

Junyu Liu

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Education

Sept. 2019 – Jun. 2023 **Bachelor of Computer Science, University of Nottingham Ningbo China**
Overall GPA 3.82/4.0, Major GPA 3.87/4.0.
Current Leader of User-Centric Computing Group, a Student-Centric Research Group.

Research Overview

My research interests lie in the **Computer Graphics** and **Human Computer Interaction** fields.

- My works in **Computer Graphics** center on geometry processing and simulation, where I worked with **Prof. Daniele Panozzo** from NYU and **Prof. Teseo Schneider** from UVic on a large-scale comparison of Finite Element Methods and Virtual Element Methods on various geometrically complex domains in solving elliptic PDEs. I have also worked on physic-based character control and animation and the intersection with **Machine Learning**, where I focus on the animation and strategy designs on feint actions in Non-Deterministic Multi-Party Games. My works include the feint formalization and automated generation method [8] and generalize the fusion of feint actions into reinforcement learning models for such games [7].
- My works in **Human-Computer Interaction** centers on (semi-)autonomous vehicles. I lead the designs and developments of optimizing driving scene simulations, such as interactive toolkits for in-lab driving scene simulations [3], the BROOK dataset [4] (a multi-modal dataset for exploiting data-driven techniques in Human-Vehicle Interactive Designs), privacy protection with high data-utility [5], and etc. I also contribute to other works [2, 1, 9, 6], which are listed in the publication list.

Research Experiences

June. 2022 – Present **Undergraduate Research Internship at New York University & University of Victoria**
Advised by **Prof. Daniele Panozzo** and **Prof. Teseo Schneider**

Sept. 2021 – Present **Undergraduate Project Manager at University of Nottingham Ningbo China**
User-Centric Computing Group (An Undergraduate-Independent Research Society)

Jan. 2021 – Aug. 2021 **Undergraduate Research Assistant at University of Nottingham Ningbo China**
User-Centric Computing Group (An Undergraduate-Independent Research Society)

Selected Research Projects

June. 2022 – Present **A Large-Scale Comparison of Finite Element Methods (FEMs) and Virtual Element Methods (VEMs) on geometrically complex domains for Solving Elliptic PDEs**
Constructed a comprehensive mesh dataset by collecting, categorizing and handwriting commonly used polygonal mesh generation and triangulation methods on various domains. Conducted large-scale comparisons of the performance of FEMs and VEMs in terms of solving time for linear systems on solving Poisson and Linear Elasticity problems. The experiment results draw instructive observations in terms of solver categories, PDE selections, mesh quality refinements, and discretization choices.

Jan. 2022 – June 2022 **Feint in Multi-Player Games**
Proposed, implemented and evaluated the high-level strategy formalization of Feint in Multi-Player Games. Comprehensively addressed the formalized Feint in terms of the temporal, spatial and collective impacts. Implemented the formalized Feint and strategies under the state-of-the-art progress of multi-agent modeling. The experiment results show that our formalization of Feint in Multi-Player Games can greatly improve the reward gains from the game and significantly improve the diversity of Multi-Player Games with only negligible overheads in terms of response time [7].

Oct. 2021 – Jan. 2022 **FeintNet: Automatic Generation of Feint Actions for Multi-Player Games**
Proposed, developed and validated the first formalization method of Feint actions, the Palindrome-directed Generation of Feint. Designed and developed an automatic Feint generation model, FeintNet, to incorporate action-level policy designs with the formalization, enabling the effectiveness of Feint in multi-agent scenarios. The experiment results show that Feint actions brings overall benefits and introduce a great extent of diversity in Multi-Player Games. [8].

Sept. 2020 – Nov. 2021 **Oneiros: An Interactive and Extensible Toolkit for Agile and Automated Developments of Complicated Driving Scenes**
Designed and developed Oneiros, an interactive toolkit for agile and automated designs and developments of driving simulations, which is the first toolkit to fulfill the domain knowledge gap between designers and programmers, and address the inefficiency during driving scene development. Empirical study shows that Oneiros can significantly improve the productivity of both designers and programmers by increasing user-friendliness [3].

