Xinhao Xiang

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Education

University of California, Davis **09/2021- Present**

- M.S. in Computer Science

Southern University of Science and Technology (SUSTech) **09/2017- 06/2021**

- B.E. in Computer Science and Technology GPA: 3.64/4.00

Scholarships

3rd Class of the Merit Student Scholarship for Exceptional Performance in the Academic Year 2017-18 & 2019-2020
3rd Class of the Merit Student Scholarship for Freshman

Honors

Excellent Graduate for Exceptional Performance in the SUSTech (Top 5% in the University)
Highest Honors in Computer Science and Engineering for outstanding achievement in the undergraduate program (2017-2021)
Shuren College Outstanding Graduates for Exceptional Performance in the SUSTech

University of California, Irvine **07-08/2019**

- Experience University Research Program (EUR) in Division of Continuing Education GPA: 3.71/4

The University of British Columbia **07- 08/2018**

- Vancouver Summer Program in Sauder School of Business
- Courses (Grade): International Business Management (A-), International Marketing (A)

Internship

UCInspire Summer Research Internship **06 - 10/2020**
University of California, Irvine, Samueli School of Engineering

Computer Skills

JAVA (3.5yr), C (2.5yr), C++ (2.5yr), C# (1.5yr), **Python** (2.5yr), HTTP (1.5yr), CSS (1.5yr), **JavaScript** (1.5yr), **MATLAB** (2yr), Verilog HDL (2.5yr), MySQL (2yr), Linux (1yr), MIPS (1.5yr), **Latex** (1yr)

Research Experiences

1. Independent Project on Anomaly Detection in Autonomous Vehicles @ UCInspire | *Member Researcher* **06-10/2020**

- Employed the Carla simulator to perform real-time vehicle driving simulation;
- Aggregated data from different types of sensors by attaching these sensors in the ego car and implemented the callback function;
- Filtered data to extract features that are mostly relative to collision anomaly detection and then trained models;
- Applied outlier detection algorithms (e.g. KNN, Variational AutoEncoder) in Python Outlier Detection (PyOD) to detect abnormal situations.

Achievement: Designed a new strategy for anomaly detection and identified VAE (variable auto-encoder) as the best algorithm for this detection;

Publication: Caio Batista de Melo, Minjun Seo, Marzieh Ashrafiamiri, Haoming Jue, **Xinhao Xiang**, Fadi Kurdahi, and Nikil Dutt "SAFER: Safety Guanrantees for Emergent Behavior" (a paper submitted to *"ACM Transactions on Embedded Computing Systems"*)

2. Collaborative Motion and Multi-target Searching Methods of Swarm Robotics @ SUSTech | *Project Manager* **09/2019 - 07/2021**

- **Funding:** This project is awarded 2020 "Climbing Plan" Special Fund for Science and Technology Innovation Cultivation of College Students in Guangdong Province (Funding code: PDJH2020b0522, Percentage: 10/400+, Fund received: RMB 40,000, 12/2019)
- Employed the strategy of collaborative motion and multi-target searching of swarm intelligent robots under the condition of decentralized topology architecture and limited sense of perception and info-communication ability;
- Established the corresponding simulation and experiment system using mobile robot simulation platforms like MATLAB and Webots as well as real robots like E-Puck and TurtleBot to verify the effectiveness of relevant methods.

Achievements:

- **2.1** Proposed a new potential field (PF) based multi-robot movement strategy for it, where Brain Strom Optimizing (BSO) algorithm plays an important role in contributing to local area potential field, and applied the strategy to detect the pollution source;
- Under the same map condition, my strategy performs a generally higher performance on multi-target searching in MATLAB multi-robot environment, compared to other classic multi-robot movement strategies.
- **My Undergraduate Thesis**: "Collaborative Multitarget Searching of Robotic Swarms Based on PF and BSO Algorithm"
- **2.2** Assisted to propose an exploration enhanced Robotic Particle Swarm Optimization (E2RPSO) method for multi-target searching problems on robotic swarms;
- The proposed method modifies the third item in the RPSO as an additional attraction term, not only enables the robot to avoid collisions but also guides the swarm to search unexplored regions as much as possible. This operation increases the swarm's task-specific (top-down) diversity, making the system cover a broader search area and avoid falling into local optimums.

