

CURRICULUM VITAE

CONTACT INFORMATION

Email

Work mariakakis@cs.toronto.edu

Website

Personal <https://mariakakis.github.io>

LANGUAGE SKILLS

English Read, Write, Speak, Understand, Peer Review

EDUCATION

Degrees

Doctorate, Computer Science and Engineering, Making Medical Assessments Available and Objective Using Smartphone Sensors (Completed) Sep. 2015 - Jun. 2019

University of Washington, Washington, United States, Academic

Supervisors: Jacob Wobbrock (2014/2 - 2019/6), Shwetak Patel (2013/9 - 2019/6)

Research Disciplines: Computer Science

Master's Equivalent, Computer Science and Engineering (Completed) Sep. 2013 - Jun. 2015

University of Washington, Washington, United States, Academic

Supervisors: Jacob Wobbrock (2014/2 - 2019/6), Shwetak Patel (2013/9 - 2019/6)

Bachelor's, Computer Science (Completed) Aug. 2009 - Jun. 2013

Duke University, North Carolina, United States, Academic

Bachelor's, Electrical and Computer Engineering (Completed) Aug. 2009 - Jun. 2013

Duke University, North Carolina, United States, Academic

RECOGNITIONS

Prize / Award, Best Paper Jul. 2021 - Jul. 2021

ACM SIGCAS Conference on Computing and Sustainable Societies (COMPASS)

This award was given by the conference's program committee for my publication on "NkhukuProbe: Using a Sensor-Based Technology Probe to Support Poultry Farming Activities in Malawi", for which I was a contributing author

Prize / Award, Best Paper Runner-Up Sep. 2020 - Sep. 2020

IEEE Pervasive Computing

This award was given by the journal editors for my first-author publication on "Challenges in Realizing Smartphone-based Health Sensing

Prize / Award, Best Paper Finalist Apr. 2019 - Apr. 2019

IEEE International Conference on Radio-Frequency Identification (RFID)

Mariakakis, Alex

November 1, 2021

This award was given by the conference's program committee for my publication on "IDCam: Precise Item Identification for AR-Enhanced Object Interactions", for which I was a contributing author

Distinction, Gaetano Borriello Outstanding Student Award

Oct. 2018 - Oct. 2019

ACM International Joint Conference on Pervasive and Ubiquitous Computing (UbiComp)

This award is given to a graduate student "who has made outstanding research contributions to the field of ubiquitous computing". The awardee is selected by the conference's Steering Committee based on their publication records, service to the community, and a submitted research statement

Distinction, Top 10 Innovations from the University of Washington's Paul G. Allen School That's Making the World a Better Place

Mar. 2018

Vulcan

Vulcan, an investment company founded by Microsoft co-founder Paul Allen, published a list of the top 10 innovations from the School of Computer Science that they saw as having the biggest potential to change the world for the better. One of my projects on scleral jaundice screening with a smartphone (BiliScreen) is #5 on that list

Citation, Geek of the Week

Sep. 2017

GeekWire

The Seattle-centric technology news site GeekWire "profiles the characters of Pacific Northwest tech, science, games, innovation, and more

Prize / Award, Honorable Mention

Sep. 2015 - Sep. 2015

ACM International Joint Conference on Pervasive and Ubiquitous Computing (UbiComp)

This award was given by the conference's program committee for my publication on "HyperCam: Hyperspectral Imaging for Ubiquitous Computing Applications", for which I was a contributing author

Distinction, Graduation Cum Laude

Jun. 2013

Duke University, North Carolina, United States, Academic

Latin Honors are given to undergraduate students who maintain a high GPA throughout all four years of their studies. In the case of graduation cum laude, a student must have a GPA within the top-25% relative to the GPA distribution of the previous year's class

Distinction, Graduation with Departmental Distinction

Jun. 2013

Duke University, North Carolina, United States, Academic

Departmental Distinction is awarded to students who complete a faculty-supervised independent study project during their senior year and present that work in written and oral forms to the department's faculty. Furthermore, students who attain this distinction must also maintain a cumulative GPA of at least 3.5

Distinction, Tau Beta Pi

Apr. 2013

Duke University, North Carolina, United States, Academic

Tau Beta Pi is the oldest engineering honor society in the United States, honoring students who have shown significant academic achievement and commitment to personal and professional integrity

Prize / Award, Outstanding Teaching Assistant Award in Electrical and Computer Engineering

Jan. 2013

Duke University, North Carolina, United States, Academic

This award is given to undergraduate teaching assistants each semester who receive exceptional praise from their peers and supervising faculty

EMPLOYMENT

Academic Work Experience

Assistant Professor, Assistant Professor (Full-time)**Aug. 2020***Computer Science, University of Toronto, Ontario, Canada, Academic*

As a new tenure-track faculty member, I will be responsible for leading my own research program. This responsibility includes, but is not limited to, completing publications from my postdoc, establishing an independent research agenda, supervising students, applying for grants, and teaching courses

Postdoctoral Researcher (Full-time)**Sep. 2019 - Jul. 2020***Computer Science and Engineering, University of Washington, Washington, United States, Academic*

