Eric Whitmire

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My research focuses on subtle and natural interaction with mixed reality systems using wearable sensors. I am particularly interested in tracking applications using physically-based models. I specialize in projects at the intersection of hardware and software and draw on my diverse skill set in rapid prototyping, signal processing, machine learning, and human-computer interaction. Currently, I'm a PhD student at the Allen School of Computer Science & Engineering at the University of Washington. I am advised by Shwetak Patel and work in the Ubiquitous Computing Lab. I am currently seeking opportunities for internships and collaborations.

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Education

2014 – Present **University of Washington (UW),** Seattle, WA
PhD student in the Paul G. Allen School of Computer Science & Engineering
National Defense in Science and Engineering Graduate (NDSEG) Fellow
Advisor: Shwetak Patel

2010 – 2014 **North Carolina State University (NCSU),** Raleigh, NC
Park Scholarship Recipient
Bachelor of Science in Computer Science
Bachelor of Science in Biomedical Engineering
Minor in Cognitive Science
GPA: 4.00 / 4.00

Honors, Grants, and Awards

2016 Best Paper Award at ISWC 2016 for EyeContact [C9]
Best Paper Nominee at CHI 2016 for SpiroCall [C8]

2015 Runner-Up Research Prize from Madrona Ventures for HyperCam Poster [C7]
Best Paper Nominee at UbiComp 2015 for HyperCam [C7]

2014 **National Defense in Science and Engineering Graduate (NDSEG) Fellowship**
National Science Foundation GRFP Honorable Mention
Best Student Poster Award at GOMACTech 2014 for [C2]

2013 **Barry M. Goldwater Scholarship**
Autonomy Research Seed Grant
NCSU Undergraduate Research Grant
Best Poster Award at NCSU Undergraduate Research Symposium for [C1]
1st Place at NCSU Student Programming Competition

2012 NCSU Undergraduate Research Grant

2011 Donald Bitzer Creativity Award

2010 **Park Scholarship** (4 year award for scholarship, service, leadership, and character)

Research and Professional Experience

2014 – present **Ubiquitous Computing Laboratory,** University of Washington
Graduate Researcher (Advisor: Shwetak Patel)
Exploring wearable, on-body sensing for virtual and augmented reality

Summer, 2017 **Microsoft Research,** Research Intern, Redmond, WA
Research Intern (Advisor: Hrvoje Benko, Christian Holz, Eyal Ofek, Mike Sinclair)
Developed a handheld VR controller with haptic feedback

Summer, 2016 **Oculus Research,** Research Intern, Redmond, WA
Research Intern (Advisor: Laura Trutoiu, Kenrick Kin)
Explored alternative input techniques for augmented reality applications

Summer, 2015 **Oculus Research,** Research Intern, Redmond, WA
Research Intern (Advisor: Laura Trutoiu, Rob Cavin)
Developed a high-accuracy scleral coil eye tracking attachment for virtual reality displays

2012 – 2014 **Integrated Bionic Microsystems Laboratory,** North Carolina State University
Undergraduate Researcher (Advisor: Alper Bozkurt)
Developed automation platform using image processing and wireless communication to electrically stimulate and steer insects for search and rescue applications
Designed an insect-mounted microphone array for sound localization

Summer, 2013 **Microsoft,** Xbox One / Kinect Speech Platform Team, Redmond, WA
Software Development Intern (Supervisor: Jonathan Campbell)
Designed and implemented new API for multimodal Kinect interactions

Summer, 2012 **Microsoft,** Internet Explorer Web Programming Team, Redmond, WA
Software Development Intern (Supervisor: Harley Rosnow)
Designed and implemented HTML 5 Dataset feature that shipped in IE 11

Summer, 2011 **IBM,** IBM Systems Director Installation Team, Research Triangle Park, NC
Software Development Intern (Supervisor: David Cole)
Developed a cross-platform Python validation utility for IBM Systems Director

2010 – 2012 **RiboLab,** North Carolina State University
Undergraduate Researcher (Advisor: Donald Bitzer)
Developed optimization algorithms to test and improve computational model
Conducted statistical analysis of E. coli genome to validate model

Refereed Journal Publications

2017 J3. *DigiTouch: Reconfigurable Thumb-to-Finger Input and Text Entry on Head-mounted Displays*
Eric Whitmire, Mohit Jain, Divye Jain, Gregory Nelson, Ravi Karkar, Shwetak Patel, Mayank Goel
IMWUT (Ubicomp) 2017

2017 J2. *PupilScreen: Using Smartphones to Assess Traumatic Brain Injury*
Alex Mariakakis, Jacob Baudin, **Eric Whitmire**, Vardhman Mehta, Megan A Banks, Anthony Law, Lynn McGrath, Shwetak Patel
IMWUT (Ubicomp) 2017

2016 J1. *Sound Localization Sensors for Search and Rescue Biobots*
Tahmid Latif, **Eric Whitmire**, Tristan Novak, Alper Bozkurt
IEEE Sensors Journal, Vol. 16, Issue 10

Refereed Conference Publications

2017 C11. *Carpacio: Repurposing Capacitive Sensors to Distinguish Driver and Passenger Touches on In-Vehicle Screens*
Edward Wang, Jake Garrison, **Eric Whitmire**, Mayank Goel, Shwetak Patel
UIST 2017

C10. *Automatic Characterization of User Errors in Spirometry*
Andrew Luo, **Eric Whitmire**, James W. Stout, Drew Martenson, Shwetak Patel
IEEE EMBC 2017