- **Publication:** Jian Yang, Ruilin Xiong, **Xinhao Xiang**, and Yuhui Shi, "Exploration Enhanced RPSO for Collaborative Multitarget Searching of Robotic Swarms", *Complexity*, vol. 2020, Article ID 8863526, 12 pages, 2020.

➢ **2.3** Assisted to propose a BSO-based collaborative searching framework for swarm robotics called Robotic BSO;

- The simulation results show that the proposed method can simulate the BSO's guided search characteristics and has an excellent prospect for multi-target searching problems for swarm robotics.
- **Publication**: Jian Yang, Donghui Zhao, **Xinhao Xiang**, and Yuhui Shi, "Robotic Brain Storm Optimization: A Multi-target Collaborative Searching Paradigm for Swarm Robotics", *Advances in Swarm Intelligence, ICSI 2021, Lecture Notes in Computer Science*, vol. 12690, Springer, Cham.

3. UCI Research Lab Project on Algorithm Design @ UCI EUR Program | *Leading Researcher* 08/2019

- Built a SMART sensor Car Kit (PiCar-S) using the Raspberry Pi single-board computer;
- Applied a Python-based IDE to design better movement strategies for obstacle avoidance, line following, and light following;
- Designed a creative-looking car and put PiCar-S in it;
- Implemented the strategies into PiCar-S and won the 3rd group in the final car-performance competition.

Selected Course Projects

Taxi data visualization and popular area mining @ Data Mining Course Project 05 - 06/2021

- Using GPS data of taxis in Shenzhen City in a day to mine information;
- Use Deck.GL to display each taxi's dynamic track in one map, also to use it to display popular pick-up and drop-off areas;
- Analysis traffic jam condition and order condition in each administrative district. and speed;
- Statistical velocity distribution by hour in Shennan Avenue, and do visualization;
- Predict the time it will take for a taxi to arrive at specific spots.

Melanoma Classification @ Deep Learning Course Project 08/2020

- Implemented a GooLeNet to complete a binary classification to judge if a given Melanoma by a picture is benign or malignant. The best accuracy is around 81%- 82% within 200 epochs;
- Shared my trained model with groupmates and use bagging to combine all the members' model together, the overall accuracy is improved by round 0.6 percent after adding my model.

Plane Fight Game @ Embedded Systems and Microprocessor Systems Course Project 12/2019

- Utilized STM32CubeIDE to program a STM32 firmware to run the Plane Flight on a chip;
- Employed Positive point atom's packet to generate basic lines and cures to form complex object shapes;
- Applied framing animation module to run the game;
- Saved game data and rendered LCD screen based on the data.

Commonly Used Text Input Based on Speech Recognition @ Artificial Intelligent Course Project 11 - 12/2019

- Applied AI models to develop a speech recognition application to improve content input efficiency;
- Stored pairs of contents and names defined by users in local database, and implemented the function of audio triggered content input;
- Applied VGG+CTC as Speech Model to extract Pinyin characters from .wav file, and then converted Pinyin characters into Chinese characters with *Hidden Markov Model with Maximum Entropy Based on Probability Graph* as the language model;
- Employed Free ST Chinese Mandarin Corpus as dataset for training.

SUSTech Mahjong @ Object-Oriented Analysis and Design Course Project 09 - 12/2019

- Utilized OOAD design pattern to write the logic and implemented the logic on the client;
- Designed the logic and implemented the functions including dealing, casting, as well as game mall.

Multifunctional Digital Clock @ Digital Logic Course Project 12/2018 - 01/2019

- Designed and built the modules based on Verilog HDL, using Minisys development board;
- Implemented functions including time display, timing, alarming and time reset.

Word Cloud @ Java programming Course Project 04 - 06/2018

- Read a photo file of the portrait and grabbed the outline of the portrait;
- Segmented the text into words and determined the word size according to the word frequency;
- Designed the user interface to choose photos and text file in PC, as well as the number of words user wants to display;
- Generated a word cloud, in which the words are in the outline of a portrait and the size of words are correspondent to their frequency

Additional Information

- Language Skills: Mandarin (Native), English (Proficient) | Hobbies: Martial Arts, Badminton
- LinkedIn: linkedin.com/in/xinhao-xiang-565532148