Alex Mariakakis

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Research Statement

My dissertation is on creating smartphone apps that systematize and automate the ways that doctors use their senses - sight, hearing, touch, smell, and taste - to detect symptoms more accurately, precisely, and consistently. My graduate work has focused on diagnosing conditions that manifest through symptoms in the eye, including jaundice for pancreatic cancer and non-responsive pupils for traumatic brain injuries. My projects cover a wide array of skills, including machine learning, computer vision, signal processing, and user interface design.

Education

University of Washington — Seattle, WA
Computer Science and Engineering MS, PhD — 2013 - present
Advisors: Dr. Shwetak Patel and Dr. Jacob Wobbrock

Duke University — Durham, NC
Electrical and Computer Engineering BSE, Computer Science BS — 2009 - 2013
Advisor: Dr. Romit Roy Choudhury

Teaching

University of Washington

- CSE 190B: CSE Direct Admission Freshman Seminar (guest lecture) . . . . Fall 2016, Fall 2017
- CSE 331: Software Design and Implementation . . . . . Fall 2013, Winter 2013, Spring 2014

Duke University

- ECE 559: Advanced Digital System Design . . . . . Spring 2013
- ECE 54/280: Introduction to Signals and Systems . . . . . Spring 2011, Spring 2012, Fall 2012
- ECE 52: Introduction to Digital Systems . . . . . Fall 2011
- EGR 224: Electrical Fundamentals of Mechatronics . . . . . Spring 2013
- EGR 53/103: Computational Methods in Engineering . . . . . Fall 2010, Fall 2011, Fall 2012

Awards, Grants & Honors

University of Washington

- Qualcomm Innovation Fellowship . . . . . Fall 2015
- NSF Graduate Research Fellowship . . . . . Fall 2014

Duke University

- Graduation Cum Laude . . . . . Spring 2013
- Graduation with Departmental Distinction . . . . . Spring 2013
- Tau Beta Pi . . . . . Spring 2013
- Outstanding Teaching Assistant Award (ECE) . . . . . Spring 2012
- Pratt Research Fellowship . . . . . Fall 2012

Service

Reviewer for CHI (3 years), UbiComp (3 years), UIST (2 years), ACM SAP (1 year), IEEE VR (1 year), IEEE Pervasive Computing (1 year)

Graduate school application reader

Graduate student coordinator

Co-head organizer of DUB's inaugural Doctoral Colloquium

Student volunteer for DUB organization

Active participant in the University of Washington's DawgBytes and Discover Days programs

At least 100 lab tours and demos for a variety of visitors, including politicians (Senator Maria Cantwell), military officials (General Kevin Chilton), visiting faculty (Andy van Dam, Raj Reddy), K-12 teachers, and countless undergrads, grads, and high schoolers.

Industry Experience

FX Palo Alto Laboratory Summer 2015
Palo Alto, CA Research Intern
Mentor: Daniel Avrahami
Developed interface that facilitates the discovery of coincidences and similarities in collections of egocentric videos

Samsung Research America Summer 2014
San Jose, CA Research Intern
Mentors: Vijay Srinivasan, Kiran Rachuri, Evan Welbourne
Explored the application of inertial and image sensing in smartwatches for driving and eating detection

HP Labs Summer 2013
Palo Alto, CA Research Intern
Mentor: Souvik Sen
Worked on enterprise-scale indoor localization system that combines Wi-Fi ranging and inertial dead reckoning

Lutron Electronics Summer 2010
Coopersburg, PA Software Engineering Intern
Mentor: Ryan Bedell
Developed software for automatic PIR occupancy sensor tests and mass microcontroller programming

Ongoing Projects

PupilScreen
Using the smartphone camera to get an absolute measurement of a patients pupil size and pupillary response for the diagnosis of head trauma.

BiliScreen
Using the smartphone camera to estimate the amount of jaundice that appears in the sclera of a patients eye for predicting pancreatic cancer.

Mobile Tonometer
Using the smartphone camera and minimal instrumentation to replicate fixed-force tonometry for the

measurement of intraocular pressure, which eventually leads to the diagnosis of glaucoma.

Selected Press

BBC News: Selfie app "spots early signs of pancreatic cancer"
GeekWire: Univ. of Washington researchers developing smartphone app that can detect concussions
UW CSE News: 10th Anniversary of UW CSE's CS4HS
UW CSE News: Changing the world: Faculty and students demonstrate CSEs impact to the UW Foundation Board

Invited Talks

[1] "BiliScreen: smartphone-based scleral jaundice monitoring for liver and pancreatic disorders". UbiComp, Maui, HI. Sept. 2017.

[2] "PupilScreen: using smartphones to assess traumatic brain injury". UbiComp, Maui, HI. Sept. 2017.

[3] "Using mobile devices to quantify traditionally qualitative health measures". HalfMoon Education: Internet of Things, Seattle, WA. Sept. 2017.

[4] "A smartphone-based system for assessing intraocular pressure". Microsoft Student Summit on Mobility, Systems, and Networking, Petaluma, CA. Feb. 2016.

[5] "Ocular symptom detection using smartphones". UbiComp Doctoral School, Heidelberg, Germany. Sept. 2016.

[6] "Ocular symptom detection using smartphones". UW CSE Industry Affiliates, Seattle, WA. Oct. 2016.

[7] "SwitchBack: improving interaction with mobile devices". CHI, Seoul, South Korea. Apr. 2015.

