

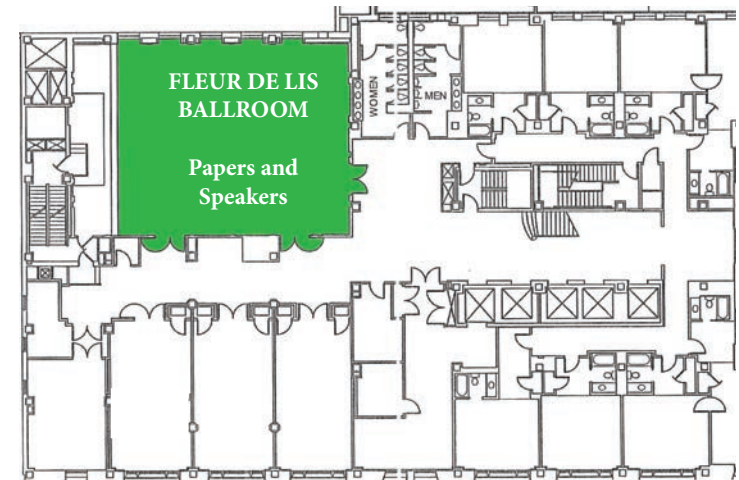


# Schedule

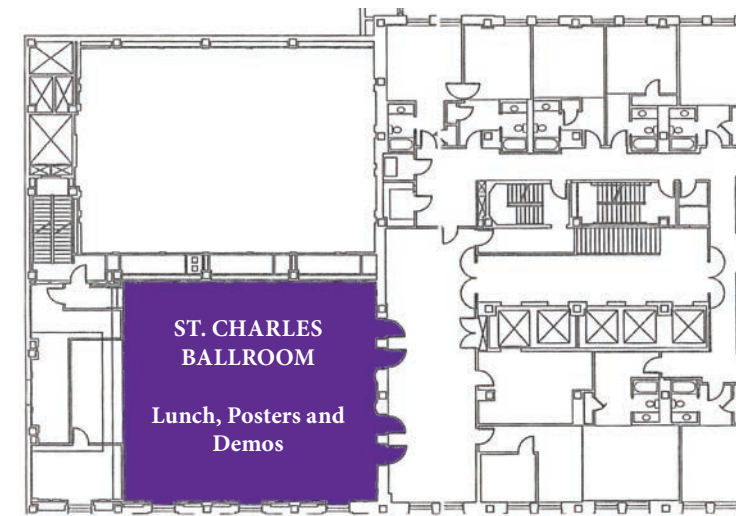
# Venue Map

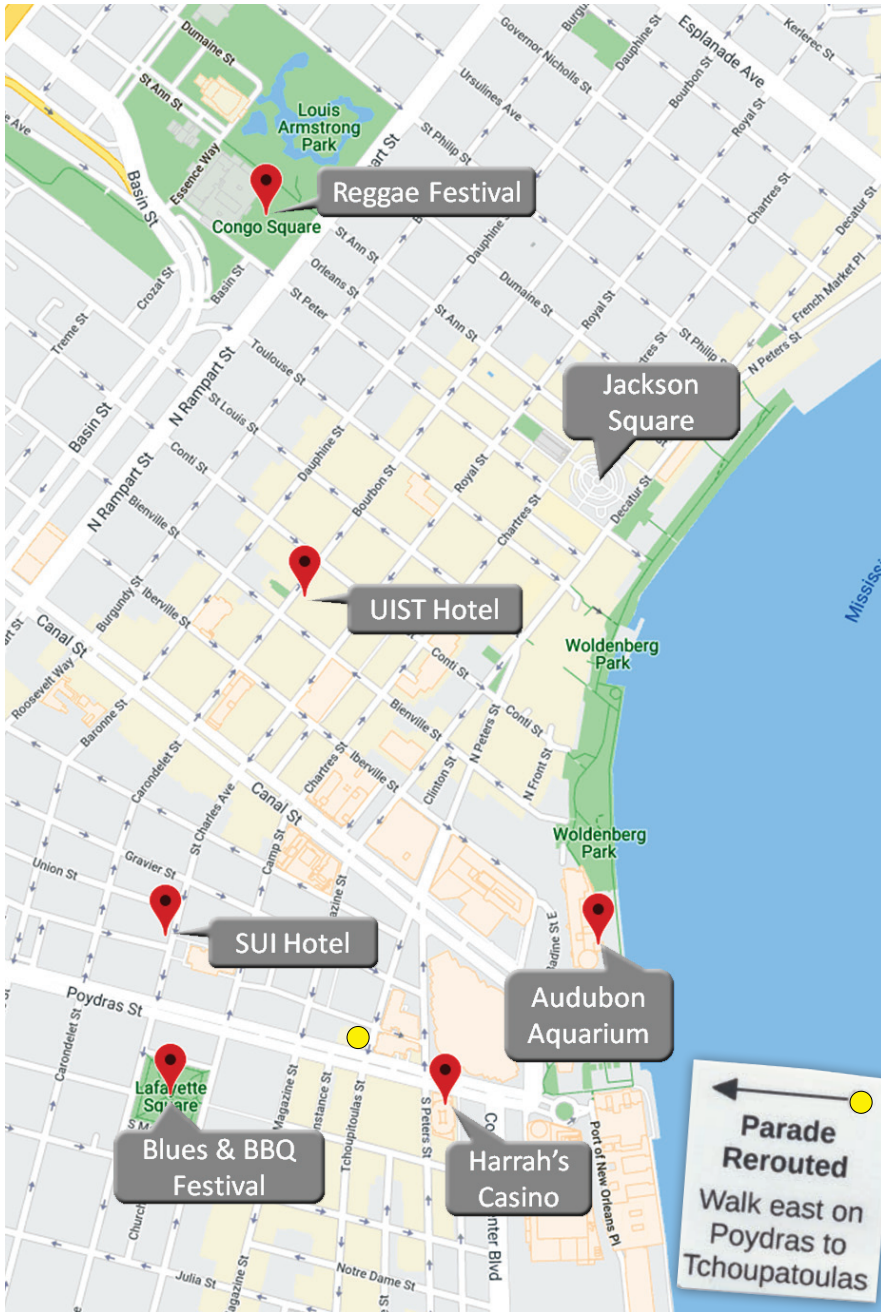
	SATURDAY, 19 OCTOBER	SUNDAY, 20 OCTOBER
7:30 AM		Breakfast (St. Charles Ballroom)
8:00 AM		Registration
8:30 AM	Registration	Session IV: Augmented Reality Modeling & Gaze (Fleur de Lis Ballroom)
9:00 AM	Opening Remarks	
9:30 AM	Session I: Multimodality (Fleur de Lis Ballroom)	Poster and Demo Session (St. Charles Ballroom)
10:00 AM		
10:30 AM	Break	
11:00 AM	Session II: Virtual Reality & Avatars (Fleur de Lis Ballroom)	Extended Lunch (on your own) Suggested meetup at Blues and BBQ Festival.
11:30 AM		
12:00 PM	Louisiana Lunch (St. Charles Ballroom)	
12:30 PM		
1:00 PM		
1:30 PM	Keynote (Fleur de Lis Ballroom)	Session V: Perception & Accessibility (Fleur de Lis Ballroom)
2:00 PM		
2:30 PM	Break	
3:00 PM	Session III: Displays (Fleur de Lis Ballroom)	Break
3:30 PM		Capstone Talk (Fleur de Lis Ballroom)
4:00 PM	Poster and Demo Fast Forward (Fleur de Lis Ballroom)	Awards and Closing Remarks (Fleur de Lis Ballroom)
4:30 PM	Poster and Demo Setup (St. Charles Ballroom)	
5:00 PM		
5:30 PM		

2nd Floor



3rd Floor





SUI 2019 takes place in historic Downtown New Orleans at the newly renovated Hilton St. Charles with exciting events and memorable attractions nearby. The conference venue is conveniently located on the St. Charles streetcar line and just blocks away from the French Quarter. After conference hours, experience a culture like no other in nearby historic neighborhoods, taste authentic creole and cajun cuisines, or visit a variety of local festivals.

