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Citizenship: China

Research interests Human-Computer Interaction, Virtual & Augmented Reality, Tactile Modelling and Rendering, Wearable Interface, Haptic Interface

Education

City University of Hong Kong	Hong Kong SAR, China
Doctor of Philosophy in Creative Media	09/2019 – 08/2023 (Expected)
Supervisor: Prof. Kening Zhu	

Huazhong Agricultural University	Wuhan, China
Bachelor of Engineering in Mechanical Engineering	09/2014 – 06/2018
Thesis: Designing of Automatic Flatness Detection System Based on PLC	

List of Publications

[j4] **PropelWalker: A Leg-based Wearable System with Propeller-based Force Feedback for Walking in Fluids in VR**
Pingchuan Ke, **Shaoyu Cai**, Haichen Gao and Kening Zhu.
In 2022 IEEE Transactions on Visualization & Computer Graphics.

[c7] **Multi-modal Transformer-based Tactile Signal Generation for Haptic Texture Simulation of Materials in Virtual and Augmented Reality**
Shaoyu Cai and Kening Zhu.
In 2022 IEEE International Symposium on Mixed and Augmented Reality Adjunct (ISMAR-Adjunct).

[j3] **GAN-based image-to-friction generation for tactile simulation of fabric material**
Shaoyu Cai, Lu Zhao, Yuki Ban, Takuji Narumi, Yue Liu and Kening Zhu.
In Computers & Graphics, vol. 102, pp. 460-473, Feb. 2022.

[c6] **Weighted Walking: Propeller-based On-leg Force Simulation of Walking in Fluid Materials in VR**
Pingchuan Ke, **Shaoyu Cai**, Lantian Xu, Kening Zhu.
In SIGGRAPH Asia 2021 Emerging Technologies (SA '21 Emerging Technologies). ACM, New York, NY, USA, Article 19, pp. 1–2. 2021.

[j2] **Visual-Tactile Cross-Modal Data Generation using Residue-Fusion GAN with Feature-Matching and Perceptual Losses**

Shaoyu Cai, Kening Zhu, Yuki Ban, and Takuji Narumi.

In IEEE Robotics and Automation Letters (RA-L), vol. 6, no. 4, pp. 7525-7532. with IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS 2021).

[c5] FrictGAN: Frictional Signal Generation from Fabric Texture Images using Generative Adversarial Network

Shaoyu Cai, Yuki Ban, Takuji Narumi, and Kening Zhu.

In ICAT-EGVE 2020: International Conference on Artificial Reality and Telexistence & Eurographics Symposium on Virtual Environments, pp. 11-15. The Eurographics Association, 2020. (**Best Paper Audience Choice Award**)

[c4] ThermAirGlove: A pneumatic glove for thermal perception and material identification in virtual reality

Shaoyu Cai, Pingchuan Ke, Takuji Narumi, and Kening Zhu.

In 2020 IEEE Conference on Virtual Reality and 3D User Interfaces (VR), pp. 248-257. IEEE VR, 2020. (Acceptance Rate = 21.4%)

[c3] Demonstration of thermairglove: A pneumatic glove for material perception in virtual reality through thermal and force feedback

Shaoyu Cai, Pingchuan Ke, Shanshan Jiang, Takuji Narumi, and Kening Zhu.

In SIGGRAPH Asia 2019 Emerging Technologies, pp. 11-12. 2019. (Acceptance Rate = 20%)

[j1] A sense of ice and fire: Exploring thermal feedback with multiple thermoelectric-cooling elements on a smart ring

Kening Zhu, Simon Perrault, Taizhou Chen, **Shaoyu Cai**, and Roshan Lalintha Peiris.

International Journal of Human-Computer Studies 130 (2019): 234-247.

[c2] Embodied Weather: Promoting Public Understanding of Extreme Weather Through Immersive Multi-Sensory Virtual Reality

Pingchuan Ke, Kai-Ning Keng, Shanshan Jiang, **Shaoyu Cai**, Zhiyi Rong, and Kening Zhu.

In The 17th International Conference on Virtual-Reality Continuum and its Applications in Industry, pp. 1-2. 2019.

[c1] HapTwist: creating interactive haptic proxies in virtual reality using low-cost twistable artefacts

Kening Zhu, Taizhou Chen, **Shaoyu Cai**, Feng Han, and Yi-Shiun Wu.

In SIGGRAPH Asia 2018 Virtual & Augmented Reality, pp. 1-2. 2018.

