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 for physiological signs and disease progression
2) algorithms for sports training and user-context awareness
3) design guidelines for human-centered information representation tool

I have diverse experience in both academia and industry for medicine, neural engineering, ubiquitous computing and health informatics. These experiences allowed me to build skillsets in computer vision, machine learning, signal processing, wearable and mobile sensing, physical prototyping and user study. I intend to continue my research with Ph.D. study and work toward providing solutions for real-world healthcare problems as well as helping users achieve better quality of life.

M.S. Candidate
Biomedical and Health Informatics
School of Medicine
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EDUCATION

2017 – Current **University of Washington**
M.S. Biomedical and Health Informatics
Advisor: Wanda Pratt, Shwetak Patel
GPA: 3.74/4.0

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

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

May 2017 **Faculty Honor**
Dec 2016 Georgia Institute of Technology
May 2016

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

Jan 2018 - Present **Patient as Safeguard**
Advisor: Wanda Pratt
University of Washington
- Leading a technology probe of a goal-tracking application to develop the design guideline on how to represent user preferences into standard medical tasks for inhospital patients.

Sept 2017 – June 2018 **Wearable for Migraine**
Advisor: Shwetak Patel; Wanda Pratt
University of Washington
- Led the research on a system of wearable monitoring device and phone application for migraine patients that monitors migraine-triggering factors and alerts the patient prior to migraine headache onset; developing using PSoC to control the embedded system; applying machine learning techniques to predict migraine onset from time-series sensor data

March 2018 – Sept 2018 **CASPER: Capacitive Serendipitous Power Transfer for Through-Body Charging of Multiple Wearable Devices**
Advisor: 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

Sept 2017 – Dec 2017 **Mobile Post-Operative Wound Evaluator (mPOWEr)**
Advisor: Bill Lober
University of Washington
- Developed the Flask backend API and ReactJS frontend for the patient version of the mPOWER, a mHealth application that monitors post-surgical wound site infection

Jan 2016 – May 2017 **Reverse-Correlation Analysis of the Mechanosensation Circuit and Behavior in *C. elegans* Reveals Temporal and Spatial Encoding**
Advisor: Hang Lu
Georgia Tech
- Applied computer vision and system identification techniques to analyze neural imaging data and model the neural circuit in *C. elegans*; developed a MATLAB-based application for semi-automated image analysis; conducted experiments with *C. elegans* with microfluidic devices, optogenetics, and calcium imaging

Sept 2015 – May 2017 **Investigating the Intersession Reliability of Dynamic Brain-State Properties**
Advisor: 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 – June 2018 **Conceptualization of Personal Values for Patient-Provider Communication for patients with Multiple chronic conditions**
Advisor: Andrea L Hartzler, 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 2018 – March 2018 **Melanocyte Detection in Skin Whole-Slide Histopathological Images**
Advisor: Linda Shapiro
University of Washington
- Developed an automated melanocytes detection method from histopathological whole-slide skin biopsy with computer vision methods and convolutional neural network.

Jan 2017 – May 2017 **AirTech: Home-Use Lung Function Monitoring Device**
Advisor: Evan Ruff, Gregory Kolovich
Georgia Tech
- 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 CO_2 sensor, conducted test validity check, and automatically recorded test results to compatible iOS application

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

Jan 2016 – May 2016 **Integration of Multi-Modal RNA-Seq Data for Prediction of Pancreatic Cancer Grade**
Advisor: May Wang
Georgia Tech
- Led the development of a classifier to identify pancreatic cancer grade using genomic and proteomic data from the National Cancer Genome Atlas

WORK AND TEACHING

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 – May 2017 **Invention Studio**
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

Summer 2016 Spring 2015 **Coulter Department of Biomedical Engineering**
Georgia Institute of Technology
Teaching Assistant
- Assisted Dr. Julia Babensee for BMED 3310 Biotransport as the Leading Teaching Assistant; rated 4.5/5.0 by the students.
- Assisted Martin Jacobson for BMED 2130 Biomedical Engineering Design as CAD Teaching Assistant and Prototyping Teaching Assistant.

VOLUNTEER

Sept 2013 – May 2015 **Engineers without Borders Uganda Clean Water Program**
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, Latex
Cloud Computing	SQL, MongoDB, AWS
Language	Mandarin – native; English – fluent; Japanese – moderate; Korean, Spanish – beginner