2016 C9. *EyeContact: Scleral Coil Eye Tracking for Virtual Reality*
Eric Whitmire, Laura Trutoiu, Robert Cavin, David Perek, Brian Scally, James O. Phillips, Shwetak Patel
ISWC 2016 (Acceptance Rate: 22%) Best Paper Award (Top Paper)

2015 C8. *SpiroCall: Measuring Lung Function over a Phone Call*
Mayank Goel, Elliot Saba, Maia Stiber, **Eric Whitmire**, Josh Fromm, Eric Larson, Gaetano Borriello, Shwetak Patel
CHI 2016 (Acceptance Rate: 23%) Best Paper Nominee (Top 5%)

C7. *HyperCam: Hyperspectral Imaging for Ubiquitous Computing Applications*
Mayank Goel, **Eric Whitmire**, Alex Mariakakis, Scott Saponas, Neel Joshi, Dan Morris, Brian Guenter, Marcel Gavriliu, Gaetano Borriello, Shwetak Patel
Ubicomp 2015. (Acceptance Rate: 22%) Best Paper Nominee (Top 5%)

2014 C6. *Acoustic Sensors for Biobotic Search and Rescue*
Eric Whitmire, Tahmid Latif, Alper Bozkurt
IEEE Sensors 2014

C5. *Microfabricated impedance sensors for concurrent tactile, biopotential, and wetness detection*
Feiyan Lin, Michael McKnight, James Dieffenderfer, **Eric Whitmire**, Tushar Ghosh, Alper Bozkurt
IEEE Sensors 2014

C4. *Solar Powered Wrist Worn Acquisition System for Continuous Photoplethysmogram Monitoring*
James P. Dieffenderfer, Eric Beppler, Tristan Novak, **Eric Whitmire**, Rochana Jayakumar, Clive Randall, Weiguo Qu, Ramakrishnan Rajagopalan, Alper Bozkurt
IEEE EMBC 2014

C3. *Toward Fenceless Boundaries for Solar Powered Insect Biobots*
Tahmid Latif, **Eric Whitmire**, Tristan Novak, Alper Bozkurt
IEEE EMBC 2014

C2. *Cyber-physical Network of Terrestrial Insect Biobots*
Eric Whitmire, Tahmid Latif, Alper Bozkurt
GOMACTech 2014 Best Poster Award (Top student poster)

2013 C1. *Kinect-based System for Automated Control of Terrestrial Insect Biobots*
Eric Whitmire, Tahmid Latif, Alper Bozkurt
IEEE EMBC 2013

Invited Talks

2016 T2. UW Computer Science & Engineering Industrial Affiliates
EyeContact: Scleral Coil Eye Tracking for Virtual Reality

2013 T1. UNC and NCSU Annual BME Research Retreat
Kinect-based system for automated control of terrestrial insect biobots

Patents

2016 P2 Patent application filed with USPTO in 2016 with Oculus Research

2015 P1 Patent application filed with USPTO in 2015 with Oculus Research

Advising and Mentoring

Fall 2016 - present **Divye Jain,** UW undergraduate in Computer Science & Engineering
Designing HoloLens framework for text entry experimentation

Spr 2017 **Dawn Liang,** UW undergraduate in Electrical Engineering
Simulated and prototyped magnetic resonance coils

Win 2016 - Spr 2017 **Michael Yi,** UW undergraduate in Computer Science & Engineering
Designed teleportation strategies using an eye tracking HMD

Spr 2016 - Win 2016 **Andrew Luo,** UW undergraduate in Computer Science & Engineering
Developed automated analysis for quality control of spirometry efforts, see [C10]

Teaching Experience

Spring 2015 **Guest lecturer in UW CSE590P: Advanced Topics in Ubiquitous Computing**
Designing an Enclosure using AutoDesk Inventor

Fall 2014 **Tutor for UW CSE312: Foundations of Computing II**

Spring 2015 **Tutor for UW CSE312: Foundations of Computing II**

Graduate Coursework

Natural Language Dialogue Systems (with Kristy Boyer, NCSU)
Bioelectricity and Neural Interfaces (with Alper Bozkurt, NCSU)
Machine Learning (with Carlos Guestrin)
Security and Privacy (with Franziska Roesner)
Design and Analysis of Algorithms (with Anna Karlin)
Computer Graphics (with Brian Curless)
Advanced Topics in Human Computer Interaction (with James Fogarty)
Computer Networks (with Shyam Gollakota)
Deep Learning Systems (with Tianqi Chen, Haichen Shen)

Leadership, Service, and Outreach

Reviewer
CHI (2016, 2017, 2018), EMBC (2015), IEEE Transactions on Sensors (2016), IEEE VR (2018), IJHCI (2017), ISS (2017), ACM SAP (2016), Ubicomp/IMWUT (2016, 2017, 2018), UIST (2016)

Student Volunteer
Ubicomp (2014)

2015 – present **FIRST Technical Challenge High School Mentor**
Coached a team of high school students in designing, building, and programming a robot

2010 – 2014 **Service Raleigh Committee Head**
Helped plan annual service event with 2000 volunteers in the Raleigh, NC area

2010 – 2014 **Mentor for Students in Programming Robotics and Computer Science**
Developed and led weekend workshops and hands-on learning activities for middle school students

Technical Skills

Design	Photoshop, Illustrator, Premiere, InDesign, SolidWorks, Inventor, PCB Layout
Modeling	Machine learning, nonlinear optimization (Ceres), Deep learning (TensorFlow), probabalistic modeling
Libraries and Platforms	Android, Unity, OpenCV, Embedded Systems (TI, PSoC, Nordic, Arduino), Bluetooth LE
Programming	C/C++, C#, Python, MATLAB, VBA, Web development (Client and server side), Database
Fabrication	3D printing, laser cutting, CNC machining, PCB etching