I conducted research involving the use of passive sensing (via smartphones, smartwatches, and Bluetooth beacons) to detect significant life events. I also led the writing of an NSF Smart & Connected Health grant proposal on the detection of heavy-drinking episodes using a similar approach to my work on significant life events. That grant was rejected, but we have plans of adapting that grant to other domains

Professional Master's Program Lecturer, Lecturer (Part-time)**Mar. 2018 - Jun. 2018***Electrical Engineering, University of Washington, Washington, United States, Academic*

I taught an introductory course on ubiquitous computing to ~35 students who were studying for their Master's degree while working in industry. The course was held 1 day a week for 3 hours. Beyond providing lectures, leading discussions, and grading assignments, I also redesigned the course so that the assignments had greater cohesion. In addition, I updated the curriculum to include more lectures on machine learning and discussions on newer topics in ubiquitous computing

Teaching Assistant (Full-time)**Sep. 2013 - Jun. 2014***Computer Science and Engineering, University of Washington, Washington, United States, Academic*

I provided supplemental lectures to ~100 undergraduate students on topics related to software design and implementation (e.g., event-driven programming, program structure, program correctness). I delivered the same 1-hour lecture 3 times a week to cover all of the students. In some cases, I was asked to reinforce what was taught in the main lectures; in other cases, I was asked to teach new content that was required for the homework assignments

Non-academic Work Experience**Postdoctoral Researcher****Sep. 2019 - Jul. 2020***Sage Bionetworks, Research*

Sage Bionetworks often runs open competitions called "challenges" where researchers attempt to achieve the best accuracy on a particular machine learning challenge. One such challenge with the Michael J. Fox Foundation aims to quantify the severity of Parkinsonian symptoms using motion sensor data. I helped verify that there was useful signal in the challenge's two datasets by producing a baseline machine learning model. In addition, I have been leading the creation of a study that would produce the largest dataset of continuous at-home gait in the world. With this dataset, we will create and validate various algorithms for estimating gait parameters (e.g., step cadence, speed) for an eventual large-scale deployment through the National Institutes of Health. This dataset will eventually be open-sourced along with datasets from other gait researchers to form a standard in that research community

Research Intern**Jan. 2018 - Sep. 2018***Microsoft Research, Private Sector*

I helped an interdisciplinary team of chemists, computer scientists, and designers create chemical sensor patches that produce colorimetric readouts of ultraviolet radiation. Beyond informing the design of these sensors and catering this research to a computer science audience, I created a smartphone app that automatically interprets the sensor patches' colors regardless of the ambient lighting conditions. his work led to a conference publication

Research Intern**Jun. 2015 - Sep. 2015***FX Palo Alto Laboratory, Private Sector*

I helped create a web interface that surfaces coincidences and similarities in egocentric video collections. The interface merges segments of geo-tagged videos using location and visual similarity to automatically generated time-lapses of commonly viewed places during a person's daily commute

Research Intern**Jun. 2014 - Sep. 2014***Samsung Research America, Private Sector*

I led an investigation of how the sensors on a smartwatch can be used to determine whether a person is a driver or passenger inside a vehicle. In this investigation, I explore both motion sensing (accelerometer) and scene recognition (camera) could be used to achieve high classification accuracy. This work led to a conference workshop publication. I also helped with the development of other smartwatch sensing modules for activity recognition, such as a module for detecting eating and gait episodes

Research Intern**Jun. 2013 - Aug. 2013***HP Labs, Private Sector*

I helped create an indoor localization system that only requires a person's smartphone to be near a single wireless access point. While my mentor was responsible for implementing a way of estimating the distance between a person's smartphone and an access point using wireless signal processing, I implemented a holistic dead-reckoning system that leveraged the smartphone's inertial measurement unit to estimate a person's instantaneous speed and heading. This work led to multiple patents and a conference publication

Affiliations**Affiliate Scientist****Jul. 2021***Techna, Health***RESEARCH FUNDING HISTORY****Principal Investigator, Grant, Continuous Passive Sensing for Bayesian Diagnostics in Mobile Health (Awarded) Sep. 2021 - Sep. 2023**

Project Description: The long-term goal of my research program is to demonstrate that the combination of continuous passive sensing and explicit clinical assessments can produce proactive mHealth systems that are more accurate and efficient than mHealth systems employing either component on its own. Over the two-year term of this award, my research team will pursue a series of investigations, user studies, and deployments to create novel techniques that continuously track a person's behavior, symptoms, and physiology. We will innovate new ways of using passively sensed information to both trigger and improve the accuracy of clinical tests across health domains, such as stress and Parkinson's disease. Furthermore, we will be able to develop models that combine estimates from such tools to generate a holistic representation of the user's health in support of long-term disease management and adaptive interventions

Funding Sources

- University of Toronto: Connaught New Researcher Award Total: \$20,000.00 (Canadian dollar) Received: \$20,000.00 (Canadian dollar), (competitive)

