

Shutong Zhong

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Homepage: <https://iverson0630.github.io/>

EDUCATION

School of Electrical and Information Engineering, Tianjin University

- Master in **Electrical and Information Engineering** 2022.09-present
- GPA: **3.74/4**
- Bachelor in **Automation** 2018.09-2022.07
- GPA: **3.65/4**
- TOEFL: **104** GRE: **321**
- **Computer skills:** Python, C++, Linux, Qt

PUBLICATIONS & PATENTS

- **Shutong Zhong**, Ming Zeng. AWED: Asymmetric Wavelet Encoder-Decoder Framework for Simultaneous Gas Distribution Mapping and Gas Source Localization. IEEE Transactions on Instrumentation and Measurement (2024), accept (**JCR Q1**).

Highlight: A high-precision reconstruction of the airflow field distribution map has been achieved under ultra-low density sampling (0.1%), significantly reducing the number of sensors required for gas monitoring.

- Ming Zeng, **Shutong Zhong**, and Leijiao Ge. Few-shot Industrial Meter Detection Based on Sim-to-Real Domain Adaptation and Category Augmentation. IEEE Transactions on Instrumentation and Measurement (2023) (**JCR Q1**).

Highlight: A generative dataset for power meter detection in complex scenes has been constructed, and a domain adaptation model has been proposed to reduce the dependence on real datasets.

- Ming Zeng, Chang Meng, Bin Han, Yuanhao Li, Hanshen Yu, Huijia Fu and **Shutong Zhong**. Gait Characteristics and Adaptation Strategies of Ants with Missing Legs. Journal of Bionic Engineering (2024) (**JCR Q2**).
- Ming Zeng, Yuanhao Li, Chang Meng, **Shutong Zhong**, Zhijing Wang, and Feng Zhao. Motion Capture and Gait Analysis of Ants with Leg Injuries. Chinese Control Conference (CCC), IEEE, 2023.
- **Shutong Zhong**, Ming Zeng, Biao Sun. Domain Adaptive Power Meter Detection for Complex Scenarios. Machinery and Electronics Conference (EME), Chinese Institute of Electronics, 2024.
- Ming Zeng, Siying Li, **Shutong Zhong**, Feng Zhao, Xianghui Wang. Image Class Incremental Learning Algorithm Integrating Uncertainty Estimation and Incremental Stage Discrimination [P]. Tianjin: CN117079024A, 2023-11-17.
- Ming Zeng, **Shutong Zhong**, Xiangyan Meng, Yuanhao Li, Chang Meng. Personalized Voice-Triggered Emergency Assistance System [P]. Tianjin: CN115985308A, 2023-04-18.

RESEARCH

Power Inspection Robot Based on Intelligent State Perception(Project Leader) 2023.05-2024.06

Highlight: A perception-manipulation integrated robot for dangerous power scenarios has been developed, replacing human labor to complete environmental detection and emergency manipulation tasks. The robot has been put into use in a substation in Tianjin, China.

Technical detail:

- Designed a crawler-type robot capable of traversing various complex terrains (e.g., grass, steps, gravel, sand). The robot is equipped with visible and infrared cameras, and gas concentration sensors for multimodal data collection.
- Mounted a lightweight six-axis robot arm on the chassis to perform inspection tasks such as rotating knobs and toggling switches.

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- Used Qt to develop remote client software for visualizing the acquired images and data, robot status, and facilitated real-time monitoring of the operating status of various equipment in the substation.

Related skills: motion control, multi-sensor fusion, wireless communication, software development

Gait analysis of injured ants and its application in motion control of multi-legged robots

2023.02-present

Highlight: Inspired by the injured gait of ants, we have implemented gait adjustment strategies for hexapod robots under various conditions of broken legs.

Technical detail:

- A universal motion-capture and behavior-analysis device for small insects has been developed. Then through signal analysis, the locomotive patterns characterizing the injured state of insects were summarized.
- Leveraging the locomotive patterns of the injured state as prior information, a deep reinforcement learning algorithm was employed to investigate the gait recovery capabilities of a hexapod robot following different leg-amputation injuries.

Related skills: key-point detection, biobehavioral analysis, Mujoco simulation

Fully Separated Intelligent Garbage Classification Guidance System

2021.09-2023.08

Highlight: A human-computer interactive garbage classification guidance system has been developed and has been featured in special reports by the media multiple times.

Technical detail:

- Achieved classification accuracy of 95% in 34 major categories and 99% in the four categories.
- Realized the communication and work of the fully separated intelligent trash can based on the built ROS environment: the upper computer applied Jetson Nano, and the lower computer used STM32 microcontroller and was equipped with infrared, ultrasonic, and other sensors.
- Relied on Jetson Nano to identify the images collected by the camera in real-time using the deployed classification algorithm, and sent the identification results to the corresponding STM32 to control the trash can.

Related skills: incremental learning, model deployment, ROS, APP development

Intelligent Auxiliary Sensing System for Aircraft Tractors

2021.06-2021.08

Intern, China-Singapore International Joint Research Institute

Advisor: Danwei Wang, NTU

- Completed using yolov5 under the DeepStream framework to detect vehicles and workers in an airport environment.
- Completed the writing of MATLAB and Python code for multi-step trajectory prediction based on particle filtering, which is used to predict the trajectory of vehicles and aircraft to eliminate the risk of collision.
- Utilized C and C++ to write DeepStream plugins in the Linux environment to complete the packaging of background data, and applied socket communication to send it to the front end to complete data interaction.

AWARDS

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| •First Prize for Postgraduate Academic Scholarship, Tianjin University | 2022.10/2023.10 |
| •Excellent Student, Tianjin University | 2019/2020/2021 |
| •University Excellent Undergraduate Graduation Project at Tianjin University | 2022.06 |
| •Second Prize in the 15th Tianjin University Challenge Cup Competition | 2022.05 |