Jiawei Fang

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Personal Statement

- I have focused on human-computer interaction, smart flexible clothing, and generative AI during my research career. Previously, I was a research intern at Carnegie Mellon University in the Computer Science Department, mentored by Prof. Lining Yao. I am currently working as a visiting scholar at UC Berkeley in the Mechanical Engineering Department thanks to Prof. Yao's support.

Education

09/2020- 07/2024 **Xiamen University, Fujian, China**

- **Bachelor of Artificial Intelligence, School of Informatics**
- Research Interests: **Human-computer Interaction, Smart Fabric, Generative AI**
- GPA: 3.47/4.00 Integrated Rank: 17/91

Publication

1. **Jiawei Fang**, Haishan Song, Chengxu Zuo, Xiaowei Chen, Shihui Guo, Yipeng Qin, SuDA: Support-based Domain Adaptation for Sim2Real Motion Capture with Flexible Sensors, ICML 2024.

2. Chengxu Zuo, **Jiawei Fang**, Shihui Guo, Yipeng Qin, Self-Adaptive Motion Tracking Against On-body Displacement of Flexible Sensors, NeurIPS 2023.

3. Xiaowei Chen, Xiao Jiang, **Jiawei Fang**, Shihui Guo, Juncong Lin, Minghong Liao, Guoliang Luo, Hongbo Fu, Dispad: Flexible On-Body Displacement of Fabric Sensors for Robust Joint-Motion Tracking, Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies (IMWUT), Volume 7, Issue 1, 2023.

4. **Jiawei Fang***, Xiaoxia Gao*, Yipeng Qin, Shihui Guo, Yiyue Luo, Learning Different Body Shape, Wearing Position and Joint Angle from Strain Curve, plan to submit to **Nature Machine Intelligence**.

5. **Jiawei Fang***, Ruonan Zheng*, Yuan Yao, Xiaoxia Gao, Shihui Guo, Yiyue Luo, FIP: Endowing Robust Motion Capture on Daily Garment by Fusing Flex and Inertial Sensors, under review of CHI 2025.

6. **Jiawei Fang***, Qiuyu Lu*, Zhihao Yao*, Yue Yang, Haipeng Mi, Lining Yao, Large Language Model Agents Enabled Generative Design of Fluidic Computation Interfaces, Adjunct UIST 2025.

7. **Jiawei Fang***, Qiuyu Lu*, Zhihao Yao*, Yue Yang, Haipeng Mi, Lining Yao, Enabling Generative Design Tools with LLM Agents for Building Novel Devices: A Case Study on Fluidic Computation Interfaces, under review of CHI 2025.

Research Experience

3/2024 - Present **Mechanical Engineering Dept, University of California, Berkeley (Onsite) Visiting Scholar**

3/2024 - Present ***Part1. Large Language Model for Autonomous Design of Novel Devices***

- **Propose** a generative LLM agent framework for autonomous design of different novel devices. Our tool could write prompts for each LLM, generate compact agent python codes, and propose a design tool for a given novel device paper. Experiments demonstrate our work could be generalized to a wide range of novel devices including RoboGrammar, Fluidic Computation Kit and Sustainflatable.

3/2024 - 8/2024 ***Part2. Enabling Generative Design Tools with LLM Agents for Building Novel Devices***

- **Propose** a generative design tool (GDT) with LLM agents for building novel device, in the realm of fluid computation. GDT could propose varied application scenarios, recommend appropriate device designs, and generates the necessary design parameters for fabrication.
- **Program** codes of a LLM agent framework independently. Achieve effective communication of six different agents using Flask, Assistant API and Voiceflow. Responsible for code implementation, paper writing and figure drawing**.** Under review of **CHI 2024**.

05/2023 - 12/2023 **Morphing Matter Lab, Carnegie Mellon University (Remote)** **Research Intern**

Generative AI for Morphing Matter

- **Utilize** diffusion model for point cloud generation, DDPM was improved with a more efficient method, and the generation rate was increased by ten times.
- **Replicate** tens of different AIGC3D methods, including differential render-based (e.g., NeRF) and generative models based (e.g., LION).

09/2022 - 11/2024 **Human + Lab, Xiamen University, China** **Research Assistant**

09/2023 - 11/2024 ***Part1. Learning Different Body Shape, Wearing Position and Joint Angle from Invariant Strain Curve***

- **Propose** Strain Curve, which captures strain variation across circular positions during joint motion, providing key insights into strain behavior.
- **Establish** a novel Biomechanics Informed Neural Network (BINN), which integrates machine learning with biomechanics information to accurately predict body shape, wearing position, and joint angle.

