

Takefumi Hiraki

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Personal Profile

I am a Postdoc Researcher in Pattern Measurement Group, Department of Systems Innovation, Graduate School of Engineering Science at Osaka University. I received my Ph.D. in Information Science and Technology in 2019, M.S. in 2016, and B.E. in 2014. I propose a new augmented reality system that aim to collaborates between the real world and the virtual world more intuitive. My major background is Computer Science and Information Engineering, but I also familiar with Robotics and Electronics through participation in robot contests for undergraduate students.

Research Interests

Augmented and Mixed Reality, Human-Computer Interaction, Ubiquitous Computing, and Robotics. Especially, I am interested in high-speed projection, light communication, projection mapping, and haptic interfaces.

Professional Experience

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| Apr 2019 - now | Osaka University
Postdoc Researcher as JSPS Research Fellow (PD).
Pattern Measurement Group,
Department of Systems Innovation,
Graduate School of Engineering Science,
Osaka University, JAPAN. |
| Jun 2016 - Oct 2016,
Jan 2017 - Mar 2017 | Microsoft Research Asia
Internship Fellow.
Human-Computer Interaction Group.
Supervised by Dr. Masaaki Fukumoto. |
| Apr 2016 - now | JST ERATO Kawahara Universal Information Network Project
Visiting Researcher (2019 - now).
Research Assistant (2016), Research Collaborator (2017 - 2019).
Application Design Group. Supervised by Dr. Yoshihiro Kawahara. |

Education

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| Apr 2016 - Mar 2019 | Ph.D., Information Science and Technology
Department of Information and Communication Engineering,
Graduate School of Information Science and Technology,
The University of Tokyo, JAPAN.
Supervised by Dr. Takeshi Naemura. |
| Apr 2014 - Mar 2016 | Masters of Interdisciplinary Information Studies
Department of Interdisciplinary Information Studies,
Graduate School of Interdisciplinary Information Studies, |

The University of Tokyo, JAPAN.
Supervised by Dr. Takeshi Naemura.

Apr 2010 - Mar 2014 Bachelors of Engineering

Department of Information and Communication Engineering,
Faculty of Engineering,
The University of Tokyo, JAPAN.

Honors and Awards

- Mar 2019 Electrical Science and Engineering Promotion Student Paper Award**
“Pixel-level Visible Light Communication Projector with Interactive Update of Images and Data,”
The Promotion Foudation for Electrical Science and Engineering, Japan.
- Dec 2018 Human Communication Award (Annual Best Paper Award)**
“Encoding Scheme for Improving Image Quality and Data Transfer Rate of PVLC Projector ,”
Human Communication Group,
the Institute of Electronics, Information and Communication Engineers, Japan.
- Jan 2018 MVE Award (Best Paper Award)**
“Encoding Scheme for Improving Image Quality and Data Transfer Rate of PVLC Projector ,”
IEICE Technical Group on Media Experience and Virtual Environment, Japan.
- Apr 2017 The Award of Excellence in the Internship Program**
Microsoft Research Asia, Beijing, China.
- Oct 2016 METI Innovative Technologies**
“Phyigital Field,”
Ministry of Economy, Trade and Industry of Japan, Japan.
- Jun 2015 MVE Award (Best Paper Award)**
“Controlling Swarms of Robots using a PVLC Projector,”
IEICE Technical Group on Media Experience and Virtual Environment, Japan.
- Jun 2013 The Runner-up**
College Category of NHK Robot Contest 2013, Japan
As a leader of the team of the University of Tokyo
- Aug 2012 ABU Robocon Award, 2nd Runners-up**
ABU Asia-Pacific Robot Contest 2012, Hongkong, China
As a leader of the team of the University of Tokyo
- Oct 2011 The University of Tokyo President Award**
As a member of the robot contest team of the University of Tokyo
- Aug 2011 ABU Robocon Award**
ABU Asia-Pacific Robot Contest 2011, Bangkok, Thailand
As a member of the team of the University of Tokyo
- Jun 2006 The Runner-up**
Multi-team section in the Rescue Secondary category
Robocup Junior 2006, Bremen, Germany
As a leader of the team

Publications

Journal Articles

Takefumi Hiraki, Shogo Fukushima, Yoshihiro Kawahara, and Takeshi Naemura: “Phygital Field: An Integrated Field with Physical Robots and Digital Images using Projection-based Localization and Control Method,” *Journal of Control, Measurement, and System Integration*, vol. 11, no. 4, pp.302–311 (2018.7).

Takefumi Hiraki, Mika Koizumi, Leijie Zhou, Shogo Fukushima, and Takeshi Naemura: “Reconfigurable Pixel-level Visible Light Communication with Light Source Control,” *Transaction on the Virtual Reality Society of Japan*, vol. 21, no. 1, pp.197–206 (2016.3). (in Japanese)

Conference Papers

Takefumi Hiraki, Shogo Fukushima, Hiroshi Watase, and Takeshi Naemura: “Pixel-level Visible Light Communication Projector with Interactive Update of Images and Data,” In *Proceedings of International Display Workshops (IDW 2018)*, pp.1192–1195 (2018.12).