Principal Investigator, Grant, Earbuds as a Sensing Platform for Physical and Mental Wellbeing (Awarded) Jun. 2021 - Jun. 2023

Project Description: In this proposal, we seek to utilize earbuds as a convenient endpoint through which we can support people's physical and mental wellbeing. Newer models of earbuds include sensors for enhancing the user experience: proximity sensors for in-ear detection, accelerometers for orientation sensing, and microphones for active noise cancellation. We will explore how these sensors can be leveraged for portable physiological sensing and activity recognition. Our primary focus will be on utilizing the earbuds' microphones to record body sounds like coughing and tidal breathing. Continuous cough detection will enable us to report key symptoms related to influenza-like diseases like cough rate and productivity. Beyond using body sounds as continuous vital sign measurements, we will also monitor tidal breathing to provide guidance during meditation sessions. Lastly, we will use the earbuds' accelerometers for continuous posture sensing and to provide guidance during neck exercises

Funding Sources

- University of Toronto: University of Toronto – Tsinghua University Joint Research Fund Total: \$40,000.00 (Canadian dollar) Received: \$20,000.00 (Canadian dollar), (competitive)

Principal Investigator, Grant, Continuous Passive Sensing for Bayesian Diagnostics in Mobile Health (Awarded) Apr. 2021 - Apr. 2026

Project Description: The long-term goal of my research program is to demonstrate that the combination of continuous passive sensing and explicit clinical tests can produce proactive mHealth systems that are more accurate and efficient than mHealth systems with either component on its own. Over the next five years, my research team will pursue a series of investigations, user studies, and deployments to create novel techniques that continuously track a person's behavior, symptoms, and physiology. We will innovate new ways of using passively sensed information to both trigger and improve the accuracy of clinical tests across health domains, including stress, Parkinson's disease, and infectious respiratory illnesses. Furthermore, we will be able to develop models that combine estimates from such tools to generate a holistic representation of the user's health for long-term disease management and adaptive interventions

Funding Sources

- Natural Sciences and Engineering Research Council of Canada (NSERC): Discovery Grant (Early Career Researcher) #RGPIN-2021-03457 Total: \$132,500.00 (Canadian dollar) Received: \$132,500.00 (Canadian dollar), (competitive)

Co-investigator, Grant, Extending the Use of Time-of-Flight Cameras for Mobile Health (Awarded) Nov. 2020 - Nov. 2022

Project Description: Research in mobile health (mHealth) has primarily focused on the sensors that have been on standard smartphones over the past decade: IMUs, microphones, and cameras. The goal of this proposal is to leverage the time-of-flight (ToF) sensor embedded in Huawei's newest smartphones for mHealth. The ToF camera provides rich spatial information that can overcome many limitations of past computer vision-based apps. This proposal will produce two mHealth applications that highlight different strengths of the ToF camera. The first application will leverage the fact that the ToF camera can objectively measure length, area, and volume to detect instances of craniosynostosis—skull deformation that can happen during infant development. The second application will leverage the ability of ToF cameras to track 3D motion to quantify the severity of Parkinsonian tremor. These approaches will be generalizable to other problem settings, enabling new applications for the latest smart-phone technologies

Funding Sources

- Huawei Technologies: Huawei-University of Toronto: Mobile AI Innovation Lab Total: \$193,000.00 (Canadian dollar) Received: \$45,000.00, (competitive)

Principal Investigator, Contract, University of Toronto Startup Funds (Awarded) Aug. 2020 - Aug. 2025

Funding Sources

- University of Toronto Total: \$600,000.00 Received: \$600,000.00

Co-applicant, Fellowship, Qualcomm Innovation Fellowship (Completed) Sep. 2016 - Sep. 2017

Other Investigators: Hanchuan Li (Co-applicant)

Funding Sources

- QUALCOMM Incorporated (USA): Innovation Fellowship Total: \$100,000.00 (United States dollar) Received: \$50,000.00, (competitive)

Principal Applicant, Fellowship, National Science Foundation Graduate Research Fellowship (Completed) Sep. 2015 - Sep. 2018

Funding Sources

- National Science Foundation (USA): Graduate Research Fellowship Total: \$102,000.00 (United States dollar) Received: \$102,000.00, (competitive)

ACTIVITIES

TEACHING ACTIVITIES

Courses Taught

Instructor, Winter CSC 2526: Topics in HCI and Ubiquitous Computing: Mobile Health Jan. 10, 2022 - Apr. 11, 2022

Computer Science, University of Toronto, Ontario, Canada, Academic Graduate

Lecture Hours Per Week: 2

Instructor, C4M: Computing for Medicine

Sep. 9, 2021 - Apr. 11, 2022

Medicine, University of Toronto, Ontario, Canada, Academic College

Lecture Hours Per Week: 3

Instructor, Winter CSC 318: The Design of Interactive Computational Media

Jan. 11, 2021 - Apr. 9, 2021

Computer Science, University of Toronto, Ontario, Canada, Academic Undergraduate, Number of Students: 113

