Libo Wu

Texas A&M University
College Station, TX, USA

Email : libo.wu@tamu.edu
Mobile : +1-631-538-8815
Website: libowu.com

Summary

- Proficient in sensors and their applications, embedded system design, and indoor human activity detection.
- Strong skills with PCB design, machine learning, wireless communication, circuit design, and signal processing.
- Hand-on experiences in 3-D CAD modeling, product design, and troubleshooting.
- Seeking for internship/full-time positions in 2020 in hardware engineering and 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, LaTeX, Labview
- **Skills**: ARM Cortex-M MCU driver/application development, MCU communication protocols, SolidWorks, Machine Learning and related frameworks (Tensorflow), Altium Designer

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**
    - ▷ 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 $< 20\mu$W) 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** Stony Brook, NY
  Research Assistant, Advisor: Dr. Ya Wang *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 μm^2, 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", *submitted to IEEE System Journal*, 2019.
- **Libo Wu**, and Ya Wang , "Compressive Sensing Based Indoor Occupancy Positioning Using A Single Thermopile Point Detector with a Coded Binary Mask", *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