SIGGRAPH **2018**: **Emerging Technologies**
English

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A Full-Color Single-Chip-DLP Projector with an Embedded 2400-fps Homography Warping Engine
Shingo Kagami
Koichi Hashimoto
Tohoku University

This installation presents a 24-bit full-color projector that utilizes single-chip DLP technology. It is extremely useful for projection mapping applications in highly dynamic scenes, allowing for motion adaptability of over 2400-fps. The projector can be interfaced with a host PC via standard HDMI and USB without the need of high computational burden.

Aerial-Biped: A New Physical Expression by the Biped Robot Using a Quadrotor
Azumi Maekawa
Ryuma Niiyama
Masahiko Inami
Shunji Yamanaka
The University of Tokyo

This project aims to augment the physical expression of the robot by using the novel foot trajectory generation method. Aerial-Biped can generate bipedal walking motions interactively according to the motion of the quadrotor.

AutoFocals: Gaze-Contingent Eyeglasses for Presbyopes
Nitish Padmanaban
Robert Konrad
Gordon Wetzstein
Stanford University

Autofocals is a hardware and software solution for presbyopes (those with an age-related loss of accommodation) that externally mimics the natural accommodation response. By combining data from eye trackers and a depth sensor and then automatically driving focus-tunable lenses, users can refocus by simply looking around.

CHICAP: Low-Cost Hand Motion Capture Device Using 3D Magnetic Sensors for Manipulation of Virtual Objects
Yong-Ho Lee

Mincheol Kim
Hwang-Youn Kim
Dongmyoung Lee
Bum-Jae You
Center of Human-Centered Interaction for Coexistence

Our exoskeleton motion capturing device leads you to a special interaction experience in the virtual world.

CoGlobe: A Co-Located Multi Person FTVR Experience

Sidney Fels
University of British Columbia

Ian Stavness
University of Saskatchewan

Qian Zhou
University of British Columbia

Dylan Fafard
University of Saskatchewan

CoGlobe uses an advanced spherical, fish-tank virtual reality multi-projector display and additional mobile displays to provide users a highly interactive, collaborative, co-located 3D mixed reality experience.

FairLift: Interaction with Mid-Air Images on Water Surface

Yu Matsuura
The University of Electro-Communications

Naoya Koizumi
The University of Electro-Communications, JST PRESTO

FairLift is an interaction system involving mid-air images, which are visible to the naked eye under and on a water surface. The system provides an experience for users to scoop up a mid-air image with their palms.

Fusion: Full Body Surrogacy for Collaborative Communication

MHD Yamen Saraiji
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Tomoya Sasaki
The University of Tokyo

Reo Matsumura
The University of Tokyo

Kouta Minamizawa
Keio University Graduate School of Media Design

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Fusion is a telecollaboration system that allows two participants to share the same point of view and physical space for remote operation and collaboration. The system is designed as a backpack, and is operated in three different modes: direct collaboration, enforced body guidance, and induced body motion, enabling effective communication.

Gum-Gum Shooting
Hsueh-Han Wu
Tokyo Institute of Technology, Hasegawa Shoichi Laboratory

This work unleashes the physics limitation of a human body and induces a sense of arm elongation in virtual reality. We mainly utilize the stimuli of touch/vision to reproduce this sensation. In addition, we designed a VR shooting game for users to enjoy the superhuman combat experience.

HapCube: A Tactile Actuator Providing Tangential and Normal Pseudo-Force Feedback on a Fingertip
Hwan Kim
HyeonBeom Yi
Richard Chulwoo Park
Woohun Lee
KAIST

HapCube is a small-size tactile actuator that provides tangential and normal pseudo-force feedback on users' fingertips. The tangential feedback simulates frictional force in any tangential directions, and the normal feedback simulates tactile sensations when pressing various types of buttons. HapCube supports users' clicking and dragging behaviors on GUIs of VR/AR.

HeadLight: Egocentric Visual Augmentation by Wearable Wide Projector
Shunichi Kasahara
SonyCSL

HeadLight is a wearable projector system that provides wide egocentric visual augmentation. This provides projection angle with approximately 105 degrees horizontal and 55 degrees vertical from the point of view. With HeadLight, the three-dimensional virtual space that is consistent with the physical environment is rendered in the real world.

LevioPole: Mid-Air Haptic Interactions Using Multirotor
Tomoya Sasaki
Richard Sahala Hartanto
The University of Tokyo

Kao-Hua Liu
National Cheng Kung University

Keitarou Tsuchiya
Atsushi Hiyama
Masahiko Inami
The University of Tokyo

LevioPole, a rod-like device that provides mid-air haptic feedback for full-body interaction in virtual reality and augmented reality. The device is constructed from two rotor units allowing portability and ease of use. These rotors generate both rotational and linear forces that can be driven according to the target application.

Make Your Own Retinal Projector: Retinal Near-Eye Displays via Metamaterials

Yoichi Ochiai
Kazuki Otao
Yuta Itoh
Shouki Imai
Kazuki Takazawa
Hiroyuki Osone
Atsushi Mori
Ippei Suzuki
University of Tsukuba, Pixie Dust Technologies, Inc.

We present a novel design method for retinal image projection by using the metamaterial mirror (plane symmetric transfer optical system). Using this projection method, the designing of retinal projection becomes easy. It would be possible to construct an optical system that allows quick follow-up of retinal projection hardware.