## Festivals

**Krewe of Boo** (October 19) Experience a taste of the spooky side of Mardi Gras. This parade features full floats, marching bands, and costumes, and takes place only a few blocks from the Hilton St. Charles. Saturday Oct 19 begins at 6:30 PM

**Crescent City Blues and BBQ Fest** (October 18-20) Just a 2-3 minute walk from the conference, renowned blues artists perform while the best BBQ vendors in the region serve up their best meats. Friday Oct 18 from 5 PM to 8:30 PM; Saturday & Sunday Oct 19 & 20 from 11 AM to 8:30 PM

**New Orleans Reggae Fest** (October 19) International reggae artists gather on 2 stages in Louis Armstrong Park only a mile away from the hotel. Saturday Oct 19 from 11 AM to 8 PM

**Oktoberfest** (October 18-19) The local German population puts on a traditional German celebration with authentic foods and beers. Friday Oct 18 from 4 PM to 11 PM, Saturday Oct 19 from 1 PM to 11 PM

### Indoor Activities

**Audubon Aquarium** - Less than a 15 minute walk from the hotel, the Aquarium of the Americas showcases aquatic life from the Great Maya Reef, the Gulf of Mexico, and many others.

**Riverwalk Outlet Collection** - Located along the bank of the Mississippi River, the Riverwalk features high-end outlet shopping, local restaurants, and a scenic view along the river only 5 blocks from the Hilton St. Charles.

**National WWII Museum** - Designated by Congress as America's official WWII museum, it tells the story of the American experience in the war, with a special focus on D-Day.

## Night Life

Harrah's Casino  
Frenchmen Street  
Bourbon Street

### Cultural and Sightseeing

Ghost Tours  
Jackson Square  
Hop On, Hop Off Buses  
French Market



### Joseph J. LaViola, Jr.

#### Keynote - Gesture Recognition: Key Insights and Future Directions

Despite over 30 years of research, 3D gestural interfaces still remain a challenging problem in achieving highly accurate and robust recognition systems that users want to adapt and use regularly. In this talk, I will discuss my work in this area, focusing on the last 10 years of research projects that aim to increase the number of gestures one can accurately recognize at any one time as well as the exploration of what it means to have an ecologically valid recognizer evaluation. I will also present lessons learned along the way and areas for future work in this exciting and challenging research area



*Joseph J. LaViola Jr. is the Charles N. Millican Professor of Computer Science and directs the Interactive Computing Experiences Research Cluster at the University of Central Florida. He is also an adjunct associate research professor in the Computer Science Department at Brown University and the former director of the Modeling and Simulation graduate program at UCF.*

*His primary research interests include pen- and touch-based interactive computing, 3D spatial interfaces, human-robot interaction, multimodal interaction, and user interface evaluation. His work has appeared in journals such as ACM TIIS, ACM TOCHI, IEEE PAMI, Presence, and IEEE Computer Graphics & Applications, and he has presented research at conferences including ACM CHI, ACM IUI, IEEE Virtual Reality, and ACM SIGGRAPH. He is also the lead author on the second edition of 3D User Interfaces: Theory and Practice, the first comprehensive book on 3D user interfaces.*

### Daniel Wigdor

#### Capstone - Building a New Paradigm: Lessons from the Commercial Development of Touch Systems, and How We Can Do Better in AR/VR

With every advance in sensing comes a renewed belief that user experience design will melt away, replaced by instinct and “natural” tendencies. As illustrated in the commercial development of multitouch technologies, this is demonstrably false. In this talk, we will review lessons learned from mistakes made in early capacitive touchscreen commercialization efforts through to the present day, and propose a path forward for rich, highly functional, appropriate user interfaces for augmented and virtual reality.