Lecture Hours Per Week: 1, Lab Hours Per Week: 2

Instructor, Spring EE 590A: Advanced Topics in Ubiquitous Computing

Mar. 29, 2018 - Jun. 7, 2018

Electrical Engineering, University of Washington, Washington, United States, Academic Ubiquitous computing, Graduate, Number of Students: 35

Lecture Hours Per Week: 2, Tutorial Hours Per Week: 1

Course Development

Course Developer, Advanced Topics in Ubiquitous Computing

Mar. 29, 2018

Electrical Engineering, University of Washington, Washington, United States, Academic

The aim of this class is to introduce students to ubiquitous computing (ubiquitous computing). The content focuses on how traditional topics of computing have evolved to support the vision of a connected, portable, and human-centric computing environment. Because ubiquitous computing is an applied field, the course covers contributions across various fields: human-computer interaction, embedded computing, computer vision, distributed systems, machine learning, and electrical engineering. Students gain practical experience in developing sensing systems for activity recognition and gestural interaction. The course is a combination of lectures, tutorials, class discussions, and demonstrations. Occasional tutorials on necessary skills are provided in the first half of the class-time (e.g., Android and Arduino programming). The rest of the class time is used for discussions on the required readings, Co-developers: Wang, Edward

SUPERVISORY ACTIVITIES

Student/Postdoctoral Supervision

Principal Supervisor: Dhruv Verma, At-Home, Passive Gait Speed Assessment Using Ubiquitous Devices, (PhD Student)

Sep. 2021 - Apr. 2026

Doctorate, In Progress

University of Toronto, University of Toronto, Student Canadian Residency Status: Study Permit

Student Country of Citizenship: India

Principal Supervisor: Sejal Bhalla, Detecting Risky Drinking Behaviors Using Smartphones and Wearables, (PhD Student)

Sep. 2021 - Apr. 2026

Doctorate, In Progress

University of Toronto, University of Toronto, Student Canadian Residency Status: Study Permit

Student Country of Citizenship: India

Other Supervisors

- de Lara, Eyal (Co-Supervisor)

Mariakakis, Alex

November 1, 2021

Principal Supervisor: Ken Christofferson, Sensing via Earables for Continuous Sleep Quality Assessment, (PhD Student) Sep. 2021 - Apr. 2025

Doctorate, In Progress

University of Toronto, University of Toronto, Student Canadian Residency Status: Study Permit

Student Country of Citizenship: United States

Other Supervisors

- Cafazzo, Joe (Co-Supervisor)

Principal Supervisor: Georgianna Lin, Virtual Reality for Cognitive Assessments, (PhD Student) Sep. 2021 - Apr. 2025

Doctorate, In Progress

University of Toronto, University of Toronto, Student Canadian Residency Status: Study Permit

Student Country of Citizenship: United States

Other Supervisors

- Truong, Khai (Co-Supervisor)

Principal Supervisor: Ian Ruffolo, Augmented Reality Guidance for Smartphone-based Motor Assessments, (MSc Student) Jun. 2021 - Apr. 2023

Master's Thesis, In Progress

University of Toronto, University of Toronto, Student Canadian Residency Status: Canadian Citizen

Student Country of Citizenship: Canada

Other Supervisors

- Brudno, Michael (Co-Supervisor)

Co-Supervisor: Brenna Li, Design Considerations for Patient-Physician Chatbots, (PhD Student) Aug. 2020 - Apr. 2024

Doctorate, In Progress

University of Toronto, University of Toronto, Student Canadian Residency Status: Canadian Citizen

Student Country of Citizenship: Canada

Other Supervisors

- Truong, Khai (Principal Supervisor)

ADMINISTRATIVE ACTIVITIES

Event Administration

Online Conference Co-Chair, Conference, ACM International Joint Conference on Pervasive and Ubiquitous Computing (UbiComp) (Sep. 2020 - Sep. 2020) Jun. 2020 - Sep. 2020

Video Preview Co-Chair, Conference, ACM Conference on Human Factors in Computing Systems (CHI) (Apr. 2019 - Apr. 2019) Jan. 2019 - Apr. 2019

Founder and Organizer, Workshop, DUB (Design, Use, Build) Doctoral Colloquium (Apr. 2017 - Apr. 2017) Jan. 2017 - Apr. 2017

Organizer, Workshop, National Science Foundation Graduate Research Fellowship Information Session and Workshop (Sep. 2016 - Sep. 2018) Sep. 2016 - Sep. 2018

ASSESSMENT AND REVIEW ACTIVITIES

Journal Review Activities

Reviewer (Blind)

Jul. 2021

JMIR mHealth and uHealth, Number of Works Reviewed / Refereed: 1

Reviewer (Double Blind) **Mar. 2019**
ACM Transactions on Computer-Human Interaction (TOCHI), Number of Works Reviewed / Refereed: 1

Reviewer (Double Blind) **Feb. 2017**
Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies (IMWUT), Number of Works Reviewed / Refereed: 32

Reviewer (Blind) **Oct. 2015**
IEEE Pervasive Computing, Number of Works Reviewed / Refereed: 4

