

Education**South China University of Technology (SCUT), Guangzhou, China***Master of Engineering* in Control Science and Engineering • expected 06/2022

- GPA: 88.5/100; Ranking: 1/65
- Selected Courses: Optimization Method, Analysis of Matrix, Linear System Theory, Image Analysis, Artificial Neural Networks and Their Applications

Beijing Forestry University (BJFU), Beijing, China*Bachelor of Engineering* in Electrical Engineering and Automation • 06/2019

- GPA: 92.65/100; Ranking: 3/64
- Selected Courses: Motion Control Systems, Signal and System, Automatic Control Theory, Optimization Theory, Probability and Mathematical Statistics

ResearchProject (Ongoing): Programming of a complete static SLAM system • 06/2021

- Completed the code respectively for distortion removal, initialization, and front-end optimization, working on the code for back-end optimization

Project: Monocular deep prediction based on attention mechanism and semantic segmentation • 01/2021 to present

- Most existing methods fail to fully leverage the semantic labels. This project proposed a supervised attention module, injecting context prior into the network.
- Designed feature sharing modules to fully leverage and merge different levels of feature maps.

Project: Motion simulation design for cross-plane autonomous passage of absorption hexapod climbing robot • 09/2020

- Designed the SS-shaped function that enabled the robot to lift and lower its feet vertically, avoiding abrasion of the suckers
- Equipped the robot with Lidar for detecting the distance between the robot and the slope, allowing the robot to lift and lower its feet at an appropriate distance

Project: Algorithm development for a four degree of freedom robotic arm for sorting and capturing based on ArUco • 07/2019 - 09/2019

- Use the object's ArUco code to extract the relevant pose between the object and the hand-eye calibrated camera on the robotic arm, controlling the arm to capture objects with the positive and inverse kinematic solution of MOVEit
- Established the simulation model of the robotic arm on Gazebo
- Displayed the arm's real-time motion trajectory on rviz

Graduation Project: Design and Research on Lidar-based Navigation System of Autonomous Cleaning Vehicle • 01/2019 - 06/2019

- Implemented lidar SLAM and navigation based on the lidar equipped in autonomous cleaning vehicle with Ackermann steering structure
 - a) Established the motion model of the Ackermann vehicle
 - b) Set up the model and scenario of simulation for the vehicle using the ROS simulation platform
 - c) Conducted contrast verification of gmapping SLAM, Hector SLAM, and Cartographer algorithm based on the model and scenario of simulation
 - d) Planned the path for the simulation model combining the Dijistera global path planning algorithm and the TEB local path planning algorithm
 - e) Verified the system in real-world scenarios

National College Student Innovative Training Project: Unmanned Vehicle with Automatic Navigation and Obstacle Avoidance based on Binocular Vision • 2016 - 2017

- Design the algorithm for distance measurement and obstacle avoidance based on regular binocular cameras and establish the communication node of the upper and lower machine in ROS
- Obtained software authorship for the Three-Dimensional Dense Point Cloud Map

Publications

Journal Article: **Tianxiao Gao**, Wu Wei, Zhun Fan, Shane Xie, Xinmei Wang, Qiuda Yu. CI-Net: Contextual Information for Joint Semantic Segmentation and Depth Estimation. IEEE Transactions on Circuits and Systems for Video Technology. (under review, <http://arxiv.org/abs/2107.13800>)

Jin Han, Wu Wei, Yanjie Li, **Tianxiao Gao**. Path Planning of Mobile Robots Based on Dual-Tree Quick-RRT* Algorithm. Journal of South China University of Technology (Natural Science Edition)

Shao Chen, Yuxiang Guo, **Tianxiao Gao**, Qingyuan Gong, Junguo Zhang. RGB-D Visual SLAM for Mobile Robots. Transactions of the Chinese Society for Agricultural Machinery

Conference Article: Zhongbin Cai , Yong Gao, Wu Wei , **Tianxiao Gao**, Zhijian Xie. Model design and gait planning of hexapod climbing robot. 2020 3rd International Symposium on Power Electronics and Control Engineering (**ISPECE 2020**)

P.R.C. Patent: Three-Dimensional Space Combination Maneuvering Unit for Parking

Software Authorship: Three-Dimensional Dense Point Cloud Map Construction System based on the Deep Camera

Research Interests

General Areas: Computer Vision and Deep Learning

Specific Areas: Dynamic SLAM, Semantic SLAM

Key Words: Semantic Segmentation, Depth Estimation, Visual Odometry, Loop Closure Detection, Convolutional Neural Network, Data Association

Professional Experience

VK Robot Co Ltd., Guangzhou, China

Research & Development Engineer • 07/2019 - 09/2019 & 06/2020 - 12/2020

- Designed two sorting and capturing algorithms for robotic arms based on color recognition and Aruco code recognition
- Assisted in the organization of 2020 BRICS Skills Development and Technology Innovation Competition which attracted 17 teams nationwide and offered training in the system building and development of edge end to participants

Technical Skills

Programming Languages: C, C++, Python

Machine Learning Techniques: PyTorch, TensorFlow

Development Platforms: Robot Operating System (ROS), Ubuntu

Hardware Platforms: STM32, NVIDIA Nano, TX2, XAVIER NX, Ordroid XU4

Miscellaneous: OpenCV, Eigen, G20, MATLAB, PointCloud, AutoCAD

Honors/ Awards

Academic

- ✓ **National Merit Scholarship** • 10/2017 & 10/2016
- ✓ SCUT Excellent Student Scholarship • 2019
- ✓ BJFU 1st Class Scholarship for Excellent Student • 10/2017 & 10/2016
- ✓ **Excellent Graduate of Beijing** • 2019
- ✓ **Merit Student of Beijing** • 2018
- ✓ BJFU Merit Student • 10/2017 & 10/2016
- ✓ Excellent Award (Nationwide) and Second Prize in Beijing of the 11th iCAN International Contest of Innovation
- ✓ **First Prize (Nationwide)** of the 2nd China Postgraduate Robot Innovation and Design Competition • 2020
- ✓ **First Prize** in Beijing of the 9th Mechanical Innovation and Design Competition for Colleges in the Capital Zone • 2018
- ✓ **First Prize** of the National College Students Physics Competition • 2016
- ✓ **Second Prize** of the Mathematics Competition for College Students in Beijing (Non-Math Major Division) • 2016

Non-academic

- ✓ Excellent Individual for Social Practice in Beijing • 2017
- ✓ BJFU Excellent Social Practice Team • 2017
- ✓ Excellent Advisor Assistant of the School of Technology, BJFU • 2017

Activities

Vice Secretary of the Electrical Engineering and Automation cohort, the School of Technology, BJFU • 2018 – 2019

Vice Editorial Director of the Student Union, the School of Technology, BJFU • 2016 – 2017

Academic Commissary of the EE 15-2 Administrative Class, BJFU • 2016 - 2019