

February 3, 2025

CHENG C. LIU, Ph.D.

Professor of Computer and Electrical Engineering

University of Wisconsin Stout

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Education

Ph.D. Electrical Engineering, Oklahoma State University, May 2007
M.S. Electrical Engineering, Oklahoma State University, May 2001
B.S. Physics, Pittsburg State University, 1996
B.S. Electrical Engineering, Nan Kai University of Technology, 1990, Taiwan

Professional Experience

09/2018 – Present	Professor	Computer & Electrical Engineering University of Wisconsin Stout
07/2013 – 08/2018	Associate Professor	Computer Engineering Program University of Wisconsin Stout
08/2009 - 06/2013	Assistant Professor	Computer Engineering Program University of Wisconsin Stout
05/2007 - 10/2008	Assistant Professor	Computer Science and Information Engineering, Providence University, Taiwan

Teaching Experience

CEE-405 Capstone 1: Computer Engineering Design (S/F-2012, S/F-2013, S-2014, S-2021, S-2024)
CEE-410 Capstone 2: Computer Engineering Design (F-2012, S/F-2013, S/F-2014, S-2015, S-2021)
CEE-445 Embedded Systems Design (F-2014 to S-2025)
CEE-345 Microprocessor Systems Design (ARM Micro) (F-2011 to S/F-2019, F-2020 to S/F-2025)
CEE-325 Digital Systems Design (FPGAs) (F-2011 to F-2021, F-2022, F-2023, F-2024, S-2025)
CEE-225 Digital Logic (F-2012, F-2013, S-2016, S-2019)
CEE-215 Electronics (S-2012, S-2013, S-2014, S-2015, F-2019, F-2020, S-2021, S-2022, S-2023, S-2024, S-2025)
CEE-335 Automatic Controls System (Computer engineering) (F-2011, F-2016)
CS-145 Computer Science II (S-2016)
ENGR-363 Controls and Instrumentation (F-2009 to S-2011, S/F-2017)
ELEC-341 Electrical Mechanical Devices (F-2009, S/F-2010, F-2015, S-2016, S-2018, F-2018, S-2022, S-2023)

Note: Spring/Fall 2009 is denoted as (S/F-2009)

Grants and Awards

- UW System Innovative Grant, Co-PI, Awarded with two-year funding \$175,000, “A Human-Centered Collaborative Approach to Designing an Energy-Efficient Wireless Sensor Network for Precision Agriculture,” with Tina Lee, Yuan Xing, Abhishek Verma, Zhiwei Zeng, January 2024 to December 2025. [direct story link](#)
- Sabbatical award, UW-Stout, Jan. 6, 2020 – May 22, 2020
- National Science Foundation, Award no. FAIN 1560219, REU Site: Interdisciplinary Research Experiences in Robotics for Assistive Technology", \$230,400, March 15, 2016 – February 29, 2019. https://www.nsf.gov/awardsearch/showAward?AWD_ID=1560219&HistoricalAwards=false
- National Science Foundation, Award no. FAIN 1531700, MRI: Acquisition of a Novel Assistive Robot Arm for Collaborative Research in Assistive and Rehabilitation Robotics at a Predominantly Undergraduate Institution," \$39,339, October 1, 2015 - September 30, 2018. https://www.nsf.gov/awardsearch/showAward?AWD_ID=1531700
- National Science Foundation, Award no. IIA 1338378, CNIC US-UAE Planning Visit, Development of Research Collaborations on Spatio-temporal Modeling and Analysis of Mobile Sensor Data in Evaluating Environmental Exposures, \$34,598, October 1, 2013 - September 30, 2014. https://www.nsf.gov/awardsearch/showAward?AWD_ID=1338378
- UW-Stout Professional Development Grant, Presenting the paper, "Use of FPGAs in A Digital System Design Course with Computer Gaming Applications," presentation at the *2018 American Society for Engineering Educators Conference*, Salt Lake, Utah, \$1,100, June 23 - 27, 2018.
- UW-Stout Research Incubator Grant, "Interdisciplinary NSF/REU Research Experiences for Undergraduates Targeting First Generation and Underrepresented Minority Students," \$10,000, July – August 2015.
- UW-Stout Professional Development Grant "Teaching Digital Designs by Building Small Autonomous Robotic Vehicles Using an FPGA Platform," a full paper and a presentation at the 2015 American Society for Engineering Educators Conference, Seattle, Washington, \$1,826, June 14 - 17, 2015.
- UW-Stout Faculty Research Initiative Grant - Seed Money, A Data Acquisition and Visualization System Development to Support Data Mining in Moving Object Databases, with Wan Bae, Amitava Karmaker, and Terry Mason, \$7,000, January - December 31, 2011.
- UW-Stout Research Incubator Grant, A Framework for Data Mining in Moving Object Databases, with Wan Bae, Amitava Karmaker, and Terry Mason, \$9,000, July - August 2010.

