

Hao GONG

U.S. Permanent Resident (EB-1A), Arcadia, Los Angeles County, CA 91006
gonghao8567@gmail.com | github.com/gonghao67 | gong-hao.com | linkedin.com/in/gonghao67

Education

Université Grenoble Alpes 2010/01 – 2013/06
Ph.D. in Signal and Image Processing, GIPSA (Grenoble Images Parole Signal et Automatique)-Lab Grenoble, France
• Research Topic: Medical Image Segmentation and Classification. Publications at ICIP^{[GD12a][Kéc+14]} and ICIAR^[GD12b]
• Thesis: Segmentation d’Images Couleurs et Multispectrales de la Peau^[Gon13] (Matlab/C++)
• Advisor: Prof. Michel Desvignes
• Awards: National Scholarship of China (2010/01/11 - 2013/01/10)

Southeast University 2007/09 – 2009/07
M.S. in Pattern Recognition & Intelligent System, School of Automation Nanjing, China
• Research Topic: Image Inpainting and Restoration. Related work patented^[4].
• Thesis: Study on Digital Image Inpainting and Its Application in Blotches Removal in Video Image Sequences (C++)
• Advisor: Prof. Xiaohui Yuan
• Awards: Second-Class Academic Scholarship of Southeast University (2007)

Southeast University 2003/09 – 2007/07
B.S. in Automation Nanjing, China
• GPA 85/100; Ranked 12/120
• Honors: Outstanding Undergraduate of Southeast University (2004); Outstanding Graduate of School of Automation (2007)

Work Experience

Enjoy Move Technology Co., Ltd. 2022/09 – 2023/08
Expert in Autonomous Driving/Visual Perception Tech Lead Shanghai, China
• Enjoy Move is a Series B+ startup with mission of becoming a bridge connecting IC and autonomous driving technology realization.
• In charge of all the research and engineering related to visual perception and localization problems (from visual-semantic feature representation to mapping and localization optimization).
• Spearheaded a team of 2 senior researchers and 4 junior engineers to build from ground-up a semantic vSLAM framework for self-localization feature in L4 Automated Valet Parking (AVP) application. Designed and implemented the proposed algorithms using inputs from CNN-based semantic detection of Bird’s Eye View (BEV) of road markings (arrow/parking spot/zebra crossing/speed bump) and IMU-wheel encoder coupled odometry. Re-localization initialized via Dynamic Time Warping (DTW) and pre-intergration of GNSS/IMU/in-vehicle sensors. (Ceres Solver/ROS2/C++)
• Enhanced stereotype performance: Achieved mapping capabilities up to 1km, positioning accuracy within 20cm, angular error within 1°, over 98% positioning success rate, and real-time impl. on NVIDIA Jetson AGX Orin at cruising speed of up to 15kph.
• Closely worked with planning and control engineers to improve the driving behavior of AVP.

Landmark Vision Technology Co., Ltd. 2019/01 – 2023/11
Co-Founder/Algorithm Scientist - lead core algorithm research and product development Shanghai, China
• Landmark Vision is an early stage startup aiming to provide state-of-the-art AI solution to offline businesses, empowering and up-grading vertical industries.
• Proposed an innovative class-wise triplet loss function to efficiently enhance the discriminative capability and reduce computational costs for face verification tasks [code]. Combined w/ face detection (MTCNN), Hungarian Kalman Filter based multi-object tracking (MOT), enables high-accuracy, low-resolution facial recognition in uncontrolled environments for real-time impl. on both CPU/GPU servers in smart access control systems. (C++/TensorFlow)
• Led a core R&D project for real-time and high accuracy 2.5D multi-target multi-camera (MTMC) human tracking with ReID. Proposed and co-implemented a Pose Estimation and Occlusion Augmentation Based Vision Transformer (POVT) for significant improvement on real-world occluded person re-identification. Details in [Wei+22]. Responsible for building the pipeline system comprising an anchor-free pedestrian detector (DarkNet53 backbone), a multi-object tracker using generic data association compatible with ReID feature similarity to handle occlusions and a homography-based perspective mapping to convert 2D pedestrian positions into real-world coordinates for trajectory plotting. This system enables inter-camera MOT and intra-camera ID assignment, optimized for real-time performance across platforms via inferencing accelerators (TensorRT/ONNX/OpenVINO). Work patented in [5] and [6].
• Closely worked with the co-founders to refine the company’s research and engineering direction.

OFilm Group Co., Ltd. 2016/06 – 2018/11
Expert in ADAS/Auto-Driving R&D Shanghai, China
• OFilm Group, a global leader in advance high-tech manufacturing and assembly, launched its smart car business in 2015, is one of China’s first large enterprises in autonomous driving and has become a Tier 1 supplier to vehicle manufacturers worldwide.