Takefumi Hiraki, Shogo Fukushima, and Takeshi Naemura: “Projection-based Localization and Navigation Method for Multiple Mobile Robots with Pixel-level Visible Light Communication,” In *Proceedings of the 2016 IEEE/SICE International Symposium on System Integration (SII 2016)*, pp.862–868 (2016.12).

Takefumi Hiraki, Shogo Fukushima, and Takeshi Naemura: “Sensible Shadow: Tactile Feedback from Your Own Shadow,” In *Proceedings of 7th Augmented Human International Conference (AH 2016)*, pp.23:1–23:4t (2016.2).

Workshops, Posters, and Demos

Ikuo Kamei, **Takefumi Hiraki**, Shogo Fukushima, and Takeshi Naemura: “PILC Projector: RGB-IR Projector for Pixel-level Infrared Light Communication,” In *Proceedings of the 26th IEEE Conference on Virtual Reality and 3D User Interfaces (IEEE VR 2019)*, 2 pages (2019.3).

Takefumi Hiraki, Masaaki Fukumoto, and Yoshihiro Kawahara: “Touchable Wall: Easy-to-Install Touch-Operated Large-Screen Projection System,” In *Proceedings of the 2018 ACM International Conference on Interactive Surfaces and Spaces (ISS 2018)*, pp.465–468 (2018.11).

Satoshi Abe, **Takefumi Hiraki**, Shogo Fukushima, and Takeshi Naemura: “Screen–Camera Communication via Matrix Barcode Utilizing Imperceptible Color Vibration,” In *Adjunct Proceedings of the 31st Annual ACM Symposium on User Interface Software & Technology (UIST 2018)*, pp.166–168 (2018.10).

Takefumi Hiraki, Yoshihiro Kawahara, and Takeshi Naemura: “Projection-based Localization and Control Method of Robot Swarms for Swarm User Interfaces,” In *Adjunct Proceedings of the 2018 ACM International Joint Conference on Pervasive and Ubiquitous Computing (UbiComp 2018)*, pp.584–589 (2018.10).

Satoshi Abe, Atsuro Arami, **Takefumi Hiraki**, Shogo Fukushima, and Takeshi Naemura: “Imperceptible Color Vibration for Embedding Pixel-by-Pixel Data into LCD Images,” In *Proceedings of the 2017 ACM Conference Extended Abstracts on Human Factors in Computing Systems (CHI EA '17)*, pp. 1464–1470 (2017.5).

Takefumi Hiraki, Shogo Fukushima, and Takeshi Naemura: “Phygital Field: an Integrated Field with a Swarm of Physical Robots and Digital Images,” In *ACM SIGGRAPH Asia 2016 Emerging Technologies, Talk (SA '16)*, pp.2:1–2:2 (2016.12).

Takefumi Hiraki *, Koya Narumi *, Koji Yatai, and Yoshihiro Kawahara: “Phones on Wheels: Exploring Interaction for Smartphones with Kinetic Capabilities,” In *Adjunct Proceedings of the 29th Annual ACM Symposium on User Interface Software & Technology (UIST 2016)*, pp.121–122 (2016.10). (* Joint First Authors)

Takefumi Hiraki, Yasuaki Kakehi, and Yoshihiro Kawahara: “Basic Estimation of Internal Power Harvesting in Mouth Cavity,” In Adjunct Proceedings of the 2016 ACM International Joint Conference on Pervasive and Ubiquitous Computing (UbiComp 2016), pp.954–957 (2016.9).

Takefumi Hiraki, Issei Takahashi, Shotaro Goto, Shogo Fukushima, and Takeshi Naemura: “Phygital Field: Integrated Field with Visible Images and Robot Swarm Controlled by Invisible Images,” In ACM SIGGRAPH 2015 Posters (SIGGRAPH ’15), p.85:1 (2015.8).

Skills and Knowledge

- **Programming Languages**

- C (includes embedded systems)
- C++ (includes embedded systems)
- Python

- **Softwares**

- PCB Design - Cadsoft EAGLE
- CAD for Mechanical Design - SolidWorks
- IC and MEMS Design - Cadence Virtuoso

- **Knowledge**

- Rapid Prototyping (Hardware and Software)
- Electronic Circuits (Analog and Digital)
- Robotics (includes Hardware Design and Control)
- Optics Design of Projector, especially High-speed DLP Projector
- Design and Processes of MEMS

- **Miscellaneous**

- Graphics and Movies - Adobe Photoshop, Illustrator, After Effects
- Source Version Control - Subversion, git
- Knowledge for Building Environment on Ubuntu / Debian Linux (includes embedded systems such as RaspberryPi)

References

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