[8] "SwitchBack: improving interaction with mobile devices". UW CSE Industry Affiliates, Seattle, WA. Oct. 2014.

Accepted Papers

[9] **Mariakakis, A.**, Banks, M. A., Phillipi, L., Yu, L., Taylor, J., Patel, S. N., "BiliScreen: smartphone-based scleral jaundice monitoring for liver and pancreatic disorders". In: *Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies* 1.2 (2017), p. 20. DOI: 10.1145/3131896. URL: http://doi.org/10.1145/3131896.

[10] **Mariakakis, A.**, Baudin, J., Whitmire, E., Mehta, V., Banks, M. A., Law, A., McGrath, L., Patel, S. N., "PupilScreen: using smartphones to assess traumatic brain injury". In: *Proceedings of the 2017 ACM Interactive, Mobile, Wearable, Ubiquitous Technologies* 1.3 (2017), p. 81. DOI: 10.1145/3131896. URL: http://doi.org/10.1145/3131896.

[11] **Mariakakis, A.**, Patel, S., "Ocular symptom detection using smartphones". In: *Proceedings of the 2016 ACM International Joint Conference on Pervasive and Ubiquitous Computing: Adjunct*. ACM. 2016, pp. 435–440. DOI: 10.1145/2968219.2971354. URL: http://doi.org/10.1145/2968219.2971354.

[12] **Mariakakis, A.**, Srinivasan, V., Rachuri, K., Mukherji, A., "WatchUDrive: Differentiating drivers and passengers using smartwatches". In: *2016 IEEE International Conference on Pervasive Computing and Communication Workshops (PerCom Workshops)*. IEEE. 2016, pp. 1–4. DOI: 10.1109/PERCOMW.2016.7457171. URL: http://doi.org/10.1109/PERCOMW.2016.7457171.

[13] **Mariakakis, A.**, Wang, E., Patel, S. N., Wen, J. C., "A smartphone-based system for assessing intraocular pressure". In: *Engineering in Medicine and Biology Society (EMBC), 2016 IEEE 38th Annual International Conference of the*. IEEE. 2016, pp. 4353–4356. DOI: 10.1109/EMBC.2016.7591691. URL: http://doi.org/10.1109/EMBC.2016.7591691.

[14] Goel, M., Whitmire, E., **Mariakakis, A.**, Saponas, T. S., Joshi, N., Morris, D., Guenter, B., Gavriliu, M., Borriello, G., Patel, S. N., "HyperCam: hyperspectral imaging for ubiquitous computing applications". In: *Proceedings of the 2015 ACM International Joint Conference on Pervasive and Ubiquitous Computing*. ACM. 2015, pp. 145–156. DOI: 10.1145/2750858.2804282. URL: http://doi.org/10.1145/2750858.2804282.

[15] **Mariakakis, A.**, Goel, M., Aumi, M. T. I., Patel, S. N., Wobbrock, J. O., "SwitchBack: Using Focus and Saccade Tracking to Guide Users' Attention for Mobile Task Resumption". In: *Proceedings of the 33rd Annual ACM Conference on Human Factors in Computing Systems*. ACM. 2015, pp. 2953–2962. DOI: 10.1145/2702123.2702539. URL: http://doi.org/10.1145/2702123.2702539.

[16] Wang, E. J., Lee, T.-J., **Mariakakis, A.**, Goel, M., Gupta, S., Patel, S. N., "Magnifisense: Inferring device interaction using wrist-worn passive magneto-inductive sensors". In: *Proceedings of the 2015 ACM International Joint Conference on Pervasive and Ubiquitous Computing*. ACM. 2015, pp. 15–26. DOI: 10.1145/2750858.2804271. URL: http://doi.org/10.1145/2750858.2804271.

[17] **Mariakakis, A. T.**, Sen, S., Lee, J., Kim, K.-H., "SAIL: single access point-based indoor localization". In: *Proceedings of the 12th annual international conference on Mobile systems, applications, and services*. ACM. 2014, pp. 315–328. DOI: 10.1145/2594368.2594393. URL: http://doi.org/10.1145/2594368.2594393.

Patents

[18] Taylor, J., Patel, S., **Mariakakis, A.,** "Bilicam for adults". U.S. Provisional Patent Application No. 62/513,825. 2017.

[19] **Mariakakis, A.**, Wang, E., Patel, S., Wen, J., "A smartphone-based system for assessing intraocular pressure". U.S. Provisional Patent Application No. 62/289,755, 62/375,779. 2016.

[20] **Mariakakis, A.**, Srinivasan, V., Rachuri, K., Mukherji, A., "WatchUDrive: Differentiating drivers and passengers using smartwatches". 2016.

[21] McGrath, L., Law, A., Bly, R., Patel, S., **Mariakakis, A.**, Baudin, J., "Smartphone-based digital pupillometer". U.S. Provisional Patent Application No. 62/513,808. 2016.

[22] **Mariakakis, A.**, Goel, M., Aumi, M. T. I., Patel, S. N., Wobbrock, J. O., "SwitchBack: Using Focus and Saccade Tracking to Guide Users' Attention for Mobile Task Resumption". U.S. Provisional Patent Application No. 62/068,413. 2015.

[23] **Mariakakis, A. T.**, Sen, S., Lee, J., Kim, K.-H., "SAIL: single access point-based indoor localization". 2014.