Reviewer (Blind) **Dec. 2019 - Dec. 2019**
IEEE Sensors, Number of Works Reviewed / Refereed: 1

Reviewer (Double Blind) **Nov. 2018 - Nov. 2018**
Biomedical Optics Express, Number of Works Reviewed / Refereed: 1

Reviewer (Double Blind) **May 2018 - Jul. 2018**
ACM Conference on Computer Supported Cooperative Work (CSCW), Number of Works Reviewed / Refereed: 1

Conference Review Activities

Reviewer, Double Blind **Jul. 2020**
International Symposium on Wearable Computers (ISWC), Number of Works Reviewed / Refereed: 1

Reviewer, Double Blind **Jun. 2019**
ACM Human-Computer Interaction with Mobile Devices and Services (MobileHCI), Number of Works Reviewed / Refereed: 9

Reviewer, Double Blind **Nov. 2016**
ACM Conference on Human Factors in Computing Systems (CHI), Number of Works Reviewed / Refereed: 30

Reviewer, Double Blind **Apr. 2015**
ACM User Interface Software and Technology (UIST), Number of Works Reviewed / Refereed: 23

Reviewer, Double Blind **Jan. 2018 - Feb. 2020**
ACM Conference on Human Factors in Computing Systems, Late Breaking Work (CHI LBW), Number of Works Reviewed / Refereed: 13

Reviewer, Double Blind **Aug. 2017 - Sep. 2017**
IEEE Virtual Reality and 3D User Interfaces (VR), Number of Works Reviewed / Refereed: 1

Reviewer, Double Blind **Apr. 2016 - Apr. 2016**
ACM Symposium on Applied Perception (SAP), Number of Works Reviewed / Refereed: 1

Reviewer, Double Blind **Apr. 2015 - May 2016**
ACM Ubiquitous Computing (UbiComp), Number of Works Reviewed / Refereed: 8

Graduate Examination Activities

PhD Oral Exam Member, Majeed Kazemi **Dec. 2021**
Computer Science, University of Toronto, Ontario, Canada, Academic

Mariakakis, Alex	November 1, 2021
PhD Oral Exam Member, Saeid Alavi Naeini <i>Biomedical Engineering, University of Toronto, Ontario, Canada, Academic</i>	Oct. 2021
PhD Oral Exam Member, Sujay Nagaraj <i>Computer Science, University of Toronto, Ontario, Canada, Academic</i>	Aug. 2021
PhD Oral Exam Member, Chunjong Park <i>Computer Science and Engineering, University of Washington, Washington, United States, Academic</i>	Mar. 2021
PhD Oral Exam Member, Minfan Zhang <i>Computer Science, University of Toronto, Ontario, Canada, Academic</i>	Nov. 2020
Master's Proposal Defense Member, Eric Lu <i>Computer Science, University of Toronto, Ontario, Canada, Academic</i>	Jun. 2021 - Sep. 2021
Master's Proposal Defense Member, Navid Korhani <i>Computer Science, University of Toronto, Ontario, Canada, Academic</i>	Jun. 2021 - Sep. 2021

PARTICIPATION ACTIVITIES

Event Participation

Scholar, Workshop, mHealth Training Institute May 2021 - Jul. 2021

The NIH mHealth Training Institute (mHTI) was created to serve as an incubator for developing transdisciplinary scientists capable of co-creating mHealth solutions for “wicked” healthcare problems. The annual institute identifies academic unicorns — from disciplines ranging from medicine and psychology to computer science and biomedical engineering — with an aptitude for interdisciplinarity and a passion for translational research with societal impact. Through a week-long, residential workshop, the mHTI helps the selected scholars develop a shared vocabulary and conceptual framework, acquire core domain expertise in latest mHealth technologies and methodologies, and get practical experience in cross-disciplinary mHealth innovation

Knowledge and Technology Translation

Presenter / Mentor Mar. 2019 - Mar. 2017

Community Engagement, National Center for Women & Information Technology, Academic Personnel, <https://www.aspirations.org/aspirations-community/washington-seattle-and-west>

Outcome / Deliverable: As a graduate student, I led our research group's involvement with the NCWIT. We had at least 5 female interns from middle or high school complete summer internships with our research group, and I specifically mentored three of those individuals. Additionally, I have provided demonstrations at the NCWIT award ceremonies, which taught students and their parents about applications of computer science

Activity Description: The National Center for Women & Information Technology (NCWIT) is a nonprofit designed to increase the meaningful participation of girls and women in computing. Our research group has worked with middle and high school women who have later received awards from the NCWIT. We have also provided demonstrations at the NCWIT award ceremony, which has both taught attendees about applied topics in computer science and allowed us to recruit talented girls and women for summer internships

Course Consultant Oct. 2017 - Dec. 2017

Consulting for Industry, Microsoft, Industry/Business (>500 employees), <https://www.edx.org/course/introduction-to-device-programming>

Outcome / Deliverable: I helped create Microsoft edX's course called "Introduction to Device Programming". I provided input on many of the courses modules, but I specifically created Module 2 on basics of the C programming language

