Guofei CHEN

gfchen@zju.edu.cn Personal Website
Zheda Rd. 38, Xihu District, Hangzhou, 310000, China

EDUCATION

Zhejiang University, Hangzhou, China *Sep 2019 - Jul 2023*
GPA: 3.95/4.0 ranking: 5/136
Bachelor of Engineering in Automation
Chukochen Honors College - Mixed Class (**4% in 3000**)
Research Interest: Multi-robot systems, Estimation, Optimization
Major Courses: Analysis, Algebra, Numerical Optimization, Control Theory, Robotics, Analog Circuit Design, Combinatorial Mathematics, Advanced Data Structure, Algorithm Analysis

PUBLICATIONS AND MANUSCRIPTS

PUBLICATIONS

1. Zhichao Chen, Luyao Wang, **Guofei Chen**, Zhiqiang Ge. Probabilistic Generative Model with Long-Term Memory and its Application in Chemical Process Modeling. *International Symposium on Process Systems Engineering (PSE)*. 2021. [paper]

MANUSCRIPTS

2. Zhichao Chen, Hao Wang, **Guofei Chen**, Le Yao, Zhiqiang Ge, Zhihuan Song. Rethinking the Parameter Learning of the Nonlinear Dynamical Probabilistic Latent Variable Model. *submitted to IEEE Transactions on Automation Science and Engineering (T-ASE)* [paper]

RESEARCH EXPERIENCE

Relative Localization in Swarm using Range Measurements June 2022 - Present
FAST Lab, Zhejiang University
Advisor: Prof. Fei Gao

- Proposed a **Vision-Inertial-UWB** tightly coupled state estimator for quadrotor swarm. Deployed multiple UWB tags on each agent and modeled the noise of UWB using Gaussian process. The state estimator could use the global relative range measurements to mitigate long-term drift in relative localization, especially in Yaw. [technical report]
- Working further on distributed global relative localization via convex relaxation. Aiming at building a robust estimator for large-scale swarms in GPS-denied environments with safety assurances.

RoboCup Small Size League Team - ZJUNlict June 2020 - July 2022
State Key Laboratory of Industrial Control, Zhejiang University
Advisor: Prof. Rong Xiong, Dr. Zheyuan Huang

- Led the team on planning & motion control module, multi-robot defense module, and kick module. In charge of maintenance, code reviewing and responsive changes in matches. Reviewed more than 30,000 lines of code. We were awarded the **champion title** among teams across the nation at *2020* and *2021 RoboCup China Open*. [video] [news]
- Proposed a mapping and planning method that accelerated the planning module by **6 times**. Leveraged the features of the soccer field for mapping and designed an efficient recursive path searching method using a visibility graph. This reduced the planning module time consumption from more than 60% to 10% per execution cycle and solved the bottleneck caused by planning efficiency, leaving more possibilities to the decision module at higher level. [technical report]

Soft Sensor based on Bayesian Inference Mar 2021 - June 2022
State Key Laboratory of Industrial Control, Zhejiang University
Advisor: Prof. Zhiqiang Ge, Dr. Zhichao Chen

- Proposed a structure in Gaussian Mixture Variational Autoencoder that uses Gumbel-Softmax reparameterization to accomplish multimodal information mixture. The work consolidated the theory of Gaussian Mixture Variational Autoencoder and improved the fitting accuracy (R^2: 0.92→0.997). The modified GM-VAE out-performs several state-of-art Auto-Encoders on chemical processes. [code] [technical report]
- Collaboratively proposed Dynamic Long-term Memory Probabilistic Generative Model (**LTM-PGM**), **the first** to consider long-term feature extraction in data-driven chemical process soft sensor. Assumed the Markov property of latent variables, used GRU cells to generate latent space, and adpoted gated residual mechanism to estimate the transformation of latent space. By analyzing the evidence lower bound (ELBO), the loss function that fits the stochastic gradient descent (SGD) framework is derived strictly. LTM-PGM out-performs the strong benchmarks of Autoencoders and LSTM networks in soft sensor research.
- Paper on *LTM-PGM* was accepted by *Symposium on Process Systems Engineering*. [code][paper]

PROJECTS

Vision-Based Electrical Transformer Inspection System Sept 2020 - Jan 2021
College of Electric Engineering, Zhejiang University
Advisor: Prof. Jianliang Zhang

- Built a vision-based inspector for electrical transformers and working conditions.
- Implemented and trained *Faster-RCNN* for object detection and *Resnet-50* for object recognition. Adopted *pytesseract* for optical character recognition (OCR), and double-check the result of OCR with another lightweight convolution neural network. Designed a pipeline for transformer inspection and built a web-based front end.

TinySQL - An Original Relational Database Management System Mar 2022 - Jun 2022
College of Computer Science, Zhejiang University
Adivisor: Prof. Yunjun Gao

- Built a relational database supporting SQL without using third-party libraries (except the SQL parser). The project includes a catalog manager to manipulate the table header, an index manager to manipulate index, a record manager to manipulate table data a buffer manager that abstracts the memory model.
- Architect of the project. Team leader, code reviewer (20k+ lines). Designed the memory model of files for table and index. Implemented the index manager, record manager, and buffer manager.
- Basic features include: SELECT Query, DELETE Query, INSERT Query, DROP Query. Other features include: Nested SELECT Query, A simple Execution Optimizer, Externally Stored Index, etc. [documentation] [code][post]

HONORS AND AWARDS

- 2020 RoboCup (ChinaOpen) Champion of Small Size League [highlights]
- 2021 RoboCup (ChinaOpen) Champion of Small Size League
- 2022 Zhejiang Robot Competition, Champion in Robot Soccer (**1 in 36**)
- 2019-2020, 2020-2021, 2021-2022 Excellence Award in Academics, Zhejiang University

SKILLS

Programming: C/C++, Python, Lua, JavaScript, MATLAB
Robotics: Airsim, ROS, IoT Chips (STM32)
Machine Learning: PyTorch, OpenCV
Language: English (TOEFL: 111, S: 25), Mandarin Chinese