Wenhao Ding

A Robotics Learner

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My mainly interested fields are ***Robot Navigation***, ***Reinforcement Learning*** and ***3D Computer Vision***. Besides doing research about robotic perception, I also make some projects of low-level hardware and architecture design, which are important for the whole robot system.

Education

2014 – 2018 **BS, Electronic Engineering**, *Tsinghua University*, Beijing, China.

GPA: 3.51/4.0

Honors: 34th Tsinghua University Academic Challenge Cup (*Second prize*)
35th Tsinghua University Academic Challenge Cup (*Third prize*)
Undergraduate Academic Recommendation Program Fund (2016)
10th Tsinghua University Science and Technology Innovation Training Program "Spark"
Tsinghua University Technology Innovation Excellence Award (*2016, 2017*)

Publications

2017.6 **Vehicle Pose and Shape Estimation through Multiple Monocular Vision**,
Wenhao Ding, Shuaijun Li, Guilin Zhang, Xiangyu Lei, Huihuan Qian and Yangsheng Xu,
arXiv preprint arXiv:1802.03515. **Submitted to IROS 2018**.
We present an accurate approach to estimate vehicles' pose and shape from off-board multi-view images. The images are taken by monocular cameras and have small overlaps. We utilize CNN to extract vehicles' semantic keypoints and introduce a Cross Projection Optimization (CPO) method to estimate the 3D pose.

2018.1 **MTGAN: Speaker Verification through Multitasking Triplet Generative Adversarial Networks**,
Wenhao Ding and Liang He,
arXiv preprint arXiv:1803.09059. **Submitted to INTERSPEECH 2018**.
In order to solve Automatic Speaker Verification (ASV) problem, We propose an enhanced triplet method that improves the encoding process of embeddings by jointly utilizing generative adversarial mechanism and multitasking optimization. We extend our triplet encoder with Generative Adversarial Networks (GANs) and softmax loss function.

Projects

2016.1 **Air Hockey Robot with Moving Object Tracking**.
This is a robot that can play air-hockey game with human. The architecture of this robot consists a suspension camera (capturing the moving ball) and an executive arm (a striking device with two degrees of freedom). Due to its excellent ability of prediction and speed, it can beat most human players. I did most work of this project and it received 34th Academic Challenge Cup second prize.

2016.5 **Collaborative Distributed Formation Robot System**.
We developed a collaborative distributed system with UWB (Ultra Wideband) communication and a self-made mobile robot platform. With the high positioning accuracy of UWB system (about 10cm), robots can know where they are and the distance with other robots. After receiving specific commands, these robots can move to their positions and form a predefined formation automatically.

2016.10 **Research on Bluetooth Base Station Location Scheme**.
The aim of this project is to locate receiving devices using the Received Signal Strength Indication (RSSI) of Bluetooth. The transmitting devices are arranged in an array and are connected with Controller Area Network (CAN) bus. I was responsible for designing the circuit board of transmitting and receiving devices. The whole network requires more than 100 pieces of circuit board, so the stability and robustness is an important factor to be considered.

2016.12 **A Design of Permeability Mask Based on Flexible Wearable Graphene Sensor**.
The mask we created can utilize carbon nano-materials and an electronic system to control the air intaking progress. When people do strenuous exercise, the mask can detect the moisture content of the breath and automatically increase intaking air. In this research project, I was responsible for the electronic circuit design of the control system. This project received 35th Academic Challenge Cup third prize.

2017.5 **Automatic Registration of Point Cloud through Small-overlap Cameras**.
Camera extrinsic Parameter calibration is important for 3D reconstruction. Beyond traditional methods like chessboard, we are developing an automatic method for real-time applications. We propose to use an end-to-end CNN for this task.

Activities

2015.12 **Skyworks, Tsinghua University**,
One of team leaders,
Beijing, China.
"Skyworks" is the largest student association about technology innovation in Tsinghua university and it consists three teams. I am the team leader of *Future Vision*. We make projects about computer vision, deep learning and robotic navigation.

2016.5 **Spark, Tsinghua University**,
Member,
Beijing, China.
This program selects about 40 students from sophomore undergraduate students every year. These selected students form a class to conduct overseas research and hold academic discussions. In 2016 summer vacation, we went to the British and visited Cambridge University, Oxford University, BP Amoco and Shakespeare's birthplace. The aim of our travel is to investigate the technology and culture of British.

2017.2 **Owlii (`http://www.owlii.com/`)**,
Internship,
Beijing, China.
Owlii is a startup company which develops 3D reconstruction and real-time compressed video transmission technology for VR/AR application. I am an intern here doing some works about multiple camera auto-calibration and parallel depth estimation of stereo camera.

2017.7 **Chinese University of HongKong**,
Research Assistant,
HongKong, China.
I spent about two months in CUHK doing some research about robotics and computer vision. The laboratory which I visited is called Robotics and Artificial Intelligence Laboratory. The leader of this laboratory is Prof. Yangsheng Xu.

2017.11 **Junction Hackathon**,
Participant,
Helsinki, Findland.
Junction is the biggest hackathon in Europe, which is held annually. There are more than 1,000 people from all around the world took part in Junction 2017. Our team consists of 4 people and we selected a topic about LeapMotion and HTC vive. We made a device to capture gestures and position of hand simultaneously. The website link of this project is `https://devpost.com/software/unmelted-snowman-vr-ila8eu`

Technical Experience

Languages: C/C++, Python, Matlab, Verilog, HTML/CSS

Technologies: Robot Operating System(ROS), Tensorflow, Pytorch, OpenCV, Point Cloud Library(PCL), Qt, Altium Designer, STM32, Arduino