

HU CAO

Technische Universität München, TUM, ♦ World Rank: THE 41; QS 50
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EDUCATION

Technische Universität München, TUM, Munich, Germany **Jan 2020 - Present**
Ph.D. in Computer Science, Specialized in Computer vision and Robotics

- His research area focuses on Computer Vision, Neuromorphic Engineering, Robotics and Artificial Intelligence Algorithms
- Working for Human Brain Project - The Human Brain Project is a H2020 FET Flagship Project which strives to accelerate the fields of neuroscience, computing and brain-related medicine
- Working for Providentia++ - Traffic Real-Time Digital Twin

HuNan University-Tongji University, China **Sept 2017 - Dec 2020**
M.S. in Vehicle Engineering, Specialized in Robotics and Autonomous Driving

- Joint Training Student in Intelligent Automobile Research Institute, Tongji University
- First-class Scholarship for Outstanding Students, Hunan University
- **Taihao Star** Scholarship for Outstanding Students, Hunan University
- Outstanding Graduate of Hunan University, Outstanding Graduate of Hunan Province

Anhui University of Technology, China **Sept 2013 - Jun 2017**
B.S. in Vehicle Engineerings **Track:** *Automotive Electronics* **Rank:** $2/77 = 2.6\%$

- First-class Scholarship for Outstanding Students, Anhui University of Technology
- National Inspirational Scholarship for Outstanding Students, Anhui University of Technology

RESEARCH AND PROJECT EXPERIENCE

Chair of Robotics, Artificial Intelligence and Real-time Systems, Technische Universität München, München, (Advisor: Prof. Alois Knoll) **Jan 2020 - Present**
Specialized in Computer vision and Robotics

- **HBP Neurorobotics Platform**

The Human Brain Project is a H2020 FET Flagship Project which strives to accelerate the fields of neuroscience, computing and brain-related medicine. I am working for developing bio-inspired learning algorithms for robotics and simulating them on the HBP platform.

- **Providentia++**

Traffic Real-Time Digital Twin. I am working for 2D/3D vehicle detection and tracking. Specifically, we fusing the data generated from camera, lidar, radar and Davis to improve the detection accuracy and robustness of Providentia++ system.

EI Innovation Lab, Cloud BU, HuaWei Inc (Advisor: Tian Qi (Fellow, IEEE), Zhang Xiaopeng, Jiang Dongsheng) **April 2021 - November 2021**
Specialized in Vision transformer

- Working for Vision Transformer: Exploring Vision Transformer for Medical image segmentation, Object classification, detection and Instance segmentation.

Perception and Decision-making Lab, Tongji University, (Advisor: Prof. Guang Chen) **Dec 2018 - Jan 2020**
Specialized in Bio-inspired learning

- Working for Bio-inspired learning for Autonomous Driving perception: Multi-Vehicle Detection and Tracking System, Multi-cue information fusion for Pedestrian detection.

- Lead the team for panoramic surround system in the **China CRRC** ART project. The ART consists of three cars, with a length of more than 30 meters. Implemented the single-car image stitching, multi-cars image stitching. And according to the angle sensor information at the link between the ART bodies, the stitched image is rotated in real time. Integrated Lane Departure Warning, Moving Object detection and Blind Spot Detection.

PUBLICATIONS AND PATENTS

Medical image analysis

- **Hu Cao**, et al. "TransAED: Transformer-based Asymmetric Encoder-Decoder for Medical Image Segmentation," *IEEE CVPR*, 2022, (Submitted)
- **Hu Cao**, et al. "Swin-Unet: Unet-like Pure Transformer for Medical Image Segmentation," *Technical Report*, (Github Star 420+), 2021