- UW-Stout Professional Development Grant, Project Title - Teaching Digital Design by Building Small Autonomous Robotic Vehicles Using an FPGA Platform, \$1,820, June 14, 2015.
- UW-Stout Student Research Fund Grant, Project Title - Spatio Temporal Modeling of Mobile Sensor Data Evaluating Environment Exposures, Awarded to Jason Gass and Eric Bonsness, \$1,078, October 17, 2013 - May 1, 2014.
- Just-in-Time Research Grant: \$550, UW-Stout, March 2010.

OTHER AWARDS RECEIVED

- Jason Gass & Eric Bonsness, UW-Stout Student Research Grant Award, \$1,078, October 17, 2013, to May 1, 2014. The funds were to support a research project supervised by Dr. Cheng Liu with the project title “Spatio-Temporal Modeling and Analysis of Mobile Sensor Data Evaluating Environmental Exposures”

Publications

Articles in Refereed Journal, Conference Proceeding, Technical Reports.

- “Optimizing Grass Selection for Beef Cattle Using Multi-Armed Bandit Algorithms: A Data-Driven Approach to Enhance Growth Through Rumination Analysis “, Xing, Liu, Abhi, Lee, Zhiwei Zeng, 2024 IEEE 15th Annual Ubiquitous Computing, Electronics & Mobile Communication Conference (UEMCON), 17-19 October 2024, New York
- “Cluster-Based Genetic Algorithm Path Planning for Cooperative UGV and UAV Operations in Energy-Efficient Wireless Sensor Networks “, Xing, Liu, Abhi, Lee, Zhiwei Zeng, 2024 IEEE 15th Annual Ubiquitous Computing, Electronics & Mobile Communication Conference (UEMCON), 17-19 October 2024, New York
- “ Optimizing Sleep Schedules for Energy-Efficient Agricultural Wireless Sensor Networks Using Deep Reinforcement Learning “, Xing, Liu, Abhi, Lee, Zhiwei Zeng, 2024 IEEE 15th Annual Ubiquitous Computing, Electronics & Mobile Communication Conference (UEMCON), 17-19 October 2024, New York
- A university-industry collaboration research paper published, "Electronics – A First Course for Printed Circuit Board Design" in 2022 ASEE Annual Conference & Exposition, Minneapolis. Abstract:<https://peer.asee.org/electronics-a-first-course-for-printed-circuit-board-design>
- “Use of FPGAs in A Digital System Design Course with Computer Gaming Applications”, Cheng Chih Liu, *Proceedings of the 125th ASEE Annual Conference and Exposition*, Salt Lake City, UT, June 2018.

