

Libo Wu

Texas A&M University
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SUMMARY

- Proficient in sensors and their applications, embedded system design, and indoor human detection technology.
- Strong skills with PCB design, machine learning, circuit design/analysis, and signal processing.
- Hand-on experiences in 3-D CAD modeling, product design, and troubleshooting.
- Seeking for internship/full-time positions in 2020 related to smart sensors/devices, embedded system design.

EDUCATION

- **Texas A&M University** College Station, TX
Ph.D. Candidate in Mechanical Engineering (transfer student); GPA: 4.0/4.0 Aug 2018 – Dec 2020
- **Stony Brook University** Stony Brook, NY
Ph.D. Candidate in Electrical Engineering; GPA: 3.9/4.0 Aug 2015 – Jul 2018
- **University of Science and Technology of China** Hefei, China
B.S. in Applied Physics; GPA: 3.71/4.3 Sept 2011 – Jun 2015

TECHNICAL SKILLS

- **Programming:** Embedded C, Python, C/C++, Matlab, Assembler, L^AT_EX, Labview
- **Skills:** ARM Cortex-M MCU driver/application development, CMSIS library, MCU communication protocols, SolidWorks, Machine Learning and related frameworks (Tensorflow), Eagle

EXPERIENCE

- **Texas A&M University** College Station, TX
Research Assistant, Advisor: Dr. Ya Wang Aug 2018 - Present
 - **Liquid Crystal Optical Shutter On Passive Infrared Sensor For Presence Detection, *current project***
 - ▷ Built a mathematical model including thermal transfer, liquid crystal modulation and response of passive infrared (PIR) sensor sensor. Characterize key factors of building the system.
 - ▷ Assembled liquid crystal optical shutter and measured the infrared optical and electrical characteristic.
 - ▷ Developed a ultra-low power (avg. power < 20μW) driving circuit to electronically control the LC shutter.
 - ▷ Integrated PIR sensor, the optical shutter, driving circuit and micro-controller for occupancy detection.
 - **Co-Mentor of Senior Design Project: Occupant-centered light and HVAC control using machine learning for human comfort and energy efficiency**
 - ▷ Guided and managed the team to build a control system that increases user's comfort and saves energy.
 - **Passive Infrared Sensors For True Presence Detection**
 - ▷ Used a single Pyroelectric infrared (PIR) and an optical shutter embedded with micro controller unit in the device to analyze occupancy status of indoor environment.
 - ▷ Explored more functionality for indoor occupancy detection, such as human tracking with 0.44 m RSME, localization with 98% accuracy and facial direction detection with 83% accuracy.
 - ▷ Introduced machine learning algorithms to improve the performance in predicting and classifying occupancy situations that reached 98% accuracy in localization.
 - **Compressive Sensing For Human Localization Using Single Thermopile Pixel Sensor**
 - ▷ Integrated one thermopile sensor and rotating optical mask to acquire compressive infrared signals from human.
 - ▷ Reconstructed compressive signals using basis pursuit denoising algorithm to recover occupancy information.
 - ▷ Reached over 90% accuracy for localization of indoor the human object with a very low cost (less than \$10).

- **Stony Brook University**

Research Assistant, Advisor: Dr. Ya Wang

Stony Brook, NY

Feb 2017 - Jul 2018

- **Long-term Presence Detection Platform**

- ▷ Built an long-term experiment platform consists of Raspberry Pi, camera, PIR sensors and MCU.
 - ▷ Used object detection algorithms (YoLo and R-CNN) on videos to extract presence information.
 - ▷ Reached 97% accuracy for classifying occupied and unoccupied scenes from 31-hour experiment.

VLSI Course Project

Fall 2016

- **8-bit Carry Select Adder Design** : Developed an 8-bit CSA adder with 45nm CMOS technology using Cadence software. The final design showed low power if 1.184 mW, low area of 1257 m2, and high speed of 4.34 GHz.

Teaching Assistant

Aug 2015 - Dec 2016

- **TA for** Embedded Microprocessor Systems Design (*Fall 2016*), Digital Systems Design (*Spring 2016*), Digital Signal Processing: Theory (*Fall 2015*)

PUBLICATIONS

Journal Publications

- **Libo Wu**, Fangwang Gou, Shin-Tson Wu and Ya Wang , “Liquid Crystal Enabled Electronical Shutter for Stationary Human Presence Detection Using Pyroelectric Infrared Sensors”, *For future submission*, 2019.
- **Libo Wu**, and Ya Wang , “Compressive Sensing Based Indoor Occupancy Positioning Using A Single Thermopile Point Detector with a Coded Binary Mask”, *submitted to IEEE Sensor Letter*, 2019.
- **Libo Wu**, Ya Wang and Haili Liu, “Detection and Localization of Individuals by Monitoring Nonlinear Energy Flow of a Shuttered Passive Infrared Sensor”, *IEEE Sensor Journal*, 2018.
- **Libo Wu** and Ya Wang, “A Low Power Electric-Mechanical Driving Approach for True Occupancy Detection Using a Shuttered Passive Infrared Sensor”, *IEEE Sensor Journal*, 2018.

Conference Proceedings

- **Libo Wu** and Ya Wang , “Compressive Sensing Based Indoor Human Positioning Using A Single Thermopile Point Detector”, *12th International Workshop on Structural Health Monitoring, September 10-12, 2019, Stanford, California, USA*.
- **Libo Wu** and Ya Wang, “Shuttered Passive Infrared Sensor for Occupancy Detection: Exploring A Low Power Electro-Mechanical Driving Approach”, *ASME SMASIS conference*, 2018 (Oral presentation).

PATENTS

- **Libo Wu** and Ya Wang, “Shuttered Passive Infrared Sensor Apparatus with A Low Power LWIR Liquid Crystal Optical Modulator for Stationary and Moving Occupancy Detection”, *U.S. Patent Application No. 62/880,058*, July 29, 2019.
- Ya Wang and **Libo Wu**, “A Single Thermopile Point Sensor Apparatus with A Set of Coding Masks (Compressive Sensing Matrix) for Indoor Human Positioning”, *U.S. Patent Application No. 62/863,823*, June 19, 2019.
- Ya Wang and **Libo Wu**, “Shuttered Passive Infrared Sensor Apparatus with A Low Power Lavet Motor Driving Approach for Stationary and Moving Occupancy Detection”, *U.S. Patent Application No. 62/863,808*, June 19, 2019.

HONORS AND AWARDS

- J. Mike Walker ‘66 Department of Mechanical Engineering Graduate Excellence Scholarship 2019
- Outstanding Undergraduate Scholarship, Bronze Medalist 2013