XINYU YI

ByteDance Research Scientist

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PROFILE

I'm Xinyu Yi, a Research Scientist at ByteDance focusing on robotics research. Previously, I obtained my Ph.D. from Tsinghua University in 2025, supervised by Prof. Feng Xu. Before that, I received my B.S. from School of the Gifted Young, University of Science and Technology of China in 2020. My research aims to build physics-based motion capture and human-environment interaction systems.

SKILLS

Languages: Python, C++, C.
Expertise: I'm familiar with tools such as PyTorch and Unity3D, and technologies including motion capture and IMU. Additionally, I have experience in motion recognition, SLAM, robotics, and physical simulation.

EDUCATION

2020.09 - 2025.07 **School of Software, Tsinghua University** **Ph.D.**
Software Engineering

2016.09 - 2020.07 **School of the Gifted Young, University of Science and Technology of China** **B.S.**
Computer Science

RESEARCH (FIRST AUTHOR)

SIGGRAPH'25 **Improving Global Motion Estimation in Sparse IMU-based Motion Capture with Physics**
***Xinyu Yi**, Shaohua Pan, Feng Xu*
Real-time human motion capture based on six inertial sensors in unconstrained 3D space. The method reconstructs human motion along with 3D-space contacts, contact forces, joint torques, and interacting proxy surfaces in real time. This series of works have been featured in domestic tech media like QbitAI, with a total of 230,000 views on domestic video platforms like Bilibili. The works were also invited to be reported by the international tech media Two Minute Papers (1.3M subscribers). Project page: xinyu-yi.github.io/GlobalPose

SIGGRAPH'24 **Physical Non-inertial Poser: Modeling Non-inertial Effects in Sparse-inertial Human Motion Capture**
***Xinyu Yi**, Yuxiao Zhou, Feng Xu*
Real-time human motion capture based on six inertial sensors, with improved accuracy through modeling non-inertial forces. This work was selected for SIGGRAPH Technical Paper Demos (17 out of 252) and invited for exhibition at SIGGRAPH 2024. Project page: xinyu-yi.github.io/PNP

SIGGRAPH'23 **EgoLocate: Real-time Motion Capture, Localization, and Mapping with Sparse Body-mounted Sensors**
***Xinyu Yi**, Yuxiao Zhou, Marc Habermann, Vladislav Golyanik, Shaohua Pan, Christian Theobalt, Feng Xu*
Real-time human motion capture, localization, and mapping based on six inertial sensors and one head-mounted camera. Project page: xinyu-yi.github.io/EgoLocate

CVPR'22 **Physical Inertial Poser: Physics-aware Real-time Human Motion Tracking from Sparse Inertial Sensors**
Best Paper Finalist ***Xinyu Yi**, Yuxiao Zhou, Marc Habermann, Soshi Shimada, Vladislav Golyanik, Christian Theobalt, Feng Xu*
Real-time human motion capture based on six inertial sensors, with physical optimization to enhance the physical plausibility of motion reconstruction. Received a perfect score (3 strong accepts) and was selected for Best Paper Finalist (0.4%). Project page: xinyu-yi.github.io/PIP

SIGGRAPH'21 **TransPose: Real-time 3D Human Translation and Pose Estimation with Six Inertial Sensors**
***Xinyu Yi**, Yuxiao Zhou, Feng Xu*
Real-time human motion capture based on six inertial sensors, achieving global motion estimation through a multi-branch strategy. Selected for the SIGGRAPH Lab Program (4 out of 150), and showcased live at SIGGRAPH 2021. Project page: xinyu-yi.github.io/TransPose

CICAI'21 **HierarIK: Hierarchical Inverse Kinematics Solver for Human Body and Hand Pose Estimation**
Best Paper Finalist ***Xinyu Yi**, Yuxiao Zhou, Feng Xu*
Real-time inverse kinematics solving algorithm for human body and hands based on multi-level networks.

RESEARCH (CO-AUTHOR)

TVCG'25 **DiffCap: Diffusion-based Real-time Human Motion Capture using Sparse IMUs and a Monocular Camera**
*Shaohua Pan, **Xinyu Yi**, Yan Zhou, Weihua Jian, Yuan Zhang, Pengfei Wan, Feng Xu*
Real-time human motion capture from sparse body-worn IMUs and a monocular camera, working well for different scenarios including severe occlusions and subjects moving out of camera view.

UIST'25 **BaroPoser: Real-time Human Motion Tracking from IMUs and Barometers in Everyday Devices**
*Libo Zhang, **Xinyu Yi**, Feng Xu*
Real-time human pose and global translation estimation from IMU and barometric data recorded by a smartphone and a smartwatch on the body.

ICCV'25 **MagShield: Towards Better Robustness in Sparse Inertial Motion Capture Under Magnetic Disturbances**
*Yunzhe Shao, **Xinyu Yi**, Lu Yin, Shihui Guo, Junhai Yong, Feng Xu*
A lightweight method that addresses the issue of magnetic disturbances in sparse inertial motion capture systems, improving their performance in magnetically disturbed environments.