*Daniel is an Associate Professor and the NSERC-Facebook Industrial Research Chair of Human-Machine Interaction at the University of Toronto. He has previously conducted research as part of teams at Microsoft Research (MSR), Mitsubishi Electric Research Labs (MERL), Cornell Tech, the University of Washington, and Harvard University. In the late 2000's, he served as Microsoft's architect of natural user interface technologies, working with teams to develop the basic tenets and technologies of Microsoft Kinect, Microsoft Surface, Windows, Office Mobile, and several other products.*

*Daniel has a history of founding companies that commercialize his team's work in human-computer interaction. He founded and now serves as Chief Scientist of Chatham Labs, and also co-founded Tactual Labs and Addem, all of which work to commercialize his and his team's work. His research in touch software has shipped out to more than 2 billion devices, in addition to being described in nearly 100 peer-reviewed papers and protected by over 40 US patents and international equivalents. He has also authored the top-selling book on the design of user interfaces for new hardware technologies.*

## SATURDAY, 19 OCTOBER

**Session I : Multimodality (9:15 am–10:30am)***Chaired by Joseph J. LaViola, The University of Central Florida (USA)***Pursuit Sensing: Extending Hand Tracking Space in Mobile VR Applications***Pascal Chiu, Kazuki Takashima, Kazuyuki Fujita, Yoshifumi Kitamura*

To provide better VR hand tracking experiences for users and designers, we develop a flexible wearable device aimed at maximizing camera sensor based tracking space for mobile and room-scale interactions.

**Minuet: Multimodal Interaction with an Internet of Things***Runchang Kang, Anhong Guo, Gierad Laput, Yang Li, Xiang 'Anthony' Chen*

We present Minuet—a system that senses a user's voice and gesture to multimodally interact with an Internet of Things spatially distributed in the environment, e.g., call "Roomba" and drawing in mid-air to tell the Roomba where needs to be cleaned.

**Analysis of Peripheral Vision and Vibrotactile Feedback During Proximal Search Tasks in Augmented Reality***Kendra Richards, Nikhil Mahalanobis, Kangsoo Kim, Ryan Schubert, Myungho Lee, Salam Daher, Nahal Norouzi, Jason Hochreiter, Gerd Bruder, Greg Welch*

We present a study investigating the effects of vibrotactile feedback and environmental lighting on participants' perceptions and behaviors during a time-limited search task in close proximity with AR entities.

**Session II : Virtual Reality & Avatars (10:45 am – 12:00 pm)***Chaired by Greg Welch, The University of Central Florida (USA)***Investigating the Effect of Distractor Interactivity for Redirected Walking in Virtual Reality***Robbe Cools, Adalberto L. Simeone*

How interactive should a distractor be? We studied three different types of distractors to redirect users in small spaces and compared it to a baseline in a task where users traversed 30m.

**LIVE: the Human Role While Learning in an Immersive Virtual Environment***Adalberto L. Simeone, Marco Speicher, Andreea Molnar, Adriana Wilde, Florian Daiber*

*LIVE is a system where both an instructor and a student are immersed together in a VR lesson. We studied the role of the presence or absence of an instructor in VR contact teaching.*

**Blended Agents: Manipulation of Physical Objects within Mixed Reality Environments and Beyond***Susanne Schmidt, Oscar Javier Ariza Nunez, Frank Steinicke*

In this talk, we introduce blended agents, which are capable of affecting a real-world object's location (i.e., moving a physical ball), and surface material (i.e., writing on a physical sheet of paper).

