Shijie Lin

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Education

M. Eng., Wuhan University, Hubei, China *Sep. 2017 -- Jul. 2019*
Electronics Engineering (**EE**); Exam-free student; **GPA:** 85.9/100

Exchange Student, Keio University, Tokyo, Japan *Feb. 2017*
The international center, mita campus.

B. Eng., Sichuan University, Sichuan, China *Sep. 2013 -- Jul. 2017*
Electronics and Information Engineering (**EE**); **GPA:** 84.7/100; **Rank:** 6/121

Research Interest

Event-based Vision, Learning in Robot, and Simultaneous Localization and Mapping (SLAM).

Publication

Paper

- **S. Lin**, F. Xu, J. Wang, W. Yang. "Learn to Cross Modalities Between Neuromorphic Events and Color Images." *AAAI Conference on Artificial Intelligence*, under preparation.
- **S. Lin**, F. Xu, X. Wang, W. Yang, L. Yu. "Efficient Spatial-Temporal Normalization of SAE Representation for Event Camera." *IEEE Robotics and Automation Letters (RA-L)*, under review.
- **S. Lin**, J Wang, R. Peng, W. Yang (2019). "Development of an Autonomous Unmanned Aerial Manipulator Based on a Real-Time Oriented-Object Detection Method." *Sensors* (IF: 3.302), *19*(10), 2396.
- F. Xu, **S. Lin**, W. Yang. "MCED: A Multi-view Color Images and Event-tream Dataset for Object Classification and Retrieval." *Frontiers in Neuroscience*, under preparation.
- F. Xu, W. Yang, **S. Lin**, H. Luo, G. Xia "Mental Retrieval of Remote Sensing Images via Adversarial Sketch-Image Feature Learning." *ISPRS Journal of Photogrammetry and Remote Sensing*, under review.
- X. Wang, Y. Du, **S. Lin**, P. Cui, Y. Shen, Y. Yang. "adVAE: a Self-adversarial Variational Autoencoder with Gaussian Anomaly Prior Knowledge for Anomaly Detection." *Knowledge-Based Systems*, under revision.
- H. Yu, **S. Lin**, J Wang, K. Fu, W. Yang. "An Intelligent Unmanned Aircraft System for Wilderness Search and Rescue." *International Micro Air Vehicles Conference and Flight Competition (IMAV)*, 2017, **oral**.

Patent (5 in total)

- **S. Lin**, W. He, H. Yu, W. Yang. "A Multifunctional Unmanned Aerial Vehicle for Field Search and Rescue."
  - Patent No. CN206926823U, Jul. 2017.
- **S. Lin**, H. Zhao, F. Jiang, P. Xue, S. Li, Z. Guo. "A Dot Matrix Braille Touch Screen."
  - Patent No. CN106775123A, Jan. 2017.
- J. Huang, X. Wang, **S. Lin**, *et al.* "A Pull-type Braille Screen and its Components Reuse Method."
  - Patent No. CN106781881A, Jan. 2017.

Report

- **S. Lin**. "Event-based Vision: from Hardware to Software, from Formulation to Methodology, from the Past to the Future." Group Meeting of Signal Processing Lab, Jan. 2019.

Scholarship

- National Scholarship for Postgraduate **(TOP 1%)** *Oct. 2018*
  - Awarded by ministry of education, PRC.
- *1st Prize*, Postgraduate Academic Scholarship of Wuhan University **(TOP 5%)** *Sep. 2018*
- *1st Prize*, Postgraduate Academic Scholarship of Wuhan University **(TOP 5%)** *Sep. 2017*
- *1st Prize*, Postgraduate Entrance Scholarship of Wuhan University **(TOP 5%)** *Oct. 2017*
- *1st Prize*, Outstanding Scholarship of Sichuan University **(TOP 5%)** *Oct. 2016*
- *1st Prize*, Individual Scholarship of Sichuan University **(TOP 8%)** *Nov. 2015*

- *2nd Prize*, Individual Scholarship of Sichuan University **(TOP 10%)** *Nov. 2014*

Research Experience

Postgraduate Researcher, supervised by Prof. Weng Yang *Sep. 2017 -- Present*
Signal Processing Lab, Wuhan University, China

- Research: **Cross Modalities Retrieval Between Neuromorphic Events and Color Images.**
  - Exploited adversarial learning to bridge the gap between color images and neuromorphic events, then retrieve high-quality color images based on the learned cross-domain representation. Paper is under preparation.
- Research: **A Multi-view Dataset for Object Classification and Retrieval.**
  - Collected the first large-scale real-world event-based object dataset using the Celex4 event camera and RGB camera for classification and retrieval. Paper is under preparation.
- Research: **Efficient Spatial-Temporal Normalization of SAE Representation for Event Camera.**
  - Proposed a highly efficient normalization method and an improved ordering strategy.
  - In the runtime benchmark test, proposed methods can run up to **500 times faster** than the previous methods.
  - Designed an end-to-end classifier with proposed normalization method, and its accuracy is **19% higher** than that of the previous event-based SOTA classification method. Paper submitted to *RA-L*.
- Research: **Toward Autonomous Rotation-Aware Unmanned Aerial Grasping**
  - Proposed Rotation-SqueezeDet, an efficient detection algorithm based on light Convolutional Neural Network (CNN) that can detect objects with rotation angles in **real-time**.
  - Built an Unmanned Aerial Manipulator (UAM) from scratch and employed proposed detection algorithm to enable rotation-aware grasping. Paper accepted by *Sensors* (IF: 3.302).
- Competition: **ICRA2018 DJI Robomaster AI Challenge**, Australia, Brisbane.
  - My work focused on the development of **two fully autonomous** combat robots, including hardware design, localization, communication, and visual tracking.
  - Designed a 2D-3D tracking framework using P-n-P and Kalman filter with a kinematic model.
  - Adopted Unscented Kalman Filter (UKF) to conduct a loosely-coupled sensor fusion for positioning.
  - The system works well in the ICRA arena. We defeated many competitors and got 6/70 final ranking.
- Thesis: **Development of an Intelligent Unmanned Aircraft System for Tunnel Inspection**
  - Developed a tunnel inspection system based on Pixhawk4 and DJI M100 drone.
  - Employed point cloud filters and RANSAC line fitting for tunnel perception. And employed VINS-Mono for localization.
  - Successfully conducted multiple autonomous inspections in the 280-meter long Luojia Shan tunnel.
  - Planning to develop an end-to-end tunnel perception algorithm using the event camera in recent.