- **Collecting** the largest dataset comprising around 150 users, 72 wearing positions, 10 motion types, and more than 100 device designs, accounting for over 4,000,000 frames in total. **Achieve** accuracy comparable to supervised learning. Submitted to **Nature Machine Intelligence.**

09/2023 - 09/2024 ***Part2. FIP: Robust Motion Capture on Daily Garment***

- **Propose** a novel motion-capturing system using daily garments with two elbow-attached flex sensors and four Inertial Measurement Units.
- **Establish** a Displacement Latent Diffusion Model and a Physics-informed Calibrator to compensate for sensor displacements and fuse the multi-modality sensor readings with a Pose Fusion Predictor.
- **Outperform** the accuracy of state-of-the-art (SOTA) real-time posture estimation **(26.4%↑)** with a significant advance in elbow joint tracking **(30.1%↑)**. Under review of **CHI 2024**.

09/2022 - 05/2023 ***Part3. Dispad: Flexible On-Body Displacement of Fabric Sensors for Robust Joint Motion Tracking***

- **Propose** an unsupervised method based on fuzzy entropy and transfer learning to address sensor displacement, achieving an average error of 10.98 degrees across different motion types and 11.81 degrees across different users.
- **Collect and pre-process** data from various motions, users, and wearing positions. Responsible for model improvement, user study and article drawing and writing. Published in **ACM IMWUT 2024.**

01/2023 - 08/2023 ***Part4. Self-Adaptive Motion Tracking against On-body Displacement of Flexible Sensors***

- **Propose** a novel self-adaptive motion tracking network to address real-time on-body sensor displacement of flexible sensors.
- **Replicate** seven SOTA domain adaptation methods such as DSAN, DANN, DAAN. The results show that our method fits the ground truth with a closer distance than other SOTA methods. Published in **NeurIPS 2023.**

09/2022 - 02/2024 ***Part5. SuDA: Support-based Domain Adaptation for Sim2Real Motion Capture with Flexible Sensors***

- **Propose** a novel Support-based transfer learning method for Sim2Real motion capture, namely SuDA (Support-based Domain Adaptation), which registers function supports instead of data distribution to address the data-hungry problem.
- **Establish** an efficient fabric-human-motion simulation framework to obtain simulation data, which was established using SMPL, Marvelous Designer and Mixamo, respectively.
- **Achieve** comparable accuracy (7.64 ± 2.58°) to supervised learning (6.42 ± 2.73°) without relying on any real labeled data, showing robustness on different users, wearing positions, motions and joints. Published in **ICML 2024.**

Startup Experience

01/2022- 01/2023 **Xiamen Yuzitongpao, Inc.** **Co-founder & CEO**

- **Design** and fabricate an intelligent motion capture clothes with 24 flexible strain sensors, experiencing technical experiments for 100 washing times, achieving a high accuracy (5.33° on full body).
- **Develop** intelligent fitness software MetaFit, bringing professional exercising guidance and provide users an fitness experience in Metaverse.
- **Sign** a technology license contract with Shenzhen Shokz CO., LTD (**300, 000 yuan**), and won the Grand Prize in China's top startup competitions.

Awards & Honors

- Outstanding Student Award (2020, 2022 & 2024)
- Outstanding Graduate Award (2024)
- Academic innovation scholarship in XMU (2021~2024)
- First Class Scholarship (top5%, 2024)
- Key Project of National Innovation Plan (top0.5%, 2022, Leadership)
- Recommended by the National Annual Meeting of Innovation and Entrepreneurship (**1st** in XMU, 2023, Leadership)
- **1st** in Software Design Competition of Xiamen University (2022, Leadership)
- **2nd** in National College Students E-commerce "Innovation, Creativity and Entrepreneurship" Challenge (2021, Leadership)
- **1st** in Fujian College Students E-commerce "Innovation, Creativity and Entrepreneurship" Challenge (2021, Leadership)
- **1st** in Xiamen College Students E-commerce "Innovation, Creativity and Entrepreneurship" Challenge (2021, Leadership)

Academic Skills

- **Software and Tools:** Origin, MeshLab, Blender, MAYA, Unity, Arduino, Marvelous Designer
- **Language:** Mandarin (Native), English (Proficiency)
- **Technical:** Python, C, C++, Flask, MATLAB, LaTeX