Autonomous driving

- **Hu Cao**, et al. "Fusion-based Feature Attention Gate Component for Vehicle Detection based on Event Camera," *IEEE Sensors Journal*, 2021, (published, SCI-II, **IF 3.3**)
- Guang Chen, **Hu Cao**, et al. "Event-based Neuromorphic Vision for Autonomous Driving: A Paradigm Shift for Bio-inspired Visual Sensing and Perception," *IEEE Signal Processing Magazine*, 2020, (published, SCI-I, **IF 11.350**, Guang Chen is my Mentor)
- Wei Li, **Hu Cao***, et al. "Parking Slot Detection on Around-View Images Using DCNN," *Frontiers in Neurorobotics*, 2020, (published, **IF 3.0**, Corresponding Author)

Robotic grasping

- **Hu Cao**, et al. "Residual Squeeze-and-Excitation Network with Multi-scale Spatial Pyramid Module for Fast Robotic Grasping Detection," *IEEE International Conference on Robotics and Automation (ICRA)*, 2021, (published, CCF-B, top in Robotics)
- **Hu Cao**, et al. "Efficient Grasping Detection Network with Gaussian-based Grasp Representation for Robotic Manipulation," *IEEE/ASME Transactions on Mechatronics*, 2021, (In review, SCI-I, **IF 5.673**)
- **Hu Cao**, et al. "NeuroGrasp: Multi-modal Neural Network with Euler Region Regression for Neuromorphic Vision-based Grasp Pose Estimation," *IEEE Transactions on Instrumentation and Measurement*, 2021, (In review, **IF 4.016**)
- Bin Li, **Hu Cao***, et al. "Event-based Robotic Grasping Detection with Neuromorphic Vision Sensor and Event-Grasp Dataset," *Frontiers in Neurorobotics*, 2020, (published, SCI, **IF 3.0**, Corresponding Author)

Patents and funding

- China Patents: Active Multi-wheel Snake Robot - Patent No.201620823146.0;
- China Patents: Adaptive Multi-wheel Climbing Robot - Patent No.201620282560.5;
- Funding: Hosted the National SIT Innovation Training Project "Autonomous Track Tracking Multi-function Robot" - Project No. 201510360031, (Finished)

RELEVANT SKILLS

Programming	Proficient in C / C++, Python, Matlab, Shell, Makefile, Sqlite3, VB, Arduino
Libraries	Pytorch, Tensorflow, MXNet, OpenCV, Qt, OpenGL, Scikit-learn, Live555, ROS
Tools Platforms:	Linux, Microsoft Visual Studio, Pycharm, VScode, git, Arm, Stm32, LaTeX, Visio, PS, Corel VideoStudio, AutoCAD, UG, Ansys

HONORS & AWARDS

◇ Outstanding Graduate of Hunan Province	2019
◇ Outstanding Graduate of Hunan University	2019
◇ Outstanding Graduate Student Leader of Hunan University	2017-2018
◇ Outstanding Graduate Student of Hunan University	2017-2018
◇ Third Prize, The First China University Intelligent Robot Creative Competition	Apr 2018
◇ Second Prize, The 3rd Lushan Cup Innovation Challenge Competition	May 2018
◇ Most media Attention Award, The 3rd Lushan Cup Innovation Challenge Competition	Oct 2018
◇ Excellence award, 2018 China Innovation Competition	Jun 2018
◇ Second Prize, 2018 "Haosen Pharmaceutical Cup" 5th China Graduate Smart City Technology and Creative Design Competition	Sep 2018
◇ Second Prize, The 4th National "TRIZ" Cup College Students Innovation Competition	Apr 2016
◇ Excellence award, The 4th National "TRIZ" Cup College Students Innovation Competition	Apr 2016
◇ First Prize, The 7th National College Students Mechanical Innovation Design Competition	May 2016
◇ Excellence award, ABU 2016 National College Robot Competition	July 2016
◇ Third Prize, Anji Cup 2015 China Robot Competition	Apr 2015
◇ Third Prize, 2015 National Aerospace Model Open Competition	Aug 2015
◇ Excellence award, The 6th College of Science and Technology Innovation Competition	Dec 2015