Research Assistant, supervised by Prof. Hui Zhao and Prof. Jiaping Xu. *May. 2014 -- May. 2017*
Texas Instruments Joint Student Innovation Lab, Sichuan University, China

- Project: **Multi-node Intelligent Access Control System**
  Supported by **National Undergraduate Training Programs for Innovation (20000 CNY)**
  - Implemented a smart access control system with multiple nodes, and each node has a smoke sensor to sense its surrounding. Nodes can automatically exchange messages in the sensor network based on BLE 4.0, and the user can use the Android App to access the system.
- Project: **Smart Braille Reader**
  Won the **1st prize** of **Microsoft Imagine Cup 2016 Global Students Technology Competition**
  - My work focused on the development of a universal braille reader, including the design of PCB circuit, communication protocol, touch unit, and an algorithm for touch signal processing.
  - Prototypes have been commercialized by Chengdu Aurora Co. Ltd, helping blind children to "see" the world. And it has been granted two patents in China.
- Competition: **National Undergraduate Electronic Design Competition** -- Implemented an autonomous quadrotor from scratch.
  - My work focused on the development of algorithms for autonomous flying, including controller design

and visual tracking. The drone tracked lines and junctions as visual feedback; And used cascade PID controller for robust flying. We defeated 2000+ competitors and got the 1st Prize.

- Thesis: **Pedestrian Detection Under UAV Perspective** -- Excellent Undergraduate Thesis.
  - Benchmarked multiple SVM-based and CNN-based detection methods in runtime and accuracy.
  - Improved the SSD for pedestrian detection by using the residue neural network. And algorithms were integrated into the field search and rescue aerial system. Paper accepted by *IMAV* and method has been granted a patent.

Other Experience

- Attend the **Summer School of Simultaneous Localization and Mapping(SLAM)** held by CAD&CG State Key Lab, Zhejiang University. Zhejiang, China, Jul. 2018.
- Attend the **2018 IEEE International Conference on Robotics and Automation (ICRA)** and **Workshop of Aerial Robotic Inspection and Maintenance: Research Challenges, Field Experience and Industry Needs**, Brisbane, Australia, May. 2018.
- Attend the **Seminar of Frontier Deep Learning Research** held by China Computer Federation. Hubei, China, Nov. 2017.
- Attend the **9th International Micro Air Vehicles Conference**, Toulouse, France, Sep. 2018.

Award

Competition:

- *1st Prize & Best paper*, National Postgraduate Electronic Design Competition **(TOP 0.2%)** *Aug. 2018*
  - National Rank: 5/2437.
- *Finalist Prize*, ICRA2018 DJI Robomaster AI Challenge *May. 2018*
  - Global Rank: 6/70. Awarded by Dr. Alex Zelinsky and Frank Wang.
- *1st Prize*, Microsoft Imagine Cup 2016 Global Students Technology Competition **(TOP 1%)** *Apr. 2016*
- *1st Prize*, National Undergraduate Electronic Design Competition **(TOP 1%)** *Aug. 2015*

Others:

- Excellent Postgraduate Student of Wuhan University *Dec. 2018*
- Excellent Undergraduate Thesis of Sichuan University *Jun. 2017*
- Outstanding Academic Student Group Leader of Sichuan University *Jul. 2015*
- Outstanding Academic Student Group Leader of Sichuan University *Jul. 2014*

Skill

Hardware Related:

- **Hardware:** Jetson TX1/TX2, 8051/ARM/X64/X86 Platform, APM/PX4/Pixhawk, DJI Drones/Robot, Structure/Circuit Design, 1D/2D/3D Rangefinder, RGBD/RGB/Event/Infrared Camera, IMU, *etc*.
- **Tools:** Solidworks, AutoCAD, Altium Designer, Cura, Keil, 3D printer, NC machine, *etc*.

Software Related:

- **Languages:** C/C++, Python, MATLAB, LaTeX, *etc*.
- **Development:** Git, Shell, ROS, Linux, ARM Platform, *etc*.
- **Framework:** Tensorflow, PyTorch, caffe, Scikit-Learn, OpenCV, PCL, *etc*.
- **Mathematics:** Calculus, Linear Algebra, Probability, Statistics, Numerical Analysis, Optimization, *etc*.
- **Robotics:** Linear & Non-linear Control, Robot State Estimation, Newton–Euler Modeling, *etc*.

English:

- **TOEFL iBT:** 92 (Reading - 25, Listening - 24, Speaking - 23, Writing - 20)

Activity

Electronic Creative Club, Sichuan University, Club Leader, *Sep. 2014 -- Jun. 2016*

- Managed the Texas Instruments Joint Student Innovation Lab with club members.
- Organized multiple campus-wide academic seminars and underwater robot competitions.
- Conducted introductory programming lessons to 30+ fresh students.