Shaoyu Cai

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Citizenship: China

Research interests

Human-Computer Interaction, Tactile Modeling and Rendering, Cross-modal Learning, Haptic Interface, Virtual & Augmented Reality

Education

City University of Hong Kong — Hong Kong SAR, China
Doctor of Philosophy — 09/2019 – Present
Supervisor: Prof. Kening Zhu

Huazhong Agricultural University — Wuhan, China
Bachelor of 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.

[c6] **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

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

ACM SIGGRAPH Asia 2021 — 12/2021
Weighted Walking Demonstration — Online

IROS 2021 — 09/2021
Visual-Tactile Data Generation Oral Presentation — Online

Seeing in the Dark: Hong Kong Harbour and Lighthouses — 05/2021
Embodied Weather Demonstration — Hong Kong Maritime Museum

ICAT-EGVE 2020 — 12/2020
FrictGAN Oral Presentation — Online

The Night of IEEE VR, China VR 2020 workshop — 09/2020
IEEE VR 2020 Workshop — Online

IEEE Virtual Reality 2020 — 03/2020
ThermAirGlove Oral Presentation — Online

ACM SIGGRAPH Asia 2019 11/2019
ThermAirGlove Demo & Presentation Brisbane, Australia

ACM SIGGRAPH VRCAI 2019 11/2019
Embodied Weather Demo Brisbane, Australia

ACM SIGGRAPH Asia 2018 12/2018
Haptwist Demo 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 2020/21 (Amount: 42096 HKD) CityU
Outstanding Reviewers MobileHCI 2020
Outstanding Graduates (Top 10) HZAU

Skills

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

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) Papers
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