

Yiran Zhao

My research interests are the intersection of healthcare, mobile and wearable sensing, machine learning and human-computer interaction. Specifically, I focus on developing:

- 1) sensing techniques and algorithms to capture physiological signs
- 2) intervention to help people perform self-care
- 3) interactions to help people communicate about their health condition and healthcare preferences.

I'm particularly interested in the mental health problem space, and I'm currently working on helping people with addiction concerns: to sense craving, and to perform intervention to manage craving.

PhD Candidate

Information Science
Computer and Information Science
Cornell Tech
New York, NY

WEBSITE

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EDUCATION

2019 – Present **Cornell Tech**
Ph.D. Information Science
Advisor: Tanzeem Choudhury, Rajalakshmi Nandakumar

2017 – 2019 **University of Washington**
M.S. Biomedical and Health Informatics
Advisor: Wanda Pratt, Ari Pollack, Shwetak Patel
Thesis: Supporting collaborative goal-setting for hospitalized adolescent patients

2013 – 2017 **Georgia Institution of Technology**
B.S. Biomedical Engineering; minor of Computer Science
Advisor: Hang Lu, Eric Schumacher

HONORS AND AWARDS


Sept 2016 **Best Paper Award**
ISWC/Ubicomp 2016 Wearable Sports Workshop

Oct 2016 **President Research Award**
Georgia Institute of Technology

April 2016 **Best Undergraduate Research Award**
GSU/GT Callosum Neuroscience Conference

Dec 2016 **Faculty Honor**
May 2016 Georgia Institute of Technology

PUBLICATIONS AND CONFERENCES

 P4 E-archery: prototype wearable for analyzing archery release.
Yiran Zhao, Shanu Salunke, Alexander Leavitt, Kevin Curtin, Nghia Huynh, and Clint Zeagler
Ubicomp 2016 Best Paper Wearable Sports Workshop

P3 CASPER: Capacitive Serendipitous Power Transfer for Through-Body Charging of Multiple Wearable Devices
Edward Jay Wang, Manuja Sharma, Yiran Zhao, Shwetak Patel
ISWC 2018

- P2 Investigating the Intersession Reliability of Dynamic Brain-State Properties
Derek M. Smith, Yiran Zhao, Shella D. Keilholz, and Eric H. Schumacher
Brain Connectivity 2018 8:5, 255-267
- P1 Reverse-Correlation Analysis of the Mechanosensation Circuit and Behavior in *C. elegans* Reveals Temporal and Spatial Encoding
Daniel A. Porto, John Giblin, Yiran Zhao, Hang Lu
bioRxiv preprint bioRxiv:147363

PATENT

Application DEVICE, SYSTEM, AND METHOD FOR CONTEXT-AWARE MEASUREMENT BASED MEDICAL COMPLIANCE
Aditya Dua, Bill Weeks, Ronny Li, Neraj Bobra, Yiran Zhao
Provisional Application Filed on June 15th, 2018

RESEARCH

- April 2020 – **Smartphone-based at-home lung function monitoring**
Current Advised by Rajalakshmi Nandakumar
Cornell Tech
- In respond to the COVID-19 pandemic, developing a smartphone-based sonar system that enables the monitor of lung function at home through measuring breath rate and volumetric flow rate of lung
- Feb 2020 – **Assessing the effectiveness of wearable-based intervention on reducing alcohol craving**
Current Advised by Tanzeem Choudhury
Cornell Tech
- Deploying a study to characterize the effectiveness of smartwatch-based, arousal-lowering heart rate-feedback systems on reducing craving for alcohol
- Oct 2019 – **PuffSensing: Predicting craving and using of electronic nicotine delivery system (ENDS) with on-body and mobile sensing for young adults**
Current Advised by Tanzeem Choudhury
Cornell Tech
- Deploying a study to explore if we can predict when people use e-cigarette based on physiological and mobile sensing data; developing a mobile application to collect user lifestyle data and user's reflection on vaping experience
- Jan 2018 – **Plan&Talk: Supporting collaborative goal-setting for hospitalized adolescent patients**
Current Advised by Wanda Pratt and Ari Pollack
University of Washington
- Lead a technology probe study on how to help hospitalized adolescents participate in their care through collaborative goal setting with their care teams; Conducted semi-structured interviews; Coded interview data and observation notes; Conducted design workshops and expert review workshops
- March 2018 – **CASPER: Capacitive serendipitous power transfer for through-body charging of multiple wearable devices**
Sept 2018 Advised by Shwetak Patel
University of Washington
- Developed digital jewelry prototypes for a capacitive through-body charging system; characterized the charging requirements of the electronics for the jewelry and implemented as tattoos with lights and a charging jacket; developed the design guideline for such system

