

# Corey Pittman

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## Research Interests

Novel user interfaces, Augmented Reality (AR), gesture recognition, human-robot interaction (HRI), human-computer interaction (HCI), multi-modal user interfaces, computer vision (CV)

## Education

**Ph.D. University of Central Florida (Orlando, FL, USA)**  
*Computer Science, 2017 (expected)*  
 Advisor: Joseph LaViola  
 Research: Human-Robot Interaction, Multimodal Interfaces

**M.S. University of Central Florida (Orlando, FL, USA)**  
*Computer Science (3.3/4.0), December 2013*

**B.S. University of Central Florida (Orlando, FL, USA)**  
*Computer Science (3.4/4.0), May 2012*

## Research Experience

**Graduate Research Assistant**                      **University of Central Florida (Orlando, FL, USA)**  
*Interactive Systems and User Experience Lab, December 2012 – Present*  
 Director: Dr. Joseph LaViola  
 Tasks: Conduct gesture recognition research; perform research paper writing; oversee undergraduate researchers; attend events to promote research lab and present work; demonstrate research projects to lab visitors

**Research Intern** **Microsoft Research (Redmond, WA, USA)**  
*Multimedia, Interaction, and eXperiences Group, June 2015 – September 2015*  
 Director: Zhengyou Zhang (Mentored by Nikolai Smolyanskiy)  
 Tasks: Conduct research with teleoperated drones; simplify control schemes for consumer flying drones; present research ideas at weekly meetings

**Undergraduate Research Assistant**                      **University of Central Florida (Orlando, FL, USA)**  
*Center for Research in Computer Vision, May 2011 – October 2011*  
 Director: Dr. Mubarak Shah  
 Tasks: Conduct computer vision research; present research ideas and progress at weekly meetings; assist in grant writing

## Teaching Experience

**Teaching Assistant** **University of Central Florida (Orlando, FL, USA)**  
*Department of Electrical Engineering and Computer Science, Jan 2013 – May 2013*  
 COP2500: Introduction to Computer Science (Jerry Hensel)  
 Tasks: teach lab sections, grade programming assignments and exams, provide assistance during office hours

## Research Projects

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### **Alternative Controls for Multirotor UAVs**

**Microsoft Research (Redmond, WA, USA)**

*June 2015 – September 2015*

Consumer UAVs have become more ubiquitous, but the control schemes behind them have not changed since their introduction. Currently, multirotor UAV borrow their control layouts from RC planes, which is not an intuitive mapping. The goal of this project was to define and implement simpler controls for the casual user, instead of focusing on enthusiasts, by utilizing a common came controller and skeletal tracking. My coding contributions included flight management code (C++), ground station app (C#), and wireless communication (C++ with ROS).

### **Improving \$-Family Recognizers**

**University of Central Florida (Orlando, FL, USA)**

*February 2015 – Present*

Sketch recognition has focused heavily on template based (kNN) recognition in recent years. Dollar family recognizers are typically leveraged for their balanced simplicity and accuracy. This project aims to determine the effect of dataset pruning and stroke averaging on spatial and temporal performance of \$-family recognizers. My coding contributions included dataset management code (C#), stroke manipulation and processing (C#), and experimental management and analysis (Python).

### **Doppler Effect Gesture Recognition**

**University of Central Florida (Orlando, FL, USA)**

*February 2014 – December 2015*

Current gesture recognition technology requires the use of electromagnetic trackers attached to the body or cameras placed in the environment. There are work environments where noise or security issues would prohibit the use of these devices. This project focused on using the Doppler Effect to detect coarse gestures using sounds emitted from speakers placed around a user. My coding contributions included the application layout (WPF), audio processing (C#), and gesture recognition logic (C#).

### **Head-Tracking for UAV Primary Control**

**University of Central Florida (Orlando, FL, USA)**

*March 2013 – February 2014*

Manipulating robots using gestural inputs has been studied often in recent years, with emphasis on interactivity and naturalness. One mode of control that has not been studied as the primary navigation control is head tracking. This project focused on using head tracking to control an Unmanned Aerial Vehicle (UAV) in an indoor environment. Five control schemes were developed and compared to a ubiquitous game controller. My contribution to this work was developing ROS nodes for the head tracker (C++), HMD (C++/OpenGL), and control node (C++), as well as conducting the user study and analyzing the resulting data using SPSS. This work was published in IUI 2014.

