



UCF Synthetic Reality Lab

Research Internship Opportunities

for U.S. Students

Overview

The Synthetic Reality Lab (SREAL) offers research internships (variable length) for undergraduates and graduate students in Human-Computer Interaction, Computer Science, Psychology, and related degrees. A multidisciplinary research laboratory affiliated with the Institute for Simulation and Training (IST) at the University of Central Florida (UCF), the SREAL hosts leading academic researchers and students in the fields of augmented reality (AR) and virtual reality (VR).

Internship students will join a team of faculty, research staff, and students focusing on different aspects of interactive AR/VR experiences. In addition to participating in research and social events, students will also prepare a final written report and present their project to the laboratory (and/or at a conference) at the end of the internship. A few examples of internship projects are listed at the end of this document.

The Synthetic Reality Laboratory (SREAL)

SREAL (pronounced “Surreal”) is a research laboratory at the University of Central Florida. The SREAL team consists of faculty researchers, postdoctoral scholars (postdocs), affiliated faculty members, software developers, PhD students, artists (modelers/animators), interactors (digital puppeteers mostly associated with the TeachLive project), undergraduate research assistants and a network of campus and external (e.g., other university) collaborators, both faculty members and students.

The laboratory is housed in the Central Florida Research Park’s Partnership III Building. The lab space consists of over 7,000 square feet of experimental and office space. The lab space is utilized for a variety of purposes including human surrogate research (e.g., virtual agents/avatars and physical-virtual humans); virtual/augmented/mixed reality research in general; interactive training using virtual agents/avatars technology; developing cultural heritage and STEM experiences; human motion capture; electro-mechanical prototyping (“maker space”); group meetings/discussion; and communal discussion/relaxation.

SREAL is part of several larger UCF entities, most notably the Institute for Simulation and Training (IST), which houses it, and the Department of Computer Science, which is the home department of most of SREAL's students.

Further information:

1. Laboratory website: <https://sreal.ucf.edu>
2. Research focus and related work: <https://sreal.ucf.edu/publications/>
3. SREAL faculty and students: <https://sreal.ucf.edu/people/>

Internship Purpose

SREAL offers select **interdisciplinary research internships** for creative and technical students wishing to pursue academic/industry careers in AR, VR, simulation, interactive media and applied research fields. SREAL aims to create compelling AR/VR research prototypes and evaluate their effectiveness in the scope of basic and applied research.

We also participate in other internship programs, e.g., National Science Foundation (NSF) Research Experiences for Undergraduates (REU) programs. The NSF REU programs are designed for undergraduates who are U.S. citizens or permanent residents, and require a separate application. Students accepted into the programs can request a project in our lab. Presently we are affiliated with the NSF REU "Research Experiences on the Internet of Things" (IoT). More information on this REU program can be found here: <https://iotreu.cs.ucf.edu>

Eligibility and Remarks

Ideal candidates for this research internship will be in the early or mid stages of their PhD/MSc/BSc, and should have a good idea of their direction and topic, but should also have room for improvement or redirection toward topics deemed suitable for project or individual academic goals. The SREAL welcomes applicants from a broad range of disciplines including VR, AR, 3D user interfaces, human-computer interaction, wearable computing, social informatics, information technology, cognitive science, and related fields.

Please include in your application a clear statement indicating whether you are requesting local (UCF SREAL) funding for your internship, or whether you have access to independent support, e.g., from your home institution. If you are in need of local support we will look for funding options by considering thematic overlaps with our current third-party funded projects and other resources. Please note that we cannot guarantee funded internships in all cases. We will aim to provide everything you need for your research at our laboratory, including administrative and

research infrastructure (e.g., lab and office space, phone, computer, VR/AR equipment, access, email) to support you in your work.

Lab Culture

Our lab is very supportive and even familial. We are all committed to our research, and work hard together, but we have fun and adventure in doing so. For new student research interns we will provide appropriate mentoring and guidance. If you are interested in first-hand experience in the lab, we will attempt to connect you to past or current students, for a private conversation.