Real-Time Non-Line-of-Sight Imaging

Matthew O'Toole
David B. Lindell
Gordon Wetzstein
Stanford University

A confocal scanning technique solves the reconstruction problem of non-line-of-sight imaging to give fast and high-quality reconstructions of hidden objects.

SEER: Simulative Emotional Expression Robot

Takayuki Todo
Independent

SEER (Simulative Emotional Expression Robot) is an animatronic humanoid robot that generates gaze and emotional facial expressions to improve animativity, lifelikeness, and impresssiveness by the integrated design of modeling, mechanism, materials, and computing. The robot can simulate a user’s movement, gaze, and facial expressions detected by a camera sensor.

Spherical Full-Parallax Light-Field Display Using Ball of Fly-Eye Mirror
Hiroaki Yano
Tomohiro Yendo
Kohei Matsumura
Akane Temochi
Masaki Yamauchi
Hiroaki Matsunaga
Nagaoka University of Technology

We present an optical system design for a full-parallax spherical light-field display based on the time-division multiplexing method. The proposed system offers features that are distinct from existing systems that make it suitable for specific uses, such as a digital signage and art exhibitions.

Steerable Application-Adaptive Near-Eye Displays
Kishore Rathinavel
Praneeth Chakravarthula
University of North Carolina at Chapel Hill, NVIDIA

Kaan Aksit
Josef Spjut
Ben Boudaoud
NVIDIA Corporation

Turner Whitted
NVIDIA Corporation, University of North Carolina at Chapel Hill

David Luebke
NVIDIA Corporation

Henry Fuchs
University of North Carolina at Chapel Hill

This augmented reality display uses interchangeable 3D-printed optical components to provide content-specific accommodation support. It also presents high-resolution imagery in a gaze-contingent manner by implementing a lens actuation based foveation mechanism.

Taste Controller: Galvanic Chin Stimulation Enhances, Inhibits, and Creates Tastes
Kazuma Aoyama
The University of Tokyo

The purpose of our demonstration is to introduce the galvanic jaw stimulation (GJS), which is a technology used to induce, inhibit, and enhance taste sensation with electrical stimulation. In our demonstration, users will experience the taste changing without additional chemical materials.

Transcalibur: Weight Moving VR Controller for Dynamic Rendering of 2D Shape Using Haptic Shape Illusion
Jotaro Shigeyama
Takeru Hashimoto
Shigeo Yoshida
Taiju Aoki
Takuji Narumi
Tomohiro Tanikawa
Michitaka Hirose
The University of Tokyo

Transcalibur is a dynamic weight moving VR controller for 2D haptic shape rendering using haptic shape illusion. This allows users to perceive the feeling of various shape in virtual space with a single controller. Our user study showed that the system succeeded in providing shape perception over a wide range.

Transmissive Mirror Device Based Near-Eye Displays with Wide Field of View
Kazuki Otao
Yuta Itoh
Kazuki Takazawa
Yoichi Ochiai
University of Tsukuba, Pixie Dust Technologies, Inc.

We present a transmissive mirror device (TMD) based near-eye see-through display with a wide viewing angle for augmented reality. We develop a simple see-through display that easily sets up from a combination of off-the-shelf HMD and TMD. We demonstrate a prototype with a diagonal viewing angle of 100 degrees.

Verifocal: a Platform for Vision Correction and Accommodation in Head-Mounted Displays
Pierre-Yves Laffont
Ali Hasnain
Pierre-Yves Guillemet
Samuel Wirajaya
Liqiang Khoo
Teng Deng
Jean-Charles Bazin
Lemnis Technologies

We present a varifocal platform for head-mounted displays. This platform eliminates the vergence-accommodation conflict and corrects the user's vision by dynamically adjusting the focus inside a head-mounted display. We introduce a varifocal rendering pipeline and compare multiple varifocal optical systems for adjusting focus.

VPET - Virtual Production Editing Tools
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Kai Goetz
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Patricia Rohr
Filmakademie Baden-Württemberg GmbH, Animationsinstitut, FMX

The work on intuitive virtual production technology at Filmakademie led to an open platform tied to existing film pipelines. The Virtual Production Editing Tools (VPET) are open-source and constantly updated on Github. We introduce an intuitive environment where augmented reality extends real sets with modifiable virtual scenes.

Wind-Blaster: A Wearable Propeller-Based Prototype That Provides Ungrounded Force-Feedback

Seungwoo Je
Hyelip Lee
Myung Jin Kim
Andrea Bianchi
KAIST

Using wearable propellers, Wind-Blaster allows the wearer to experience ungrounded haptic force feedback, increasing immersion in virtual environments without restricting movement.

Human Support Robot (HSR)

Takashi Yamamoto, Hideki Kajima, Mitsunori Ohta, Koichi Ikeda, Tamaki Nishino, Andrew Custer, Yutaka Takaoka
Toyota Research Institute

Human Support Robot is a compact mobile manipulator for family members living under the same roof, which provides support to improve the overall quality of life. The Human Support Robot can move around the house, watch over family members, and fetch objects. The goal is to make our robot beneficial to all people in the near future.

Hands-Free Augmented Reality for Vascular Interventions

We demonstrate how a virtual 3D anatomical model can be rotated, scaled, and translated using small head movements and voice commands. This enables easy hands-free manipulation by a physician during a vascular intervention—a type of minimally invasive surgical procedure in which catheters and wires are guided through a patient's body.

Alon Grinshpoon, Shirin Sadri, Gabrielle Loeb, Carmine Elvezio, Samantha Siu, Steven Feiner
Columbia University