Activity Description: Microsoft offers introductory online courses for people who are interested in learning a new skill in computer science. I was recruited by Kasey Champion, a member of Microsoft's Learning Team, to provide input on

a course related to device programming. This course includes overviews of Arduino, the C programming language, simple circuits, and integrating Arduino with Azure Cloud resources

Lecturer**Jul. 2016 - Jul. 2017**

Community Engagement, Seattle-Area High School Teachers, Academic Personnel, <https://news.cs.washington.edu/2016/07/10/10th-anniversary-of-uw-cses-cs4hs/> <https://cs4teachers.cs.washington.edu>

Outcome / Deliverable: I taught a lecture in the program that introduced the teachers to the fields of human-computer interaction and ubiquitous computing. The lectures also included demonstrations of concepts and technologies that could be reproduced in their classrooms

Activity Description: The University of Washington's CS4HS program is designed to teach local high school teachers about the importance of computer science and the help them identify ways that they could get exposure their students to the field before their students graduate

Presenter**Jun. 2016 - Jun. 2016**

Community Engagement, Government Personnel, <https://news.cs.washington.edu/2016/06/18/sen-maria-cantwell-uw-cse>

Outcome / Deliverable: I provided demonstrations and presentations on applications of computer science for mobile health and interaction. The work included my own research as well as other projects from research group during my PhD

Activity Description: Senator Maria Cantwell visited the Department of Computer Science and Engineering to learn about how the state government's funding of the University of Washington has led to new innovations that have broad impacts outside of academia

Researcher**Feb. 2016 - Jul. 2017**

Involvement in/Creation of Start-up, Senosis Health, Industry/Business-Small (<100 employees), <https://www.geekwire.com/2017/exclusive-google-buys-seattle-health-monitoring-startup-senosis-bolstering-digital-health-push>

Outcome / Deliverable: Senosis Health was acquired by Google in July 2017. My project on scleral jaundice (BiliScreen) was part of the intellectual property included in the agreement

Activity Description: Senosis Health is a startup created by my PhD advisor for his research group's mobile health research. Senosis was acquired by Google in July 2017 to help with their endeavors in digital health

Presenter**Sep. 2015 - Sep. 2015**

Community Engagement, University of Washington Foundation, Academic Personnel, <https://news.cs.washington.edu/2015/09/15/changing-the-world-faculty-and-students-demonstrate-cses-impact-to-the-uw-foundation-board>

Outcome / Deliverable: I provided demonstrations and presentations on applications of computer science for mobile health and interaction. The work included my own research as well as other projects from research group during my PhD

Activity Description: The University of Washington Foundation is a group of alumni and other major donors to the University. The Department of Computer Science and Engineering held an event where graduate students working on particularly impactful projects were asked to present their work to members of the Foundation

Presenter**Nov. 2014 - Dec. 2018**

Community Engagement, DawgBytes Program, General Public, <https://www.cs.washington.edu/outreach/k12>

Outcome / Deliverable: As a graduate student, I organized, led, and presented our research group's booth at the yearly DawgBytes Computing Open House event

Activity Description: The DawgBytes Program is the official K-12 outreach program for the School of Computer Science and Engineering at the University of Washington. One of the events that DawgBytes holds every year is the Computer Open House where children and their parents can come on campus to learn more about computer science

Presenter**Apr. 2014 - Apr. 2018**

Mariakakis, Alex

November 1, 2021

Community Engagement, Engineering Discovery Days Program, General Public,
<https://www.engr.washington.edu/about/k12/discovery-days>

Outcome / Deliverable: As a graduate student, I organized, led, and presented our research group's booth at the yearly Engineering Discovery Days event

Activity Description: The Engineering Discovery Days Program is the official K-12 outreach program for the School of Engineering at the University of Washington. Every April, the program organizes a 2-day event where students visit the campus to learn about and experience real-world applications of different disciplines in engineering

International Collaboration Activities

Co-Lead Organizer and Mentor

Jul. 2020 - Sep. 2020

China

I helped co-create and organize the Access Computing Summer Program, a program sponsored by the Global Innovation Exchange as part of a long-term collaboration between the University of Washington and Tsinghua University. The program is targeted towards senior undergraduate and junior graduate students in the United States and China who are interested in developing research skills in ubiquitous computing and human-computer interaction. The students in this program not only receive guidance on a summer project, but also regularly attend group meetings, guest lectures, and workshops to expand their knowledge base (virtually due to COVID-19)

Mentor

Sep. 2018 - Oct. 2018

Singapore

The Broadening Participation Workshop at the ACM International Joint Conference on Pervasive and Ubiquitous Computing (UbiComp) aims to increase the involvement of women, all researchers from developing countries, as well as underrepresented minorities, including persons with disabilities, in the field of ubiquitous and wearable computing

MEMBERSHIPS

Committee Memberships

Committee Member, Workshop Program Committee

May 2021 - Jun. 2021

The Future of Digital Biomarkers Workshop, Academic

Made final decisions of paper acceptances/rejections for 2 submissions

Committee Member, Editorial Board

Feb. 2021 - Feb. 2023

Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies (IMWUT), Academic

Selected reviewers, provided reviews, and moderated reviews for 12+ submissions; contributed to the final decisions of paper acceptances/rejections

