# Mo Shan (Sean)

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## EDUCATION

**University of California, San Diego**                            La Jolla, CA, USA
*PhD in Electrical and Computer Engineering, GPA 3.74/4*                 *Expected Jun. 2022*

**University of California, San Diego**                            La Jolla, CA, USA
*Master of Science in Electrical and Computer Engineering, GPA 3.74/4*       *Sept. 2016 – Feb. 2020*

**National University of Singapore**                                    Singapore
*Bachelor of Science in Electrical and Computer Engineering, GPA 4.84/5*       *Sept. 2010 – Jun. 2014*

**University of Southampton**                          Southampton, United Kingdom
*Student Exchange Program in School of Electronics and Computer Science*       *Dec. 2012 – Jul. 2013*

## RESEARCH INTERESTS

- Rich models of tightly coupled localization and environmental representation that unify multiple characteristics, such as the geometric landmarks, semantic object-level map, object surfaces, and yet scale to large environments in real-time on embedded platforms such as quadrotors
- Simultaneous localization and mapping; visual-inertial odometry
- Relevant fields: computer vision, machine learning, optimization

## EXPERIENCE

**Graduate Student Researcher**                                 Jun. 2018 – Sept. 2019
ECE, UCSD                                                                *USA*

- Designed and developed a tightly coupled, filtering based semantic VIO (OrcVIO) that produces an object-level map, with C++, Python, OpenCV, Sophus, Eigen, PyTorch
- OrcVIO is 4.8% better in object mapping accuracy compared with a single view object mapping approach, and 23.4% better in localization accuracy compared with an object SLAM approach, on the KITTI dataset

**Associate Scientist**                                         Jun. 2014 – Sept. 2016
TEMASEK LABORATORIES                                               *Singapore*

- Developed a Google Map aided visual odometry with C++, OpenCV, Dlib, which increases the localization accuracy by 96.0% compared with the baseline
- Implemented an UAV navigation approach based on a laser-stereo sensor suite with C++, OpenCV

**Summer Intern**                                               Jun. 2011 – Sept. 2011
INTERACTIVE DIGITAL MEDIA INSTITUTE                                  *Singapore*

- Implemented a foreground detection algorithm based on RPCA using MATLAB reaching more than 70% precision at recall higher than 90%, which outperforms state-of-the-art
- Designed and developed a painting classification algorithm using sparse coding with MATLAB, achieving 2.3 times better authentication accuracy than the baseline

## AWARDS

**Multi-Year Dean's Fellowship and Jacobs Fellowship**          Sept. 2016 – Sept. 2017
UCSD                                                          *La Jolla, CA, USA*

- Most prestigious fellowship offered by the ECE Department

**The 3rd International UAV Innovation Grand Prix**                      Nov. 2015
*AVIC*                                                         *Zhejiang, China*

- Championship of rotary wing competition
- Designed and implemented a bucket detection algorithm to guide bucket transfer for the firefighting task using a UAV, with C++, OpenCV and Dlib

## Technical Skills

**Languages**: Python, C++, MATLAB
**Frameworks**: ROS
**Developer Tools**: Git, Docker, VS Code, PyCharm
**Libraries**: OpenCV, Eigen, Sophus, PyTorch

## Professional Activities

**Talks**

- "OrcVIO: Object residual constrained Visual-Inertial Odometry", IROS Oral Presentation, Oct. 25, 2020.
- "Geo-referenced UAV Localization", PaoPao Robot Open-course, April 21, 2018.

**Reviewer**

- Journals: IEEE Transactions on Robotics (T-RO), IEEE Robotics and Automation Letters (RA-L)
- Conferences: International Conference on Intelligent Robots and Systems (IROS), Conference on Computer Vision and Pattern Recognition (ICRA), Conference on Computer Vision and Pattern Recognition (CVPR)

## Publications

**Journal Articles**

- Z. Gao, **M. Shan**, Q. Li. (2015). Adaptive Sparse Representation for Analyzing Artistic Style of Paintings. ACM Journal on Computing and Cultural Heritage
- Z. Gao, Q. Li., R. Zhai, **M. Shan**, F. Lin. (2015). Adaptive and Robust Sparse Coding for Laser Range Data Denoising and Inpainting. IEEE Transactions on Circuits and Systems for Video Technology

**Conference Proceedings**

- **M. Shan**, Q. Feng, N. Atanasov. (2020). OrcVIO: Object residual constrained Visual-Inertial Odometry. In IEEE International Conference on Intelligent Robots and Systems (IROS). Las Vegas, USA.
- Q. Feng, Y. Meng, **M. Shan**, N. Atanasov. (2019). Localization and Mapping using Instance-specific Mesh Models. In IEEE International Conference on Intelligent Robots and Systems (IROS). Macao, China.
- **M. Shan**, Y. Bi, H. Qin, J. Li, Z. Gao, F. Lin and B. M. Chen. (2016). A brief survey of visual odometry for micro aerial vehicles, Proceedings of the 42nd Annual Industrial Electronics Conference (IECON), Florence, Italy.
- **M. Shan**, Fei Wang, Feng Lin, Zhi Gao, Ya Z. Tang, Ben M. Chen. (2015). Google Map Aided Visual Navigation for UAVs in GPS-denied Environment. In IEEE International Conference on Robotics and Biomimetics (ROBIO). Zhuhai, China.
- Z. Gao, **M. Shan**, L. Cheong, Q. Li. (2014). Adaptive Sparse Coding for Painting Style Analysis. In Computer Vision-ACCV 2014. Springer Berlin Heidelberg.
- Z. Gao, L. Cheong, **M. Shan**. (2012). Block-sparse rpca for consistent foreground detection. In Computer Vision-ECCV 2012 (pp. 690-703). Springer Berlin Heidelberg.

**Workshop Papers**

- **M. Shan**. (2019). Weakly supervised keypoint detection. Southern California Robotics Symposium (SCR), Pasadena, USA.
- **M. Shan**, N. Atanasov. (2017). A spatiotemporal model with visual attention for video classification. In Robotics: Science and Systems (RSS) Workshop on Articulated Model Tracking, Cambridge, USA.
- **M. Shan**, A. Charan. (2015). Google Map Referenced UAV Navigation via Simultaneous Feature Detection and Description. Poster paper. In IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS). Hamburg, Germany.