### **Multimodal Interfaces for Robot Control**

**University of Central Florida (Orlando, FL, USA)**

*December 2012 – September 2013*

Typical control stations for a group of robots include a large number of joysticks and assorted button for switching control modes and targets. This project aimed to reduce the cognitive load on operators by using a combination of body and hand gestures that better represented the robots' movements than a simple button press. The three selected robots were a humanoid robot, a flying UAV, and a scorpion-like robot. My contributions to this project included literature review and developing the UAV control class in C++.

May 2011 – October 2011

Image localization relies heavily on the density of the source dataset. Prior work using a systematically gathered dataset from Google Maps StreetView showed good performance for localization. The goal of this project was to test the performance of the previously developed system on a less structured dataset collected from image sharing webpages such as Flickr, Picasa, and Panoramio. I developed web crawlers for each of the repositories in Python that queried the servers via their respective APIs. Analysis of the data was done using MATLAB. This work was part of the Research Experience for Undergraduates in Computer Vision program.

## **Publications**

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### **Conference Publications**

- **Pittman, C.**, Wisniewski, P, Brooks, C., & LaViola Jr, J. "Multiwave: Doppler Effect Based Gesture Recognition in Multiple Dimensions", Proceedings of the 34th Annual ACM Conference Extended Abstracts on Human Factors in Computing Systems, May 2016.
- **Pittman, C.**, Taranta, E., and LaViola, J. "A \$-Family Friendly Approach to Prototype Selection", To Appear: Proceedings of the 2016 ACM International Conference on Intelligent User Interfaces, March 2016.
- **Pittman, C.** and LaViola, J. "Exploring Head Tracked Head Mounted Displays for First Person Robot Teleoperation", Proceedings of the 2014 ACM International Conference on Intelligent User Interfaces, 323-328, February 2014.

### **Book Chapters**

- LaViola Jr, J. J., Buchanan, S., & **Pittman, C.** "Multimodal Input for Perceptual User Interfaces", *Interactive Displays: Natural Human-Interface Technologies*, 285-312. John Wiley & Sons, 2014.

## **Professional Activities**

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### **Paper Reviewer**

- Conference Poster Reviewer (3 posters), the 14<sup>th</sup> IEEE International Symposium on Mixed and Augmented Reality (ISMAR 2015)
- Conference Full Paper Reviewer (1 paper), the 13th IEEE International Symposium on Mixed and Augmented Reality (ISMAR 2014)

## **Presentations**

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- Poster presenter for "Multiwave: Doppler Effect Based Gesture Recognition in Multiple Dimensions" at Annual ACM on Human Factors in Computing Systems (CHI), San Jose, CA, May. 2016
- Presenter for "A \$-Family Friendly Approach to Prototype Selection" at International Conference on Intelligent User Interfaces (IUI), Sonoma, CA, Mar. 2016
- Poster presenter for "Exploring Head Tracked Head Mounted Displays for First Person Robot Teleoperation" at International Conference on Intelligent User Interfaces (IUI), Haifa, Israel, Feb. 2014

## **Conferences Attended**

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1. May 2016: Conference on Human Factors in Computer Systems (CHI), San Jose, CA
2. Mar 2016: International Conference on Intelligent User Interfaces (IUI), Sonoma, CA
3. Apr 2014: Conference on Human Factors in Computer Systems (CHI), Toronto, Canada
4. Feb 2014: International Conference on Intelligent User Interfaces (IUI), Haifa, Israel
5. Apr 2013: IEEE Virtual Reality 2013 (IEEE-VR), Orlando, FL

## Computer Skills

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### Languages

- Proficient in: C# (3 years), C++ (6 years), C (5 years), JavaScript (2 years), Java (9 years)
- Familiar With: Python (1 year)

### Software

- Libraries & Tools: ROS, MATLAB, OPENGGL, SPSS, CUDA
- SDK: Kinect SDK
- Other: Unity 3D, Coppelias V-Rep

## Relevant Coursework

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- **Doctorate:** Computer Graphics (WebGL), Bioinformatics, Computer Vision, Computational Complexity
- **Master's:** Algorithms & Analysis, Pen-Based User Interfaces, 3D User Interfaces, 3D Computer Vision, Evolutionary Computation, Parallel Programming
- **Bachelor's:** Robot Vision, Computer Graphics (OpenGL), AI for Game Programming