Committee Member, Editorial Board

Jan. 2021 - May 2021

ACM International Conference on Mobile Human-Computer Interaction (MobileHCI), Academic

Selected reviewers, provided reviews, and moderated reviews for 9 submissions; contributed to the final decisions of paper acceptances/rejections

Committee Member, Interaction Techniques Program Subcommittee

Sep. 2020 - Dec. 2020

ACM Conference on Human Factors in Computing Systems (CHI), Academic

Selected reviewers, provided reviews, and moderated reviews for 15 submissions; contributed to the final decisions of paper acceptances/rejections

Committee Member, Late-Breaking Works Program Committee

Jan. 2020 - Feb. 2020

ACM Conference on Human Factors in Computing Systems (CHI), Academic

Made final decisions of paper acceptances/rejections for 8 submissions

Mariakakis, Alex

November 1, 2021

Committee Member, Program Committee

Apr. 2019 - Jul. 2019

ACM Symposium on User Interface Software and Technology (UIST), Academic

Selected reviewers, provided reviews, and moderated reviews for 17 submissions; contributed to the final decisions of paper acceptances/rejections

Committee Member, Workshop Program Committee

Jul. 2018 - Aug. 2019

International Workshop on Ubiquitous Personal Assistance (UPA), Academic

Made final decisions of paper acceptances/rejections for 1 submission

Other Memberships

Member

Dec. 2020

Temerty Centre for Artificial Intelligence Research and Education in Medicine (T-CAIREM), Academic

T-CAIREM seeks to establish world-class educational programs in AI in medicine, fund research opportunities that bring together experts from a range of disciplines, and create a secure data platform to house datasets for applied AI learning and research

MOST SIGNIFICANT CONTRIBUTIONS

1. Mariakakis, Alex. (2020, December). RDTScan.
Rapid diagnostic tests are inexpensive chemical tests that produce a colorimetric output depending on the viral load in a biological sample. RDTs are becoming more widely available for screening diseases like malaria and COVID-19, yet one concern is that untrained people may misinterpret their RDT's colorimetric output. As a postdoctoral researcher, I supervised a graduate student in the development of an open-source software library called RDTScan that supports automatic RDT interpretation with the smartphone's camera. Using real-time image processing and computer vision, the library provides guides users to capture a high-quality photograph of their completed RDT and then analyzes the photograph to interpret the test's results on their behalf. We have helped three global health organizations integrate RDTScan into their workflows, which has resulted in publications to the ICTD Conference, ACM IMWUT, and BMJ Open
2. Mariakakis, Alex. (2020, July). EcoPatches.
Year-round ultraviolet (UV) exposure silently causes skin damage that goes unnoticed until sunburn. As an intern at Microsoft Research, I was part of a team composed of chemists, designers, and computer scientists tasked with supporting personal UV monitoring. We created inkjet-printable chemical stickers called EcoPatches that change their color in response to UV radiation over time. We designed EcoPatches to be human-readable so that people can notice large changes throughout the day. We also made EcoPatches interpretable with computer vision to help people with low color acuity. My specific contributions to this project included deciding the specifications of the EcoPatches' color response and creating a computer vision algorithm to interpret the EcoPatches' color change. We published this work at ACM DIS
3. Mariakakis, Alex. (2017, September). PupilScreen.
One biosignal that physicians use to screen a person for a traumatic brain injury is the pupillary light reflex (PLR) — the involuntary change in a person's pupil size in response to a light stimulus. As a graduate student, I led a project called PupilScreen to investigate whether a smartphone's camera could be used to measure a person's PLR. The PupilScreen app constricts a person's pupils with the smartphone's flash and records a video of the pupils' response. The app then processes the video using a fully convolutional neural network and signal processing to report key metrics like pupil constriction velocity. We published our work in ACM IMWUT and a journal called Neurosurgery. After I presented our findings at ACM UbiComp, we further disseminated our work through interviews with news outlets like Newsweek and Voice of America News. We filed a patent for our technology, and I maintain an advisory role for a startup that my clinical collaborators are pursuing around this project
4. Mariakakis, Alex. (2017, September). BiliScreen.

One of the perceptible symptoms of pancreatic cancer is jaundice — the yellowing of the skin and eyes due to excess bilirubin in the blood. Although jaundice is obvious in severe cases, the ability to identify subtle instances of jaundice could lead to earlier detection of pancreatic cancer. As a graduate student, I led a project called BiliScreen that investigated whether a photograph from a smartphone's camera could be used to identify subtle cases of scleral jaundice. In brief, the underlying algorithm uses image processing to summarize the color of a person's sclera as a feature vector that is fed into a machine learning model to estimate a person's bilirubin level. We published our work to ACM IMWUT, presented our results at ACM UbiComp, and subsequently filed a patent. We also disseminated our findings through media outlets like the BBC and Reuters. This project was one of many that formed a startup led by my PhD advisor called Senosis, which has since been acquired by Google