Application Process

To apply for a research internship, please submit the following two documents. All submissions should be prepared in IEEE Computer Society VGTC format² and submitted as a PDF. If you are a LaTeX user, feel free to use the Overleaf template³.

1. **Research proposal** (usually 4 pages): This proposal must clearly motivate, discuss, and summarize the proposed research, describe how the research fits into and advances research in AR/VR or related fields, and report on your progress so far as well as your intended progress during the internship at SREAL. You should further outline the synergies that you see between your own research and the topics addressed at SREAL (see previous publications⁴); please discuss in some detail *at least one* (!) of our publications within the last two years and describe how your skills would align with this research. Please include a timeline in your proposal, stating your preferred start and end dates. We encourage students to prepare the research proposal with the help of your local graduate/undergraduate student advisor.
2. **Curriculum Vitae** (no page limit)

Please submit both documents together (in one email) to **bruder@ucf.edu**

Note that we have **no regular deadlines** for internship applications. Please submit your application when you feel that it is ready.

² IEEE VGTC format: <http://junctionpublishing.org/vgtc/Tasks/camera.html>

³ Overleaf: <https://www.overleaf.com/latex/templates/ieee-tvcg-conference-style-template/htqfqtgkvcqf>

⁴ SREAL Publications: <https://sreal.ucf.edu/publications/>

Before starting this process, feel free to send us a brief **preliminary email** to determine whether or not it makes sense to do a full application. Please make sure that the email includes convincing information that would be expanded upon in the full application, otherwise we are likely to respond negatively.

Internship Contact

For questions related to a potential research internship at SREAL, feel free to contact Prof. Gerd Bruder (bruder@ucf.edu). Students will be advised or co-advised during their internship by Prof. Gerd Bruder, Prof. Gregory Welch, and/or Prof. Charles Hughes, as well as affiliated SREAL faculty and research staff.

Co-Advisors:

1. Prof. Gerd Bruder: <https://sreal.ucf.edu/people/bruder/>
2. Prof. Charles Hughes: <https://sreal.ucf.edu/people/hughes/>
3. Prof. Gregory Welch: <https://sreal.ucf.edu/people/welch/>

Our Address

3100 Technology Parkway
Orlando, Florida 32826
United States of America

The Synthetic Reality Lab (SREAL) is located in the Partnership III building of the Institute for Simulation and Training (IST) in the Research Park south of the main campus of the University of Central Florida (UCF). It is located approximately 35 minutes from the Orlando Airport (MCO).

The general business hours for the IST are 7:00 am to 5:00 pm, Monday through Friday. Work days are usually 8 hours per day. Students applying to a research internship are usually expected to work full-time (40 hours per week). IST is open to SREAL members 24/7.

Where to Live

There are a variety of living arrangements available to you during your stay in Orlando. Below is a list of resources that may assist you with locating living arrangements during your visit. Note that applying for a place in the student dormitories would require you to be registered as a student at UCF.

Please note that UCF/IST does not officially endorse any of the options listed below, but simply offers the information as a courtesy.

1. <https://www.airbnb.com>
2. <http://www.homestay.com>
3. <http://www.padmapper.com>
4. <http://orlando.craigslist.org>
5. <http://www.roommates.com>
6. <http://www.extendedstayamerica.com>
7. <https://hotpads.com>

Getting Around UCF/Orlando

Although Orlando has a public transportation system, it should be noted that Orlando is classified by many as a driving city. Having reliable transportation to travel around the UCF campus, Orlando city, and surrounding areas is very beneficial.

You can find additional information on bus passes (e.g., Lynx) and schedules at:

1. <https://www.golynx.com>
2. <http://maps.google.com>

Additionally, it is possible to use Uber (<http://www.uber.com>) and Lyft (<http://www.lyft.com>) in Orlando and the Central Florida area.

