

EDUCATION

Nanyang Technology University*Doctor of Philosophy, Computer Science and Engineering*

Singapore

*Jan. 2020 – Present***Shanghai Jiao Tong University***Second Bachelor of Science, Applied Mathematics*

Shanghai, China

*Sep. 2017 – July. 2020***University of Michigan - Shanghai Jiao Tong University Joint Institute***Bachelor of Science, Electrical and Computer Engineering (Major), Data Science (Minor)*

Shanghai, China

*Sep. 2015 – Aug. 2019*PUBLICATION

Minimising Task Tardiness for Multi-Agent Pickup and Delivery*International Conference on Autonomous Agents and Multiagent Systems (AAMAS), 2023*

Extended Abstract

May. 2023

Saravanan Ramanathan, Yihao Liu, Xueyan Tang, Wentong Cai, Jingning Li

Multi-Agent Pickup and Delivery with Individual Deadlines*International Conference on Web Intelligence and Intelligent Agent (WI-IAT), 2021*

Full Paper

Dec. 2021

Xiaohu Wu, Yihao Liu, Xueyan Tang, Wentong Cai, Funing Bai, Gilbert Khonstantine, Guopeng Zhao

RESEARCH

Multi-Agent Systems*Jan. 2020 – Present****Robust Continuous-Time Multi-Agent Path Execution***

Studied “Multi-Agent Path Execution with Uncertainty” with generalized definitions: continuous time, arbitrary agents shapes, graphs in Euclidean space.

Designed an algorithm to detect conflicts and remove redundant conflicts between the path plans of two agents.

Multi-Agent Path Execution with Uncertainty

Studied robust and effective execution of multi-agent path plans under uncertainty.

Defined a feasibility problem (proved to be NP-Complete) to check whether the remaining portion of a path plan can be successfully executed (conflict-freeness and deadlock-freeness).

Designed algorithms to coordinate the agents online and have as many of them as possible moving concurrently to maximize the effectiveness of execution.

Minimising Task Tardiness for Multi-Agent Pickup and Delivery

Designed a cost-based integrated task assignment and path planning algorithm to assign tasks to the agents to solve the multi-agent pickup and delivery problem.

Multi-Agent Pickup and Delivery with Individual Deadlines

Studied the multi-agent pickup and delivery problem with task deadlines, where a team of agents execute a batch of tasks with individual deadlines to maximize the number of tasks completed by their deadlines.

Buliding Systems*Jan. 2022 – Present****Playground: a “Sustainable” Building Operating System***

Studied how to support untrusted user-facing applications in smart building environments with a “sustainable” maintenance and management labor cost.

Developed an operating system abstraction for smart buildings that incorporates a structured semantic representation of the building (Brick), named Playground.

AWARDS AND HONORS

NTU Research Scholarship

Nov 2019

Meritorious Winner in Mathematical Contest In Modeling

Topic: *The Opioid Crisis*. Code: <https://github.com/tc-imba/MCM2019/>

Feb 2019

Honorable Mention in Mathematical Contest In Modeling

Topic: *Cooperate and navigate*. Code: <https://github.com/tc-imba/MCM2017/>

Feb 2017

EXPERIENCE

Teaching Assistant

Nanyang Technology University

Jan 2020 - Aug 2021

CZ2007 Introduction To Databases

CZ2005 Operating Systems

CZ1115 Introduction to Data Science and Artificial Intelligence

Teaching Assistant

University of Michigan - Shanghai Jiao Tong University Joint Institute

May 2018 - Aug 2019

VE572 Methods and Tools for Big Data

VE482 Introduction to Operating Systems

VE281 Data Structures and Algorithms

VE280 Programming and Elementary Data Structures

VG101 Introduction to Computer and Programming

VG100 Introduction to Engineering) (*Part-time*)

PROJECTS

Bubbleteach

<https://bubbleteach.org/>

Lead Developer

Sep 2023 - Present

A startup company that provides online education service to students in Singapore.

Designed the backend framework and led the development of the backend services based on FastAPI / PostgreSQL / minio.

Contest in Modeling Examination

<https://anl.sjtu.edu.cn/cme/>

Project Leader

Aug 2021 - Present

Designed and developed a platform for self-hosted MCM (Mathematical Contest in Modeling)

Served a maximum number of 2000 students at the same time.

Gatsby Theme: Academic

<https://github.com/tc-imba/gatsby-theme-academic>

Project Leader

Oct 2020 - Present

Designed a gatsby personal website template for *academic* usage.

Used by quite a few people now.

Joint Online Judge

<https://github.com/joint-online-judge>

Project Leader

Apr 2018 - Present

Developed a online judge (or auto grader) system for various courses in the joint institute.

Used python based web engine and back-end accelerated with Cython.

Sandbox based on Linux Containers (LXC) / docker.

Secure Private Dating

<https://github.com/secure-private-dating>

Project Leader

June 2019 - Aug 2019

A capstone design project about sharing a secret over an unsecure channel.

A person in the channel (Alice) only receives another person (Bob)'s message when she is also sending a message to Bob, and no other people can know this communication

Designed a protocol based on public key cryptography

Developed a secure dating platform for demonstration.

Research and Implementation of a Student Community for Modern University Project Leader

Undergraduate Innovation Practice Program

Mar 2016 - Mar 2017

Provided the student community a platform to communicate and hold events.

Isolated front-end and code integration systems.

The Optical System Study and Improvement of Visual Reality

Project Member

Undergraduate Innovation Practice Program

Mar 2016 - Mar 2017

Made some optimization in optical models of visual reality devices.

Relieved the players from dizziness during the experience of VR.

Developed A test application in *Unity*.

The Development of Teaching Assessment System

Project Member

Participation in Undergraduate Research Program

Oct 2015 - Oct 2016

Developed under the PHP CodeIgniter Framework.

Two subsystems: TA evaluation and TA admission.

PROGRAMMING SKILLS

Languages

Proficient (> 1000 hours): C/C++, Python, L^AT_EX

Medium (100 - 1000 hours): NodeJS, TypeScript/HTML/CSS, SQL, Java, PHP

Elementary (< 100 hours): MATLAB, R, Julia, Ruby, C#, Go, Shell Script, Assembly, regex

Software Tools

Deployment: docker, docker compose, git, ssh, nginx, Amazon S3, ...

Python Libs: poetry, click, pandas, numpy, matplotlib, PIL, pytorch, ...

Web: FastAPI, React, Gatsby, PostgreSQL, MongoDB, Redis, Celery, ...

L^AT_EX (huge fan): beamer, pgf/tikz, macro injection/hacking