5. Mariakakis, Alex. (2015, April). SwitchBack.

A pedestrian who is reading an article on their smartphone must balance their focus between their smartphone and the physical space in front of them, imposing cognitive load that can lead to a pedestrian accident if the person is not aware of their surroundings. I led a project called SwitchBack that aimed to alleviate the cognitive burden induced during such scenarios. SwitchBack monitors the user's attention as they read by tracking their gaze through the front-facing camera. SwitchBack counts how many lines the user has read in an article by detecting quick changes in gaze direction, leveraging information about the layout of the content and typical reading speeds to make corrections. When the user looks away and then returns their gaze back to the screen, SwitchBack highlights the last line of text the user read to guide their attention back to where they left off. We published this work at ACM CHI

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6. Mariakakis, Alex T.. (2018). *Drunk User Interfaces: Determining Blood Alcohol Level Through Everyday Smartphone Tasks*. ACM Conference on Human Factors in Computing Systems (CHI), Montreal, Canada.
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INTELLECTUAL PROPERTY**Patents**

1. Taylor J, Patel S, Mariakakis A. (2018, June 1). Bilirubin estimation using sclera color and accessories therefor Patent No. US20200121228A1.
Pancreatic cancer is one of the deadliest forms of cancer worldwide because it is often detected in later stages. One of the few characteristic symptoms of pancreatic cancer is jaundice — the yellowing of the skin and eyes due to the build-up of a compound called bilirubin. Although jaundice is obvious in severe cases, the ability to identify more subtle instances of jaundice could lead to earlier detection or continuous monitoring. This patent describes an algorithm that analyzes a photo of someone's eyes to estimate their bilirubin level. The algorithm uses computer vision to separate the sclera (the white part of the eye) from the rest of the image and summarize its color. A machine learning algorithm uses that color feature vector to report a bilirubin level. Ambient lighting can affect the appearance of colors in an image, so the patent describes two methods for color control: a 3D-printed box for color control or color references for calibration
2. McGrath L, Law A, Bly R, Patel S, Mariakakis A, Baudin J. (2018, May 31). Smartphone-based digital pupillometer Patent No. US20200129063A1.
There is no definitive way of diagnosing traumatic brain injuries (TBIs) — head injuries caused by an external force that leads to brain damage. Recent medical literature has posited that the pupillary light reflex — the involuntary change in a person's pupil size in response to a light stimulus — can be a useful biological signal for objective TBI assessment. Some hospitals have a clinical device called a pupillometer, which is able to measure a person's pupillary light reflex using an infrared camera; however, this device typically costs thousands of dollars and is thus not often used by paramedics. This patent describes how the smartphone can be used to produce similar measurements. The system uses a 3D-printed box to control the lighting around the eyes as the smartphone's flash provides a light stimulus. The smartphone's camera records the response, and the pupillary light reflex is measured using a deep learning
3. Wen J, Mariakakis A, Wang E, Warren N. (2017, February 1). Applanation tonometer Patent No. US20170215728A1.
Measuring intraocular pressure is an important test that ophthalmologists conduct to monitor cases of glaucoma. Ophthalmologists normally measure intraocular pressure using specialized and expensive equipment in a clinic, so patients often have to travel great distances for regular monitoring. This patent describes a system that allows ophthalmologists to measure intraocular pressure using only their smartphone and an unpowered smartphone accessory. The smartphone accessory gently applies pressure to the patient's eye, and the deformation of the eye is recording by the smartphone's camera. A computer vision algorithm is applied to the video to produce an intraocular pressure readout
4. Sen S, Lee J, Mariakakis A. (2019). Localization using access point Patent No. US10349214B2.
GPS does not work indoors, so many researchers have explored other sensing modalities for localizing a person inside a building. Indoor localization could help people find their way through unfamiliar buildings or provide people with personalized directions to their destination. The most common indoor localization techniques use people's smartphones to measure the wireless signal strength from nearby access points for triangulation or trilateration; however, these techniques often require coordination between many devices, which induces a significant overhead on the access points. This patent describes a way of providing indoor localization using just a smartphone and a single access point. The smartphone's sensors record the user's steps and heading to infer their local trajectory, and the access point periodically estimates the user's

distance from a known location. These measurements produce a geometrical problem that can be solved to infer the user's location

5. Sen S, Lee J, Mariakakis A. (2018). Localization using access point Patent No. US9883342B2.

GPS does not work indoors, so many researchers have explored other sensing modalities for localizing a person inside a building. Indoor localization could help people find their way through unfamiliar buildings or provide people with personalized directions to their destination. The most common indoor localization techniques use people's smartphones to measure the wireless signal strength from nearby access points for triangulation or trilateration; however, these techniques often require coordination between many devices, which induces a significant overhead on the access points. This patent describes a way of providing indoor localization using just a smartphone and a single access point. The smartphone's sensors record the user's steps and heading to infer their local trajectory, and the access point periodically estimates the user's distance from a known location. These measurements produce a geometrical problem that can be solved to infer the user's location