Selected Publications

- [7] **Junyu Liu**, Wangkai Jin, and Xiangjun Peng. 2022. Feint in Multi-Player Games. In *Proceedings of ICLR 2023: Eleventh International Conference on Learning Representations (ICLR'23)*, **(Under Review)**.
- [8] **Junyu Liu**, Wangkai Jin, and Xiangjun Peng. 2022. FeintNet: Enabling Automatic Generation of Feint Actions for Multi-Player Games. In *Proceedings of SIGGRAPH 2023: International Conference and Exhibition on Computer Graphics and Interactive Techniques (SIGGRAPH'23)*, **(Manuscript/In Preparation)**.
- [3] **Junyu Liu***, Shuolei Wang*, Haoxuan Sun, Xiaoxing Ming, Wangkai Jin, Zilin Song, and Xiangjun Peng. 2022. [Oneiros-OpenDS: An Interactive and Extensible Toolkit for Agile and Automated Developments of Complicated Driving Scenes](#). In *Proceedings of the 24th International Conference on Human-Computer Interactions (HCI'22)*.
- [4] **Junyu Liu***, Yicun Duan*, Zhuoran Bi, Xiaoxing Ming, Wangkai Jin, Zilin Song, and Xiangjun Peng. 2022. BROOK Dataset: A Playground for Exploiting Data-Driven Techniques in Human-Vehicle Interactive Designs. In *Proceedings of the 25th International Conference on Human-Computer Interactions (HCI'23)*, **(Under Review)**.
- [5] **Junyu Liu***, Yicun Duan*, Wangkai Jin, and Xiangjun Peng. 2022. Characterizing Differentially-Private Techniques in the Era of Internet-of-Vehicles. In *Proceedings of the 25th International Conference on Human-Computer Interactions (HCI'23)*, **(Under Review)**.
- [1] Zeyu Xiong, Jiahao Wang, Wangkai Jin, **Junyu Liu**, Yicun Duan, Zilin Song, and Xiangjun Peng. 2021. [Face2Statistics: User-Friendly, Low-Cost and Effective Alternative to In-Vehicle Sensors/Monitors for Drivers](#). In *Proceedings of the 24th International Conference on Human-Computer Interactions (HCI'22)*.
- [2] Jiahao Wang, Zeyu Xiong, Yicun Duan, **Junyu Liu**, Zilin Song, and Xiangjun Peng. 2021. [The Importance Distribution of Drivers' Facial Expressions Varies over Time!](#) In *AutomotiveUI '21: 13th International Conference on Automotive User Interfaces and Interactive Vehicular Applications (AutomotiveUI'21)*. ACM, 148–151.
- [6] Xiaoxing Ming, Yicun Duan, **Junyu Liu**, Zhuoran Bi, Haoxuan Sun, Zilin Song, Xiangjun Peng, and Wangkai Jin. 2022. Enabling Efficient Emulation of Internet-of-Vehicles on a Single Machine: Practices and Lessons. In *Proceedings of the 25th International Conference on Human-Computer Interactions (HCI'23)*, **(Under Review)**.
- [9] Zhuoran Bi, **Junyu Liu**, Xiaoxing Ming, and Wangkai Jin. 2022. FIGCON: Exploiting Fine-Grained CONstructs of Facial Expressions for Efficient and Accurate Estimation of In-Vehicle Drivers' Statistics. In *Proceedings of the 25th International Conference on Human-Computer Interactions (HCI'23)*, **(Under Review)**.

Academic Services and Mentoring

Fall 2021 – Present **Undergraduate Project Manager** in *User-Centric Computing Group*.

I am mentoring four undergraduate students to conduct research, which is a significant part of our group. Currently, we have four research projects ongoing, including model customization, driving style characterization and simulator engines generalization.

May 2022 **Technical Reviewer** in NeurIPS 2022

* stands for equal contribution.