- “Teaching Digital Designs by Building Small Autonomous Robotic Vehicles Using an FPGA Platform”, Cheng C. Liu, *Proceedings of the 122nd ASEE Annual Conference and Exposition*, Seattle, WA. June 2015.
- “A Real-time Health Monitoring System Framework: An Approach for Evaluating Environmental Exposures and Health Decision Support”, Wan Bae, Shayma A. Sada A, Cheng Liu, *Journal of Software, Vol. 8, No 4, 791-801*, April 2013.
- “A Mobile Data Analysis Framework for Environmental Health Decision Support”, Wan Bae, Shayma A., Sada N. Cheng Liu, in *Proceedings of the Ninth International Conference on Information Technology-New Generations*, IEEE Computer Society, 2012.
- “Project-Based & Active Learning in Computer Engineering Education”, W. Shi, A. Turkmen, C. Liu, R. Nelson, J. Bumblis, D. Olson, *Proceedings of the 2012 ASEE North Midwest Section Meeting*, St. Cloud, MN October 5, 2012.
- “Project-Based & Active Learning in Computer Engineering Education”, W. Shi, A. Turkmen, C. Liu, R. Nelson, J. Bumblis, D. Olson, *Proceedings of the 2012 ASEE North Midwest Section Meeting*, St. Cloud, MN October 5, 2012.
- “Health Monitoring Systems using Patient Trajectory Analysis and Environmental Factors”, in *Proceedings of Geo Processing 2012, the 4th International Conference on Advanced Geographic Information Systems, Applications, and Services*, Wan Bae, Shayma A., Sada N. Cheng Liu, 2012
- “Low Noise Band-pass Neural Amplifier with Adjustable Bandwidth for bio-medical Applications”, Cheng C. Liu, Jian Chang, Sitong Yuan, L.G. Johnson, R.L. Rennaker in *Proceedings of IEEE International Conference on Green Circuits and Systems*, pp. 438 - 441 (ICGCS 2011)
- “Energy Model of CMOS Gates Using a Piecewise Linear Model”, Cheng C. Liu, Jian Chang, L.G. Johnson in *Proceeding of 2010 International Symposium on Circuits and Systems*, pp. 3829 – 3832 (ISCAS 2010)
- “Piecewise Linear Delay Modeling of CMOS VLSI Circuits”, Jian Chang, L.G. Johnson, Cheng C. Liu, in *Proceedings of 2009 IEEE International Midwest Symposium on Circuits and Systems*, pp. 1151 - 1154, MWSCAS 2009.
- “Current Biased Pseudo-Resistor for Implantable Neural Signal Recording Application”, Sitong Yuan, L.G. Johnson, Cheng C. Liu, R.L. Rennaker in *Proceedings of 2008 IEEE International Midwest Symposium on Circuits and Systems*, pp. 658 - 661, MWSCAS 2008
- “A 70-dB Gain Low-Power Band-Pass Amplifier for Bio-Sensing Applications”, Cheng C. Liu, in *Proceedings of 2007 International Symposium on Circuits and Systems*, pp. 557 - 580, 2007, ISCAS 2007

Technical Report for Sponsored Research

- Sujay Bajracharya (student), Derek Belsky (student), Benjamin Klave (student), “Autonomous Meal Assistance Robot using Facing gesture and Voice Commands”, *Research Experience for Undergraduates (NSF-REU) at UW-Stout*, NSF Technical Report, September 2018. (a video to demonstrate the student research: <https://www.youtube.com/watch?v=kkbPEdshNx8>)
- Quoc Pham (student), Evan Weiler (student), “Light-weight Reconstruction Algorithm Using OpenCV for Robotic Computer-Vision Applications”, *Research Experience for Undergraduates (NSF-REU) at UW-Stout*, NSF Technical Report, September 2017.
- Bryan Ehlers (student), Meng Vue (student), “Robot Aid for the Blind”, *Research Experience for Undergraduates (NSF-REU) at UW-Stout*, NSF Technical Report, December 2016.

Presentations and other Scholarly Activities

- Principal Investigator Presentation for “Research Experiences for Undergraduates (REU) Site at UW-Stout and the Assistive Robotics Research for Undergraduate Students program at UW-Stout, National Science Foundation, San Diego, CA, April 22 – 24, 2018.
- Poster Presentation, Devin Berg, Cheng Liu, Wei Shi, Cayte Anderson, “Assisted Robotics Research Experiences for Undergraduate Students”, UW-Stout Research Day, May 3, 2018

Consulting/Mentoring Experiences

National Science Foundation (NSF)

- 06/2016 – 9/2018, “The Robotics for Assistive Technology Experience for Undergraduates at the University of Wisconsin – Stout,” funded by the NSF. Support involved summer salary for eight students and stipends for three faculty mentors.

United Arab Emirates University Al Ain (UAEU)

- 07/2015 – 10/2016, Project title “A smart inhaler development for people with asthma” which was a follow-up project from the NSF project “CNIC US-UAE Planning Visit”. This project was to bring a design from a prototype to a product that was used to keep patients and doctors informed of locations and time stamps when asthma attacks occur to patients. Support involved stipend to one Computer Engineering student (\$1000 for every three months) and a summer contract for Cheng.