Jan 2016 – **Reverse-correlation analysis of the mechanosensation circuit and behavior in *C. elegans* reveals temporal and spatial encoding**
May 2017

Advised by Hang Lu
Georgia Tech

- Applied computer vision and system identification techniques to analyze neural imaging data and model the neural circuit in *C. elegans*

Sept 2015 – **Investigating the intersession reliability of dynamic brain-state properties**
May 2017

Advised by Eric Schumacher
Georgia Tech

- Analyzed functional MRI data of human brain with computer vision and machine learning to identify the activation patterns of brain networks; developed MATLAB-based application for fMRI signal processing and unsupervised learning

PROJECTS

March 2018 – **Conceptualization of Personal Values for Patient-Provider Communication for patients with Multiple chronic conditions**
June 2018

Advised by Andrea L Hartzler and James Ralston
University of Washington; Kaiser Permanente Washington

- Led the development of a design guideline that helped patients reflect on connections between personal values and self-care strategy, as well as manage self-care for multiple chronic conditions.

Jan 2017 – **AirTech: Home-Use Lung Function Monitoring Device**
May 2017

Advised by Evan Ruff and Gregory Kolovich
Georgia Tech; Micro-C LLC.

- Partnered with Micro-C LLC., led the development of a lung function monitoring device and iOS application for pediatric lung disease patients. The system quantified air flow rate using pressure sensors and exhaled gas components using CO₂ sensor, conducted test validity check, and automatically recorded test results to compatible iOS application

Jan 2016 – **E-archery: Prototype Wearable for Analyzing Archery Release**
Sept 2016

Advised by Clint Zeagler, Thad Starner
Georgia Tech

- Led the development of a wearable glove and Android application system for archery form classification from accelerometer and IMU sensor data; conducted user interview with the university's archery team

WORK AND TEACHING

Spring 2020 Data Science in the Wild

Cornell Tech
Teaching Assistant

- Assisting Dr. Rajalakshmi Nandakumar to help over 150 students to setup Spark environment, understand large data set, perform data cleaning, visualize data and extract useful knowledge from real world data set using large-scale ML

Fall 2019 Psychological and Social Aspects of Technology

Cornell Tech
Teaching Assistant

Winter 2019 Master of Human-Computer Interaction and Design

University of Washington

Teaching Assistant

- Assisted Dr. Jon Froehlich and Michael Smith as the Lead Teaching Assistant for HCID 521 Prototyping Studio; helped 30 students conceptualize their ideas, achieve their design through rapid prototyping, and give critiques; prepared and gave lectures on 2D prototyping

Summer 2018 Proteus Digital Health LLC.

Redwood City, CA

Algorithm Engineer Intern

- Led the development of algorithms based on sensors in a wearable pill detection patch (ECG, device temperature, skin conductivity and accelerometer) for user activity classification and device attachment quality classification; implemented such algorithms in iOS and Android application; conducted on-person field study

Sept 2015 – Invention Studio

May 2017 Georgia Institute of Technology

Prototyping Instructor

- Instructed, trained and advised students on prototyping with 3D printing, waterjet, laser cutting, electronics and circuits, and various metalwork and woodwork tools

NON-PROFIT

Sept 2013 – Engineers without Borders Uganda Clean Water Program

May 2015 Georgia Institute of Technology

Director of Operation

- Implemented a borehole well with a solar pump in Oloo, Uganda; communicated with the village community throughout the design process; trained the community technicians responsible for well and pump maintenance; conducted local health survey; the project allowed the community of approximate 200 people to have access to clean water

SKILLS

Data Analytic/ML	MATLAB, Python, Keras, OpenCV, TensorFlow, R, PLAS, Mathematica, Netlogo, GPower, AFNI
CAD	Solidworks, Autodesk Fusion 360, Sketch Up, Inkscape, Adobe Illustrator
Prototyping	3D Printing, laser-cut, waterjet, electronics, woodwork, metalwork
Instrumentation	PSoC, Arduino, FPGA
Programming	Java, C, Python, JS, Flask, ReactJS, Assembly, GBA, Lua, php, Unix Shell, Android, iOS, Latex
Cloud Computing	SQL, MongoDB, AWS
Language	Mandarin – native; English – fluent; Japanese – moderate; Korean, Spanish – beginner