Dress Code

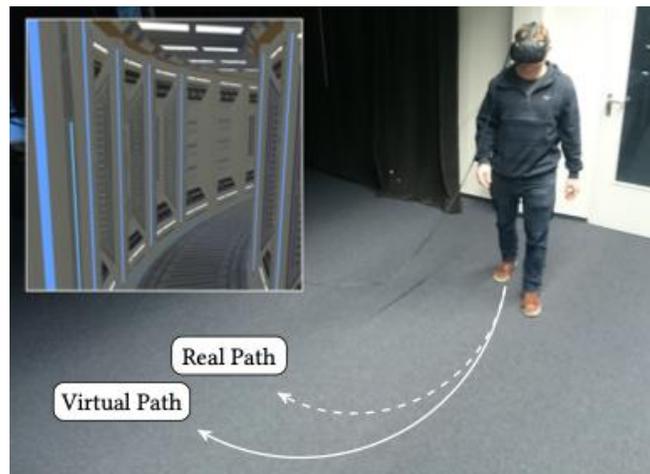
The SREAL dress code is business casual: Jeans (not torn), khakis, polo shirts, walking shorts, tennis shoes, t-shirts, dresses, skirts, and similar.

Examples of Internship Projects at SREAL (2017-2019)

An increasing number of national and international students perform a research internship at the SREAL. In the following, we list a few previous projects.

In the Blink of an Eye – Leveraging Blink-Induced Suppression for Imperceptible Position and Orientation Redirection in Virtual Reality

Intern: Eike Langbehn (2017, PhD student, University of Hamburg, Germany)