**Session III : Displays (2:45 pm – 4:00 pm)***Chaired by Shin Takahashi, Tsukubua University (Japan)***Extending Virtual Reality Display Wall Environments Using Augmented Reality***Arthur Nishimoto, Andrew E Johnson*

An exploratory design and evaluation of combining a see-through AR HMD with CAVE2, a curved VR display wall environment to extend the field of regard of display wall.

**Extramission: A Large Scale Interactive Virtual Environment Using Head Mounted Projectors and Retro-reflectors***Hiroto Aoki, Jun Rekimoto*

In this paper, we present Extramission, a virtual environment using head mounted projectors and retro-reflectors for large scale applications. It shows a bright and clear images without dimming the environment light. It also provides stereoscopic vision for all users in the system.

**Effects of Dark Mode on Visual Fatigue and Acuity in Optical See-Through Head-Mounted Displays***Kangsoo Kim, Austin Erickson, Alexis Lambert, Gerd Bruder, Greg Welch*

We present a human-subject study investigating the effects of dark mode (light-on-dark color schemes) on visual acuity, fatigue, and usability in the field of optical see-through head-mounted displays.

## SUNDAY, 20 OCTOBER

**Session IV : Augmented Reality Modelling & Gaze (8:30 am – 9:45 am)***Chaired by Jens Grubert, Coburg University (Germany)***Evaluating the Impact of Point Marking Precision on Situated Modeling Performance***Leonardo Pavanatto Soares, Doug Bowman, Márcio Sarroglia Pinho*

We investigate the impact of using point marking techniques with different levels of precision on the performance of situated modeling, considering accuracy and ease of use.

## **Gaze Direction Visualization Techniques for Collaborative Wide-Area Model-Free Augmented Reality**

*Yuan Li, Feiyu Lu, Wallace S Lages, Doug Bowman*

In collaborative tasks, it is often important for users to understand their collaborator's gaze direction/target. In this project, we designed two novel visualization techniques to improve gaze ray effectiveness when 3D models of the environment is unavailable.

## **Effects of Shared Gaze Parameters on Visual Target Identification Task Performance in Augmented Reality**

*Nahal Norouzi, Austin Erickson, Kangsoo Kim, Ryan Schubert, Joseph LaViola, Gerd Bruder, Greg Welch*

In this work, we simulated different eye tracking (i.e. accuracy and precision) and networking (i.e. latency and lag) errors in a collaborative augmented reality experience and investigated the influence of these errors on users' objective performance and subjective experience during a target identification task with a virtual human collaborator.

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## **Session V : Perception & Accessibility (2:00 pm – 3:15 pm)**

*Chaired by Florian Daiber, German Research Center for Artificial Intelligence (Germany)*

## **Interaction can hurt - Exploring Gesture-Based Interaction for Users With Chronic Pain**

*G. Michael Poor, Alvin Jude*

An exploration into using mid-air gestures as an alternative input method for users suffering from Chronic Pain.

## **Understanding the Effect of the Combination of Navigation Tools in Learning Spatial Knowledge**

*Sanorita Dey, Wai Fu, Karrie Karahalios*

Based on existing theories and our user studies, we investigated how reference frames and navigational cues can be combined in off-the-shelf navigation applications to help people acquire spatial knowledge.

## **Effects of Depth Layer Switching between an Optical See-Through Head-Mounted Display and a Body-Proximate Display**

*Anna Eiberger, Per Ola Kristensson, Susanne Mayr, Matthias Kranz, Jens Grubert*

AR data glasses can complement smartphone and smartwatch interaction, but this interaction comes at a cost. We quantify this cost between a body-proximate and an optical see-through display.

## **Visual Cues to Restore Student Attention based on Eye Gaze Drift, and Application to an Offshore Training System**

*Andrew Yoshimura, Adil Khokhar, Christoph W Borst*

Drifting student attention is a common problem in educational environments. We demonstrate 8 attention-restoring visual cues for display when eye tracking detects that student attention shifts away from critical objects.