- Built independently a calibrated and optimized vehicle motion model via Ackermann Steering/Levenberg-Marquardt algo., deployed to all of core ADAS/Autonomous Driving products (e.g. Moving Object Detection and Trained Parking) of the company. (C/C++)
- Designed and implemented independently an ADAS feature: Detection and Tracking of Moving Objects from Non-stationary Fisheye Cameras, which leverages epipolar geometric constraints to segment dynamic objects from static backgrounds while SfM, powered by feature-level tracking (KLT optical flow), object-level detection (meanshift clustering) and tracking (KF w/ Hungarian Algo.), with detection rate over 95%, false alarm rate less than 1% and latency less than 65ms on TI Jacinto 5 upon delivery to leading domestic OEMs (BAIC Group and Chang'an Automobile) with initial mass-production orders of over 200,000 units and cumulative sales of 243 million CNY. Related work is patented in[2]. (C++/OpenCV)
- Led a core R&D project for Trained Parking with mapping distance up to 100m and centimeter-level localization accuracy. First in China to apply vSLAM to mass-produced L3 self-parking solution, launched on SAIC Motor's premium e-SUV, Roewe Marvel X.
- Redesigned ORB-SLAM and developed a multi-fisheye visual SLAM system tailored to vehicle trims and delivery standards, since fisheye camera's large FOV ensures robust pose estimation in confined spaces as underground parking. To address the lack of loop-closing and fisheye-induced radial distortions, I proposed special descriptors to enhance feature matching and integrated precise absolute scale information from my vehicle motion model. Led the validation through real-world ground truth and the "Multi-FoV" synthetic datasets, confirming centimeter-level accuracy in 3D landmark reconstruction. Proposed a mapping environment evaluator and a map quality evaluator to improve practicality and deployability. (C++/OpenCV/DBoW/g2o)
- In close collaboration with embedded software engineers to enhance system performance on Renesas RH850 MCU and TI TDA2x SoC for real-time operation at 15fps during the localization phase.
- Recruited and mentored 6 junior engineers on my team.

Third Research Institute of Ministry of Public

2013/09 – 2016/05

Research Scientist

Shanghai, China

- Led a team of 2 PhD researchers and 3 junior engineers in developing the main pipeline for vehicle image retrieval based on annual inspection marks. Proposed to employ Deformable Parts Model (DPM) for coarse-detection of vehicle and its front windshield, and template matching method for fine-localization of annual inspection marks. Image retrieval with Bag of Words (BoW) subsequently applied to identify target vehicles within seconds from a large gallery database containing hundreds of thousands of high-definition vehicle surveillance images. Related work is patented in[3]. (Matlab/C++/OpenCV)

Academic Services

Conference Reviewer: ICIP2014, ACCV2022, ICASSP2023, ICASSP2024

Publications

[Link] to my Google Scholar Profile.

- [GD12a] H. Gong, and M. Desvignes, "Quantification of pigmentation in human skin images," in *19th IEEE Int. Conf. Image Process. (ICIP 2012)*, Oct. 2012A, pp. 2853–2856, doi: 10.1109/ICIP.2012.6467494.
- [GD12b] H. Gong, and M. Desvignes, "Hemoglobin and melanin quantification on skin images," in *9th Int. Conf. Image Anal. Recognit. (ICIAR 2012)*, Berlin, Heidelberg, Jun. 2012B, pp. 198–205, doi: 10.1007/978-3-642-31298-4_24.
- [Gon13] H. Gong, "Segmentation d'images couleurs et multispectrales de la peau," Thesis, Université de Grenoble, 2013. [Online]. Available: <https://theses.hal.science/tel-00934789>
- [Kéc+14] R. Kéchichian*, H. Gong*, M. Revenu, O. Lezoray, and M. Desvignes, "New data model for graph-cut segmentation: application to automatic melanoma delineation," in *21st IEEE Int. Conf. Image Process. (ICIP 2014)*, Oct. 2014, pp. 892–896, doi: 10.1109/ICIP.2014.7025179.
- [Tan+20a] T. Tang, H. Wang, X. Zhou, and H. Gong, "Understanding electric bikers' red-light running behavior: predictive utility of theory of planned behavior vs prototype willingness model," *J. Adv. Transp.*, vol. 2020, p. 7097302, Feb. 17, 2020A, doi: 10.1155/2020/7097302. [Online]. Available: <https://doi.org/10.1155/2020/7097302>
- [Tan+20b] T. Tang, Y. Guo, X. Zhou, Q. Shi, and H. Gong, "Identifying psychological factors of e-bike riders' traffic rule violating intention and accident proneness in china," in *20th COTA Int. Conf. Transp. Professionals (CICTP 2020)*, Aug. 2020B, pp. 4420–4432, doi: 10.1061/9780784482933.379.
- [Wei+22] Y. Wei, D. Niu, H. Gong, Y. Dong, and X. Chen, "Pose estimation and occlusion augmentation based vision transformer for occluded person re-identification," in *Jiangsu Annu. Conf. Automat. (JACA 2022)*, vol. 2022, Nov. 2022, pp. 82–87, doi: 10.1049/icp.2023.0150.

Patents

- [1] H. Gong, L. Mei et al. "System and method for realizing gait recognition by virtue of fusion of depth information and gray-scale information". C.N. Patent 104200200, filed Aug. 28, 2014, and issued Nov. 10, 2017.
- [2] H. Gong, B. Duan et al. "Moving object detection system, moving object detection method and vehicle". C.N. Patent 109598747, filed Sep. 30, 2017, and issued Apr. 09, 2019.
- [3] H. Gong, T. Tang et al. "Traffic checkpoint vehicle intelligent retrieval system and method based on annual inspection marks". C.N. Patent 110807415, filed Oct. 31, 2019, and issued Apr. 07, 2023.
- [4] H. Gong, F. Deng et al. "Digital video file restoration method and device". C.N. Patent 111127376, filed Dec. 13, 2019, and issued May 23, 2023.

- [5] H. Gong, D. Niu et al. “Intelligent building online cross-camera multi-object tracking method”. C.N. Patent 114240997, filed Nov. 16, 2021, and issued Jul. 28, 2023.
- [6] H. Gong, Y. Wei et al. “Occluded pedestrian re-identification method based on pose estimation and Transformer”. C.N. Patent 115841682, filed Nov. 08, 2022. Patent Pending.