National Science Foundation (NSF)

- 01/2013 – 12/2013. Awarded by NSF. Project title “CNIC US-UAE Planning Visit: Development of Research Collaborations on spatio-temporal Modeling and Analysis of Mobile Sensor Data in Evaluating Environmental Exposures.” This project was to design a device that keeps track of geographical locations where asthma attack occurs for people with asthma. Support involved stipends for two students for six months and travel to United Arab

Emirates (UAE) University at Al Ain to meet with medical professionals at UAE. The two students were from the Computer Engineering and Computer Science programs at UW-Stout.

Service Activities

University of Wisconsin – Stout

- **CEE Program Advisor**, advising 43 students in Computer and Electrical Engineering program, 2024.
- **Summer camp instructor**, a career camp for high-school students, UW-Stout, June 14-20, 2024.
- **Summer camp instructor**, a printed circuit board design camp, UW-Stout, June 24 – July 3, 2024.
- **Chair**, Search and Screen committee for the Instrumentation Technologist 1 position, Jan. 1 – May 1, 2023.
- **Member**, Search and Screen committee for the Instrumentation Technologist 1 position, Sep. 1 – Dec. 20, 2023
- **Summer camp instructor**, session: Machine Learning with Robots, UW-Stout STEM Experience (STEM-X), 9-12th grade students, UW-Stout STEM Experience (STEM-X), June 25 – 28, 2023
- **Full-time Instructor search committee**, Chair, Computer and Electrical Engineering program, 2021
- **Personnel Committee** for the Engineering and Technology department, March 2017 – March 2020 (3-year term)
- **Promotion Committee Chair** for the Engineering and Technology department, October 2018
- **IEEE advisor for IEEE UW-Stout Student Chapter, 2015 – 2017**
- **Search and Screen Committee for the computer/electrical lab coordinator position**, Engineering and Technology department, Nov. 2016 – Jan. 2017
- **Search and Screen Committee for the computer/electrical lab coordinator position**, Engineering and Technology department, Jan. 2016 – March 2016
- **The campus representative** to UW-Stout for American Society for Engineering Education (ASEE), 2012 – 2015
- **College-level Associate Professor Promotion committee, 1 term**, September 2014
- **Curriculum Instruction Committee (CIC) alternate** for CSTEM, 2013, 2014
- **Positive action, Ethics and Competition Review Committee** – University committee, 2013, 2014
- **Student Disciplinary Hearing Committee** – University committee, 2013, 2014
- **Graduate thesis advisor**, Advising two theses, Manufacturing Engineering program at UW-Stout, since 2012

Service to Institution

- facilitator for International Partnership; A Memorandum of Understanding (MoU) Agreement with Nan Kai University of Technology (NKUT) in Taiwan went into effect

on May 20, 2019, for future collaboration on exchange student program and dual degree programs.

Service to Profession

- Reviewer for ASEE Computers in Education Journal, in the field of Field Programmable Gate Array devices and their applications in computer and electrical engineering.

Gifts-in-Kind Donation

- 25 Bluetooth PSoC Microprocessor development board, Cypress, April 2016, valued at \$1,500
- 11 Motor Control Development Board, Microchip Inc., April 2016, valued at \$1,200
- 30 microprocessor system boards, Texas Instruments, October 2014, valued at \$2,550,
- 12 Analog System Lab Kits PRO, Texas Instruments, March 2014, valued at \$1,200
- Freedom Lab in A Box - containing 10 ARM Cortex M0 Microprocessor boards, 100 copies of ARM/Keil MDK-ARM Software Pro 1-year renewable software tools, ARM Inc., October 2013, valued at \$10,150
- 25-seat Xilinx ISE Design Suite, valued at \$129,875 from Xilinx Inc., September 2012
- Miscellaneous embedded systems boards, from Realityworks, Inc., Eau Claire, Wisconsin, January 2012, valued at \$108,534
- 12 units CY8CKIT-050 PSoC 5 microprocessor development boards, from Cypress Semiconductor, December 2011, valued at \$1,200
- 25-seat Xilinx ISE Design Suite from Xilinx Inc., January 2010, valued at \$129,875