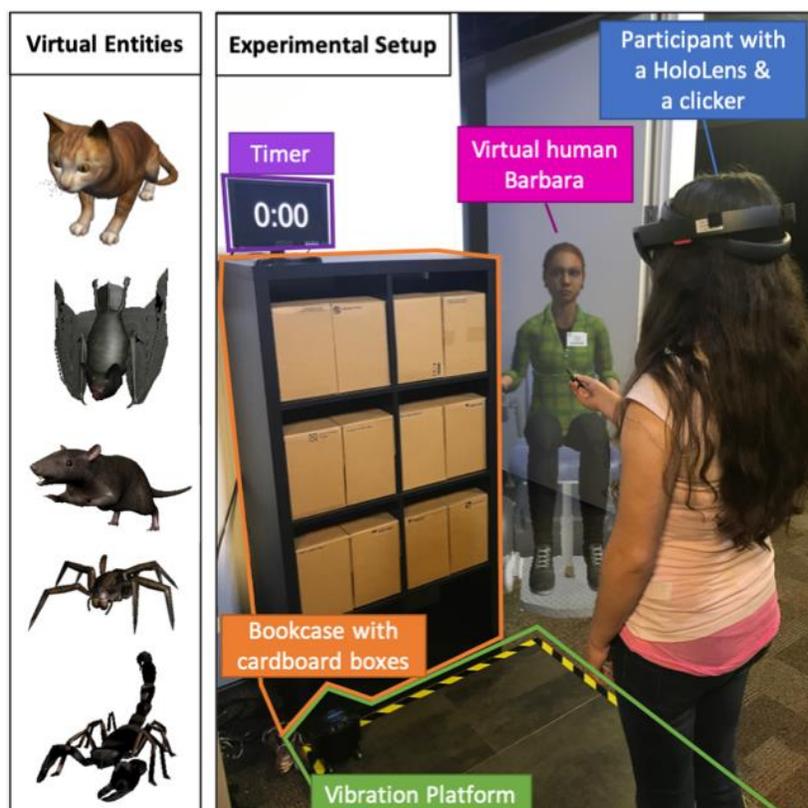


Abstract: Immersive computer-generated environments (aka virtual reality, VR) are limited by the physical space around them, e. g., enabling natural walking in VR is only possible by perceptually-inspired locomotion techniques such as redirected walking (RDW). We introduce a completely new approach to imperceptible position and orientation redirection that takes advantage of the fact that even healthy humans are functionally blind for circa ten percent of the time under normal circumstances due to motor processes preventing light from reaching the retina (such as eye blinks) or perceptual processes suppressing degraded visual information (such as blink-induced suppression). During such periods of missing visual input, change blindness occurs, which denotes the inability to perceive a visual change such as the motion of an object or self-motion of the observer. We show that this phenomenon can be exploited in VR by synchronizing the computer graphics rendering system with the human visual processes for imperceptible camera movements, in particular to implement position and orientation redirection. We analyzed human sensitivity to such visual changes with detection thresholds, which revealed that commercial off-the-shelf eye trackers and head-mounted displays suffice to translate a user by circa 4 - 9 cm and rotate the user by circa 2 - 5 degrees in any direction, which could be accumulated each time the user blinks. Moreover, we show the potential for RDW, whose performance could be improved by approximately 50 % when using our technique.

Publication Link: <https://dl.acm.org/citation.cfm?id=3201335>

Analysis of Peripheral Vision and Vibrotactile Feedback During Proximal Search Tasks with Dynamic Virtual Entities in Augmented Reality

Interns: Kendra Richards (2019, B.Sc. student, Dixie State University) & Nikhil Mahalanobis (2019, B.Sc. student, University of Central Florida)

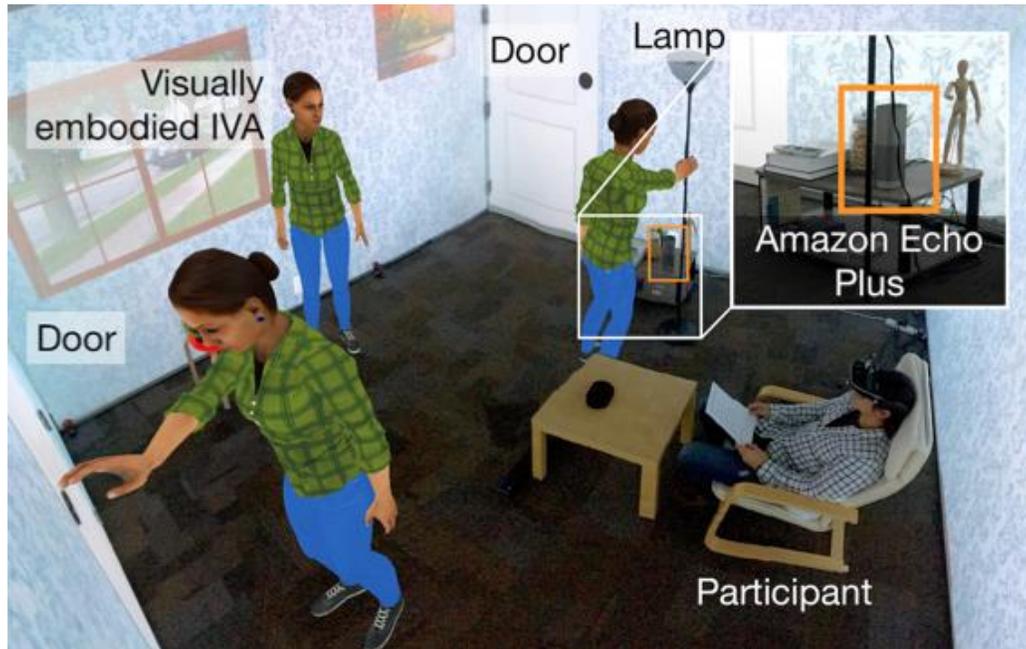


Abstract: A primary goal of augmented reality (AR) is to seamlessly embed virtual content into a real environment. There are many factors that can affect the perceived physicality and co-presence of virtual entities, including the hardware capabilities, the fidelity of the virtual behaviors, and sensory feedback associated with the interactions. In this paper, we present a study investigating participants' perceptions and behaviors during a time-limited search task in close proximity with virtual entities in AR. In particular, we analyze the effects of (i) visual conflicts in the periphery of an optical see-through head-mounted display, a Microsoft HoloLens, (ii) overall lighting in the physical environment, and (iii) multimodal feedback based on vibrotactile transducers mounted on a physical platform. Our results show significant benefits of vibrotactile feedback and reduced peripheral lighting for spatial and social presence, and engagement. We discuss implications of these effects for AR applications.