## **Object Manipulation by Absolute Pointing with a Smartphone Gyro Sensor**

*Koki Sato, Mitsunori Matsushita*

This is a demonstration of the pointing operation method for objects such as home appliances using a smartphone. With this method, you can manipulate objects using only your smartphone.

## **An Adaptive Interface for Spatial Augmented Reality Workspaces**

*Wallace S. Lages, Doug A. Bowman*

We demonstrate how adaptive interfaces can help users to manage information workspaces in wearable AR. Our workspace manager enables user position control while automatically adapting to movement in space.

## **A Viewpoint Control Method for 360° Media Using Helmet Touch Interface**

*Takumi Kitagawa, Yuki Yamato, Buntarou Shizuki, Shin Takahashi*

While watching 360° media, you can change your viewpoint to the desired direction by touching the surface of the helmet touch interface located in the desired direction of view.

## **Collaborative Interaction in Large Explorative Environments**

*Jason Wolfgang Woodworth, David Michael Broussard, Christoph W Borst*

We demo collaborative interaction tools and menu techniques designed for large environments in a networked geological dataset exploration and interpretation application.

## **A Social Interaction Interface Supporting Affective Augmentation Based on Neuronal Data**

*Daniel Roth, Larrissa Brübach, Franziska Westermeier, Tobias Feigl, Christian Schell, Marc Erich Latoschik*

In the demo we present a communication interface prototype. The prototype is designed to augment affect/emotion in avatar-mediated social interactions.

## **“SkyMap”: World-Scale Immersive Spatial Display**

*Thomas Kapler, Robert King, Dario Segura*

SkyMap is a novel immersive display device method that presents a world-scaled and world-aligned map above the user that evokes a huge mirror in the sky. We discuss first-hand observations and further areas of research.

## **A Comparison of Stairs and Escalators in Virtual Reality**

*Julian Wright, Benjamin Yaffee, Betsy Williams Sanders*

We present a study to compare the use of simulated escalators with simulated stairs within a VR environment. This experiment will test if the advantage of escalators requiring less real-world movement is offset by other factors, such as nausea, general discomfort, and the presence of the participant during the simulation.

## **V-ROD: Floor Interaction in VR**

*Andrew Rukangu, Alexander James Tuttle, Anton Franzluebbbers, Kyle Johnsen*

We present a novel cane-based device for interacting with floors in Virtual Reality (VR). We demonstrate its versatility and flexibility in several use-case scenarios like gaming and menu interaction.

## **Virtual Window Manipulation Method for Head-mounted Display Using Smart Device**

*Shu Sorimachi, Kota Kita, Mitsunori Matsushita*

We propose a virtual window manipulation method used for information search while using a head-mounted display (HMD). We compared the operability of this new method and the classic hand tracking one based on the results of user experiments.

## **Adjustable Adaptation for Spatial Augmented Reality Workspaces**

*Wallace Lages, Doug A. Bowman*

We designed and implemented a unified interaction system for AR windows that allow users to quickly switch and fine tune spatial adaptation. Our study indicates that a small number of adaptive behaviors is sufficient to facilitate information access in variety of conditions.

## **One-Handed Interaction Technique for Single-Touch Gesture Input on Large Smartphones**

*Kyohei Hakka, Toshiya Isomoto, Buntarou Shizuki*

We propose a one-handed interaction technique using cursor based on touch pressure to enable users to perform various single-touch gestures such as a tap, swipe, drag, and double-tap on unreachable targets. We conducted a pilot study to investigate the performance of the proposed technique.

## **Exploring the Effects of Stereoscopic 3D on Gaming Experience Using Physiological Sensors**

*Ekram Hossain, Arun K. Kulshreshth*

We propose to study games that are optimized for stereoscopic 3D viewing and use physiological sensors to better gauge the user’s experience with these games. Our preliminary results reveal that stereo 3D provides benefits in tasks where depth information is useful for the game task at hand.