SIGGRAPH'25 *Best Paper Award* **Transformer IMU Calibrator: Dynamic On-body IMU Calibration for Inertial Motion Capture**
*Chengxu Zuo, Jiawei Huang, Xiao Jiang, Yuan Yao, Xiangren Shi, Rui Cao, **Xinyu Yi**, Feng Xu, Shihui Guo, Yipeng Qin*
Online IMU calibration for inertial motion capture, addressing dynamic sensor-to-bone rotation estimation and sensor global drift estimation. Project page: www.humanplus.xyz/siggraph-2025-zcx

SIGGRAPH'24 **Hand-Object Interaction Controller (HOIC): Deep Reinforcement Learning for Reconstructing Interactions with Physics**
*Haoyu Hu, **Xinyu Yi**, Zhe Cao, Jun-Hai Yong, Feng Xu*
Real-time hand-object interaction reconstruction based on a single depth camera, incorporating physical simulation to ensure the physical correctness of the reconstruction.

CVPR'24 **Loose Inertial Poser: Motion Capture with IMU-attached Loose-Wear Jacket**
*Chengxu Zuo, Yiming Wang, Lishuang Zhan, Shihui Guo, **Xinyu Yi**, Feng Xu, Yipeng Qin*
Real-time human pose estimation based on sparse inertial sensors located on loose-fitting clothing.

SIGGRAPH Asia'23 **Fusing Monocular Images and Sparse IMU Signals for Real-time Human Motion Capture**
*Shaohua Pan, Qi Ma, **Xinyu Yi**, Weifeng Hu, Xiong Wang, Xingkang Zhou, Jijunnan Li, Feng Xu*
Real-time human motion capture based on six inertial sensors and one monocular camera. Project page: shaohua-pan.github.io/robustcap-page

SIGGRAPH Asia'22 **Physical Interaction: Reconstructing Hand-object Interactions with Physics**
*Haoyu Hu, **Xinyu Yi**, Hao Zhang, Jun-Hai Yong, Feng Xu*
Real-time reconstruction of hand-object interaction based on a single depth camera.

PATENTS (GRANTED)

Patent 2024	IMU-Based Human Motion Capture and Joint Force Analysis Method	CN114332912B
Patent 2024	A Deep Learning-based Method for Solving Human Inverse Kinematics Problems	CN113643419B
Patent 2022	A System for Real-time Human Motion Capture and Force Estimation from Sparse IMUs	CN114417738B

PATENTS (PUBLISHED)

Patent 2025	Method and Device for Human-Environment Interaction Reconstruction Using Sparse IMUs	CN120406726A
Patent 2024	Method and Device for IMU Data Synthesis in Inertial Motion Capture	CN118570250A
Patent 2024	Method and Apparatus for Inertial Motion Capture Using Non-Inertial-Frame Dynamic Modeling	CN118643265A
Patent 2024	Body Shape-Aware Sparse IMU Motion Capture Method and System	CN118097775A
Patent 2023	Method for Motion Capture, Localization, and Environment Mapping Using Sparse Sensors	CN116503540A
Patent 2022	Physics-Based Method and Device for Real-Time Reconstruction of Hand-Object Interactions	CN115239906A
Patent 2022	Method, Apparatus, and Device for Real-Time Human Motion Capture Using Sparse IMUs	CN114413897A

TALKS

CSIG Talk'25 **Sparse Sensor-Based Real-Time Human Motion Capture Method**
Invited talk at the 14th Forum of CSIG. Website: www.csig.org.cn/22/202501/52359.html

CVPRW'24 **Talk & Live Demo: Egocentric Motion Capture with Sparse Inertial/Visual Sensors**
Invited talk at the CVPR 2024 EgoMotion Workshop. Website: egomotion-workshop.github.io

Invited Talk'24 **Human Tracking and Localization with Sparse Body-worn Sensors**
Invited talk at the 1st Guangdong-Hong Kong-Macao Greater Bay Area Indoor Positioning Youth Academic Seminar in 2024.

GAMES Webinar'22 **Human Motion Capture with Sparse Inertial Measurement Units**
Invited talk at GAMES Webinar 2022. Website: games-cn.org/games-webinar-20220929-249

SERVICES

- Reviewer for SIGGRAPH Asia 2025、TVCG 2025、SIGGRAPH 2025、CVPR 2025、ICCV 2025、AAAI 2025、3DV 2025、EG 2025、TOG 2024、ECCV 2024、IMWUT 2024、EG 2024、TOMM 2023、SIGGRAPH Asia 2023、ICCV 2023、MVAP

2023

- GitHub 1k+ stars

HONORS

2025 Outstanding Ph.D. Dissertation of Tsinghua University
2025 Outstanding Graduate of Beijing
2025 University Nomination for Apple Scholars in AI/ML
2024 National Scholarship
2023 China Guanggu Scholarship (1st)
2022 Huawei Scholarship (1st)
2021 Kuaishou Scholarship (1st)
2018 Outstanding Student Scholarship (2nd)
2017 Guanghua Scholarship
2016 Outstanding Student Scholarship (2nd)

ACTIVITIES

2025.01 Invited talk at the 14th Forum of CSIG
2024.08 Live demo at SIGGRAPH 2024 conference
2024.06 Invited talk at CVPR 2024 Workshop
2022.09 Invited talk at CCF GAMES Webinar
2022.08 Spotlight talk and poster at VALSE 2022
2022.04 Talk at Microsoft CVPR 2022 Pre-workshop
2021.08 Live demo at SIGGRAPH 2021 Lab Program
2021.06 Invited exhibition at GAITC 2021
2021.05 Best Poster Award at CCF GAMES 2021

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