Publication Link: <https://dl.acm.org/citation.cfm?id=3357251.3357585>

Seeing is Believing: Improving the Perceived Trust in Visually Embodied Alexa in Augmented Reality

Intern: Steffen Haesler (2017-2018, M.Sc. student, University of Wuerzburg, Germany)

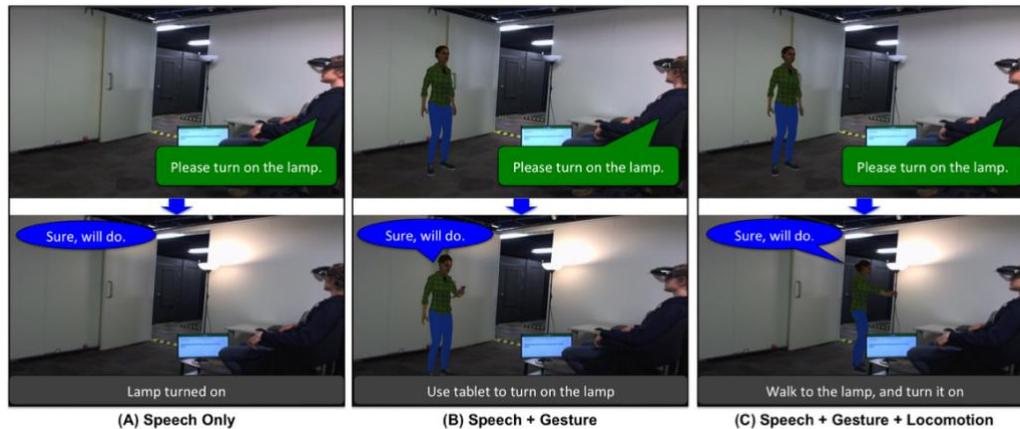


Abstract: Voice-activated Intelligent Virtual Assistants (IVAs) such as Amazon Alexa offer a natural and realistic form of interaction that pursues the level of social interaction among real humans. The user experience with such technologies depends to a large degree on the perceived trust in and reliability of the IVA. In this poster, we explore the effects of a three-dimensional embodied representation of Amazon Alexa in Augmented Reality (AR) on the user's perceived trust in her being able to control Internet of Things (IoT) devices in a smart home environment. We present a preliminary study and discuss the potential of positive effects in perceived trust due to the embodied representation compared to a voice-only condition.

Publication Link: <https://ieeexplore.ieee.org/abstract/document/8699187>

Does a Digital Assistant Need a Body? The Influence of Visual Embodiment and Social Behavior on the Perception of Intelligent Virtual Agents in AR

Intern: Luke Boelling (2017-2018, M.Sc. student, University of Muenster, Germany)



Abstract: Intelligent Virtual Agents (IVAs) are becoming part of our everyday life, thanks to artificial intelligence technology and Internet of Things devices. For example, users can control their connected home appliances through natural voice commands to the IVA. However, most current-state commercial IVAs, such as Amazon Alexa, mainly focus on voice commands and voice feedback, and lack the ability to provide non-verbal cues which are an important part of social interaction. Augmented Reality (AR) has the potential to overcome this challenge by providing a visual embodiment of the IVA. In this paper we investigate how visual embodiment and social behaviors influence the perception of the IVA. We hypothesize that a user's confidence in an IVA's ability to perform tasks is improved when imbuing the agent with a human body and social behaviors compared to the agent solely depending on voice feedback. In other words, an agent's embodied gesture and locomotion behavior exhibiting awareness of the surrounding real world or exerting influence over the environment can improve the perceived social presence with and confidence in the agent. We present a human-subject study, in which we evaluated the hypothesis and compared different forms of IVAs with speech, gesturing, and locomotion behaviors in an interactive AR scenario. The results show support for the hypothesis with measures of confidence, trust, and social presence. We discuss implications for future developments in the field of IVAs.

Publication Link: <https://ieeexplore.ieee.org/abstract/document/8613756>