electronics lab sessions weekly and graded lab reports weekly

Introduction to Circuits and Electronics Lecture Assistant (UMN)

January 2016 - May 2016

- Held weekly office hours to help students learn the basics of circuits and electronics and graded exams

Introduction to Digital System Design Lecture Assistant (UMN)

September 2015 - December 2015

- Held weekly office hours to assist students with learning the basics of digital system design and graded homeworks and exams

Commercial Electrical Engineering Intern (The Toro Company)

May 2015 - August 2015

- Investigated warranty claims on field-return control boards to determine possible failure modes and the statistics of the failure rates
- Designed prototype wireless test platforms, including a GPS and Bluetooth-based asset tracker and a wireless joystick control platform
- Investigated the internal components and safety ratings for high-current, three-phase AC motor controllers for comparison against the various vendor ratings, to provide a final recommendation for use in the fully electric mid-duty Toro Workman

Taylor Center Tutor (UMN)

September 2013 - December 2014

- Tutored freshmen in Physics I & II, Calculus I, II, & III, and Linear Algebra at Frontier Residence Hall

ACTIVITIES AND LEADERSHIP EXPERIENCES:

IEEE - Eta Kappa Nu (UMN)

President, Omicron Chapter

May 2015 - May 2016

- Organized tutoring schedule for members and worked with the Electrical and Computer Engineering Department to provide funding for members meeting enough tutoring hours per semester
- Extended invitations to new members and organized induction ceremony and dinner

Member, Omicron Chapter

December 2015 - May 2016

- Tutored lower level electrical engineering courses weekly as a part of the IEEE Honors society

Tau Beta Pi (UMN)

Member, Minnesota Alpha Chapter

April 2013 - May 2016

- Developed team chartering skills through Engineering Futures sessions and developed other engineering skills as a member of the oldest engineering honors society in the nation

Marching Band (UMN)

Leader, University of Minnesota Marching Band

May 2014 - December 2015

- Taught marching fundamentals and expectations to the 2014 and 2015 rookie classes and led weekly small group sectionals

Member, University of Minnesota Marching Band

August 2012 - December 2015

- Rehearsed for 500+ hours each fall semester to build strong discipline, personal motivation, teamwork, self-awareness, and musicianship to foster a strong sense of Gopher Pride at the University of Minnesota

Pep Band (UMN)

Member, University of Minnesota Gold Pep Band

September 2013 - May 2016

- Performed at men's basketball games and other sporting events, including several NCAA championship games (women's hockey and women's volleyball) and the Big Ten men's basketball tournament

Member, University of Minnesota Gopher Pep Band

September 2012 - May 2013

- Performed at women's hockey, women's basketball, and women's volleyball sporting events, including the women's hockey NCAA and WCHA championships

Colleges Against Cancer (UMN)

Director of Event Development

May 2014 - May 2016

- Organized the 2015 and 2016 Relay for Life fundraisers at the University of Minnesota, with each having over 1,000 participants attending

Chair of Event Logistics

October 2013 - May 2014

- Worked with the Director of Event Development to organize and coordinate the 2014 Relay for Life event at the University of Minnesota