Training Courses Offered

- 4-days Hands-on Workshop on Embedded Controller Design using ARM-based Cortex-M4 processor, Microchip C8051 processor, and Altera FPGA. Topics include the software development to interface Brushless DC motor, Stepper and servo motors with those microprocessor and FPGA devices, Beifang University of Nationalities, Yinchuan, China, May 9 – 16, 2016
- 5-days Hands-on Workshop on Advanced Embedded System Design and Programming on ARM-based Microcontrollers, at Beifang University of Nationalities, Yinchuan, China, June 17 – 25, 2015

Professional Development

Training Experience Received from

- Attended the conference “Using Sensors for Internet-Of-Things Applications”, NXP Technology Day Conference on *current NXP microcontroller technology* at Minneapolis, Tuesday, April 15, 2019.

- Attended the conference, “Rapid Internet-Of-Things Development Using ARM IoT Prototyping kit K64-120 MHz KW41Z Microprocessor”, NXP Technology Day Conference on *current NXP microcontroller technology* at Minneapolis, Tuesday, April 15, 2019.
- Attended the conference, “Get your motor spinning/motor controls with ARM i.MX RT Microprocessor”, NXP Technology Day Conference on *current NXP microcontroller technology* at Minneapolis, Tuesday, April 15, 2019.
- Attended the ST Microelectronics workshop on *low power STM32 microcontroller* at Minneapolis, Thursday, March 14, 2019.
- Rockwell Automation Conference on *Allen Bradley and Micro850 PLCs and their industrial applications on Industry Internet of things (IIOT)*, May 16-17, 2018, Milwaukee, Wisconsin.
- Microsemi’s *FPGA Igloo2* workshop, held in the Future Electronics Minneapolis Office, Thursday March 9th, 2017
- KINETIS Microcontrollers on *Wireless Communication* Workshop – hands-on experience implementing Thread, *Bluetooth low energy (BLE) and BLE mesh connected applications*, offered by NXP Semiconductors office at Minneapolis, MN on Dec. 6, 2016
- SENSational *Internet-of-Things* seminar for Embedded System Engineers held by STMicroelectronics office, Minneapolis, October 20, 2016
- STMicroelectronics *STM32F7 microcontroller technology seminar*, Minneapolis, MN, May 24, 2016
- STMicroelectronics training based on *STM32F072 Processor technology*, Minneapolis MN, 6/3, 2015
- Atmel Tech-on-Tour, Introduction to the Atmel Smart Connect *WINC1500 Wi-Fi Module using the Atmel | SMART SAM D21 Xplained Pro*, July 29, 2015
- Terasic DE1 FPGA *System-On-Chip (SoC) development*, July 12, 2014, Hsinchu, Taiwan
- ST Microelectronics training based on *STM32F401 Processor technology*, Minneapolis MN, July 12, 2014
- MATLAB *Simulink Real Time workshop*, Milwaukee, WI, Oct. 3, 2014
- Microsemi Semiconductor Corporation *SmartFusion2 SoC FPGA Speedway Design* Workshop at Avnet Electronics in Bloomington, Minnesota, March 19, 2013
- Cypress Introduction to *PSoC 5 microcontroller* Workshop, Minneapolis, MN, April 24, 2013
- Freescale *Embedded Linux-based QT application and leverage RTOS*, May 21, 2013
- Atmel low-power system design with Atmel MCU, Wireless, and Touch solutions, June 6, 2013
- Freescale i.MX Microprocessor Workshop, Minneapolis, MN, Oct. 16, 2013
- Getting Started with the *TIVA™ C Series TM4C123G LaunchPad*, Itasca, IL, Aug. 13, 2013

Training Certifications Awarded

- Xilinx Customer Education on Embedded Systems Development, certified by North Pole Engineering, Minneapolis, MN on May 21, 2011
- Accelerated development with Atmel SAM4 Cortex-M4 Microprocessor-Based Flash Microcontrollers Atmel Studio 6 and Atmel Software Framework, certified by Atmel Inc. June 05, 2012