Research experience

Shanghai Jiaotong University

School of Mechanical Engineering

Wearable Systems Lab

Shanghai, China

Visiting Researcher

03/2022 – 07/2022

Mentor: Prof. Peter Shull

The University of Tokyo Tokyo, Japan
Graduate School of Information Science and Technology Visiting Researcher
Cyber Interface Lab 01/2020 – 03/2020
Mentors: Prof. Takuji Narumi and Prof. Yuki Ban

City University of Hong Kong Hong Kong SAR, China
School of Creative Media Research Assistant
Multimodal and Embodied Interaction (MEI) Lab 09/2018 – 08/2019
Mentor: Prof. Kening Zhu

National Taipei University Taiwan, China
Department of Electrical Engineering Exchanging Student
Artificial Intelligence & Robotics Technology Lab 09/2016 – 01/2017
Mentor: Prof. Hooman Samani

Teaching experience **SM1103A: Introduction to Media Computing** Teaching Assistant
Lecturers: Mike Wong, Daniel Howe, Dick Thung Fall 2020 & 2021
Teaching basic programming of p5.js

SM2715: Creative Coding Teaching Assistant
Lecturers: Mike Wong, Manfred Lau, Ryan Lam Spring 2021
Teaching basic programming of Processing

Talks and Demos **CCVR 2022 Student Competition** 11/2022
Presentation: A pneumatic glove with thermal and force feedback Online

2nd Chinese Journal of image and Graphics (JIG) workshop 10/2022
Talk: Haptic modelling algorithms and rendering techniques Online

Workshop in ISMAR 2022: Transforming Medical Education and Clinical Application through Extended Reality 10/2022
Talk: Haptic modelling and rendering for VR and robotics Singapore

NUS-HCI Lab Visiting 10/2022
Talk: Tactile modelling and rendering for VR and robotics Singapore

SCM/ACIM Research Colloquium 02/2022
Talk: Deep Cross-modal Visual-Tactile Generation Hong Kong

ACM SIGGRAPH Asia 2021 12/2021
Demonstration: *Weighted Walking* Online

IROS 2021	09/2021
Presentation: <i>Visual-Tactile Data Generation</i>	Online
Seeing in the Dark: Hong Kong Harbour and Lighthouses	05/2021
Demonstration: <i>Embodied Weather</i>	Hong Kong Maritime Museum
ICAT-EGVE 2020	12/2020
Presentation: <i>FrictGAN</i>	Online
The Night of IEEE VR, China VR 2020 Workshop	09/2020
Talk: <i>ThermAirGlove</i>	Poster Presentation Online
IEEE Virtual Reality 2020	03/2020
Presentation: <i>ThermAirGlove</i>	Online
ACM SIGGRAPH Asia 2019	11/2019
Demonstration & Presentation: <i>ThermAirGlove</i>	Brisbane, Australia
ACM SIGGRAPH VRCAI 2019	11/2019
Demonstration: <i>Embodied Weather</i>	Brisbane, Australia
ACM SIGGRAPH Asia 2018	12/2018
Demonstration: <i>Haptwist</i>	Tokyo, Japan

Honors

First Prize in 5th Competition on VR	CCVR 2022
Second Prize in AR/VR workshop (Chinese)	Journal of Graphics 2022
Best Paper Audience Choice Award (Top 3)	ICAT-EGVE 2020
Special Thanks for Speakers	China VR 2020
Research Tuition Scholarship (Amount: 84192 HKD)	CityU 2020 & 2022
Special Recognitions for Outstanding Reviews	CHI 2020 & 2022
Outstanding Reviewers	MobileHCI 2020
Outstanding Graduates (Top 10)	HZAU 2018

Skills

Programming

Proficient in: Python, TensorFlow, PyTorch, Keras, MATLAB.
Familiar with: C, C#, JavaScript, HTML, Unity.

Prototyping

Proficient in: Arduino, Processing, 3D Printing & Laser cutting.
Familiar with: AutoCAD, PCB, Circuit design.

Languages

Mandarin Chinese (Native), English (Fluent), Cantonese (Competent), Japanese (Basic).

Service and outreach	Paper Reviewing	
	CHI 2020 (Special Recognitions) & 2021 & 2022 (Special Recognitions) & 2023 Papers IEEE VR 2023 (TVCG) Elsevier Virtual Reality & Intelligent Hardware ISS 2021 (ACM PAMHCI Journal) VRST 2020 & 2021 Papers ICMI 2021 & 2022 Papers ISMAR 2021 & 2022 Posters UbiComp/ISWC 2021 Posters and Demos MobileHCI 2020 (Special Recognitions) & 2022 Papers SIGGRAPH Asia 2019-2022 Emerging Technologies CHI 2019 Late-Breaking Work	
	Program Committee Member	
	CHI 2020 & 2021 & 2023 Late-Breaking Work ICMI 2022 Papers	
Memberships	ACM student member	2019.10-present
	IEEE student member	2022.09-present
List of referees	<u>Prof. Kening ZHU, PhD</u>	
	PhD supervisor	
	Associate Professor at School of Creative Media & Department of Computer Science, City University of Hong Kong Email: keninzhu@cityu.edu.hk Webpage: https://meilab-hk.github.io/	
	<u>Prof. Takuji NARUMI, PhD</u>	
	Research supervisor	
	Associate Professor at Graduate School of Information Science and Technology, The University of Tokyo Email: narumi@cyber.t.u-tokyo.ac.jp Webpage: https://www.cyber.t.u-tokyo.ac.jp/ja	
	<u>Prof. Xinge YU, PhD</u>	
	Research supervisor	
	Associate Professor at Department of Biomedical Engineering, City University of Hong Kong Email: xingeyu@cityu.edu.hk Webpage: https://yu-electronics.com/	