Shaoyu Cai

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Person Webpage: https://shaoyuca.github.io/mypage/

Citizenship: China

Research interests
Human-Computer Interaction, Haptic Texture Modelling and Rendering, Cross-modal Learning, Haptic Interface, Virtual & Augmented Reality

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

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**	Shanghai, China
	School of Mechanical Engineering	Visiting Researcher
	Wearable Systems Lab	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   **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: *Visual-Tactile Data Generation* Oral Presentation   Online

Seeing in the Dark: Hong Kong Harbour and Lighthouses   05/2021

Demonstration: *Embodied Weather*   Hong Kong Maritime Museum

ICAT-EGVE 2020   12/2020

Presentation: *FrictGAN* Oral Presentation   Online

The Night of IEEE VR, China VR 2020 Workshop   09/2020
Talk: *ThermAirGlove* Poster Presentation   Online

IEEE Virtual Reality 2020   03/2020
Presentation: *ThermAirGlove* Oral Presentation   Online

ACM SIGGRAPH Asia 2019   11/2019
Demonstration & Presentation: *ThermAirGlove*   Brisbane, Australia

ACM SIGGRAPH VRCAI 2019   11/2019
Demonstration: *Embodied Weather*   Brisbane, Australia

ACM SIGGRAPH Asia 2018   12/2018
Demonstration: *Haptwist*   Tokyo, Japan

Honors

Best Paper Audience Choice Award (Top 3)   ICAT-EGVE 2020
Special Thanks for Speakers   China VR 2020
Special Recognitions for Outstanding Reviews   CHI 2020 & 2022
Research Tuition Scholarship 2020 & 2022 (Amount: 84192 HKD)   CityU
Outstanding Reviewers   MobileHCI 2020
Outstanding Graduates (Top 10)   HZAU

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 Late-Breaking Work
ICMI 2022 Papers

Memberships | ACM student member | 2019.10-present
 | IEEE student member | 2022.09-present

References | **Prof. Kening Zhu** | PhD supervisor

Associate Professor at the School of Creative Media & Department of Computer Science, City University of Hong Kong
Email: keninzhu@cityu.edu.hk

Prof. Takuji Narumi | Research supervisor

Associate Professor at the Graduate School of Information Science and Technology, The University of Tokyo
Email: narumi@cyber.t.u-tokyo.ac.jp