## **Gaze Data Visualizations for Educational VR Applications**

*Yitoshee Rahman, Sarker Monojit Asish, Adil Khokhar, Arun K. Kulshreshth, Christoph W. Borst*

VR displays (HMDs) with embedded eye trackers could enable better teacher-guided VR applications since eye tracking could provide insights into student’s activities and behavior patterns. We present several techniques to visualize eye-gaze data of the students to help a teacher gauge student attention level.

## **Mixed-Reality Exhibition for Museum of Peace Corps Experiences using AHMED Toolset**

*Krzysztof Pietroszek*

We present a mixed-reality exhibition for the Museum of Peace Corps Experiences designed using the Ad-Hoc Mixed-reality Exhibition Designer (AHMED) toolset.

## **SIGMA: Spatial Interaction Gaming for Movie- and Arena-goers**

*Krzysztof Pietroszek*

We present SIGMA, a mass interaction system for playing games in movie theatres and arenas. SIGMA uses players’ smartphones as spatial game controllers. The games for SIGMA use novel techniques for aggregating mass interactions.

## **Strafing Gain: A Novel Redirected Walking Technique**

*Christopher You, Evan Suma Rosenberg, Jerald Thomas*

This poster presents strafing gains, a novel redirected walking technique that can be used to shift the user laterally away from obstacles without disrupting their current orientation.

## **Remote Robotic Arm Teleoperation through Virtual Reality**

*Anton Franzluebbbers, Kyle Johnsen*

A spatial interface was designed and evaluated for enabling effective teleoperation of bi-manual robotic manipulators. Results of a user study was conducted with teleoperators split into two groups by interaction metaphor used to control the robot end-effectors.

## Improving Usability, Efficiency, and Safety of UAV Path Planning through a Virtual Reality Interface

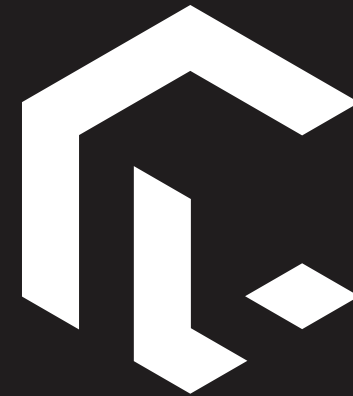
*Jesse Rawlins Paterson, Jiwoong Han, Tom Cheng, Paxtan Huish Laker, David Livingston McPherson, Joseph Menke, Allen Y. Yang*

This work introduces an open-source platform for 3D aerial path planning in VR and compares it to existing UAV piloting interfaces.

## Preliminary Study of Screen Extension for Smartphone Using External Display

*Yuta Urushiyama, Buntarou Shizuki, Shin Takahashi*

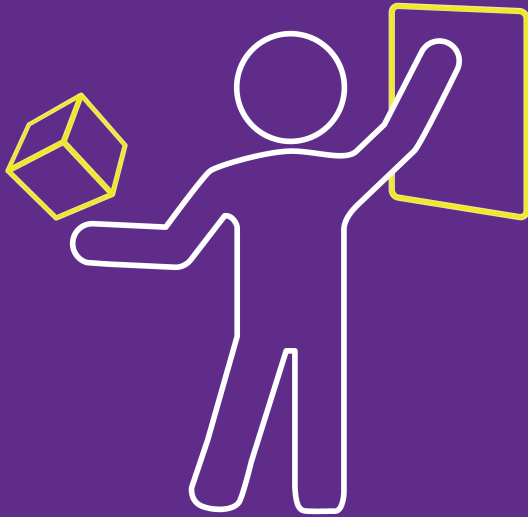
We are exploring the feasibility of a technique we call Screen Extension that seamlessly adds display spaces to a smartphone using an external display, allowing users to use displays available in many places.



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# ACM SUI 2019

Spatial User Interaction

