Rawan M. Alharbi

680 N Lakeshore Dr, Suite 1400, Chicago, IL, 60611

+17738083268 • rawan.alharbi@northwestern.edu
www.rawanalharbi.com

Research Interest

My research interest is at the intersection of Machine Learning (ML) and Human Computer Interaction (HCI) from which the field of Human-Centered Machine Learning (HCML) is evolving. I am interested in using wearables to understand and develop machine learning models that can detect and categorize human behavior that is representative of people's authentic behavior in their natural habitat. I am also interested in allowing people to design their own personalized machine learning models for wearables to aid in tracking their own behavior.

Education

Northwestern University — **Chicago, IL**
Ph.D. in Computer Science, GPA: 3.8/4.0 — *2016–2020*
Advisor: Nabil Alshurafa

Northwestern University — **Evanston, IL**
M.S. in Computer Science, GPA: 3.8/4.0 — *2014-2016*
Advisor: Micheal Horn

Prince Sultan University — **Riyadh, Saudi Arabia**
B.S. in Computer Science, GPA: 3.86/4.0 — *2006-2011*

Publications

R. Alharbi, M. Tolba, L. PetitO, J. Hester, and N. Alshurafa, "To mask or not to mask?: Balancing privacy with visual confirmation utility in activity-oriented wearable cameras," *Proc. ACM Interact. Mob. Wearable Ubiquitous Technol.*, vol. 2, Sept. 2019.

N. Alshurafa, J. Jain, **R. Alharbi**, G. Iakovlev, B. Spring, and A. Pfammatter, "Is more always better?: Discovering incentivized mhealth intervention engagement related to health behavior trends," *Proc. ACM Interact. Mob. Wearable Ubiquitous Technol.*, vol. 2, pp. 153:1–153:26, Dec. 2018.

R. Alharbi, T. Stump, N. Vafaie, A. Pfammatter, B. Spring, and N. Alshurafa, "I can't be myself: Effects of wearable cameras on the capture of authentic behavior in the wild," in *Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies*, vol. 2, (New York, NY, USA), ACM, 2018.

N. Alshurafa, **R. Alharbi**, A. F. Pfammatter, and B. Spring, "Detecting real time episodic overeating for just in time interventions," in *Annals Of Behavioral Medicine*, vol. 52, pp. S726–S726, Oxford Univ Press INC Journals Dept, 2001 Evans Rd, Cary, NC 27513 USA, 2018.

A. F. Pfammatter, **R. Alharbi**, N. Alshurafa, and B. Spring, "From sensing to theory: Implications of capturing naturally occurring behaviors in the wild," in *Annals Of Behavioral Medicine*, vol. 52, pp. S153–S153, Oxford Univ Press INC Journals Dept, 2001 Evans Rd, Cary, NC 27513 USA, 2018.

R. Alharbi, N. Alshurafa, and M. Horn, "Intuito: Opportunistic tangible programming by demonstration for physical components," in *Proceedings of the 2017 CHI Conference Extended Abstracts on Human Factors in Computing Systems*, CHI EA '17, (New York, NY, USA), pp. 2322–2328, ACM, 2017.

R. Alharbi, A. Pfammatter, B. Spring, and N. Alshurafa, "Willsense: Adherence barriers for passive sensing systems that track eating behavior," in *Proceedings of the 2017 CHI Conference Extended Abstracts on Human Factors in Computing Systems*, CHI EA '17, (New York, NY, USA), pp. 2329–2336, ACM, 2017.

N. Alshurafa and **R. Alharbi**, "From lab to field: Eating detection machine learning models, privacy, stigma and user-comfort of wearables," in *Annals Of Behavioral Medicine*, vol. 51, pp. S2375–S2376, SPRINGER 233 SPRING ST, NEW YORK, NY 10013 USA, 2017.

S. Zhang, **R. Alharbi**, M. Nicholson, and N. Alshurafa, "When generalized eating detection machine learning models fail in the field," in *Proceedings of the 2017 ACM International Joint Conference on Pervasive and Ubiquitous Computing and Proceedings of the 2017 ACM International Symposium on Wearable Computers*, UbiComp '17, (New York, NY, USA), pp. 613–622, ACM, 2017.

S. Zhang, **R. Alharbi**, W. Stogin, M. Pourhomayun, B. Spring, and N. Alshurafa, "Food watch: Detecting and characterizing eating episodes through feeding gestures," in *Proceedings of the 11th EAI International Conference on Body Area Networks*, BodyNets '16, (ICST, Brussels, Belgium, Belgium), pp. 91–96, ICST (Institute for Computer Sciences, Social-Informatics and Telecommunications Engineering), 2016.

Research Experience

Wearable Low-powered Sensor Array for Human Activity Detection **HABits LAB**
Machine learning, wearable sensors *March 2019–September 2019*

- Designed and built a custom printed circuit board (PCB) for a wearable device prototype.
- Designed and 3D printed the encapsulation of the wearable device.
- Conducted an experiment with ten participants to test the feasibility of using the wearable device in detecting human activity.
- Built a Python application programming interface to ease processing and visualizing the data.
- Built a deep learning based activity detection model using PyTorch.
- Analyzed the performance of the model.

Effect of Image Partial Obfuscation on Privacy-Utility Trade off **HABits LAB**
Quantitative analysis, image processing, wearable sensors *September 2018–March 2019*

- Designed and conducted an online experiment to measure privacy-utility of obfuscated videos
- Built a prototype of a low-powered multi-modal camera which we used for data collection.
- Designed and collected ten video acting scenarios to show case the utility-privacy trade off.
- Wrote a pipeline that generate segmentation of human body using information from the low powered thermal sensor which then generate five obfuscations for the video.
- Compared the pipeline against current state-of-the-art deep learning models for human detection and obfuscation.
- Performed hypotheses testing in order to test the effect of obfuscation on privacy and utility.

Activity Oriented Camera **HABits LAB**
Qualitative Analysis *March 2017–February 2018*

- Designed three prototypes of wearable activity oriented cameras that can help in obtaining specific human activity.
- Designed an experiment in order to understand the problems that can arise with using wearable cameras in the wild.
- Conducted the experiment with twenty-four participants
- Analyzed participants qualitative data using thematic analysis

Defining Overeating **HABits LAB**
Statistical Analysis, Data Science *July 2016 – February 2017*

Comparing self-reported over-eating meal episodes with objective over-eating definitions found in the literature.

- Designed an experiment to collect contextual and emotional self reported data around meal time
- Conduct an experiment with twenty participants with obesity.
- Worked in a interdisciplinary team in order to measure over-eating objectively based on the food reported by the participants
- Implemented a new definition of calculating objective overeating on both episodic level and on day level.
- Performed statistical analysis on the subjective and the objective report to investigate the cases where a miss-match happens

Intuito **TIDAL LAB**
HCI, hardware prototyping, programming languages *September 2015 – July 2016*

Platform that enable opportunistic programmers to code arduino compatible components using a program by demonstration method.

- Built the modular hardware components that will connect to an Arduino environment
- Built the interface that communicates with the Arduino in order to present the recorded action and trigger events along with the generated text code
- Built a Node.js server that interact with the Arduino in order to listen to the events.
- Designed an algorithm the demonstrated program to text based code.
- Designed an experiment to test the effect of Intuito platform on twelve opportunistic programs (novice and intermediate).

Teaching Experience

Computing Everywhere: Building Android App Workshop **Evanston, IL**
Instructor *January 2019*

- Designed a two hour workshop to teach non-computer science students how to build and deploy their own Android mobile apps
- Used block based approach method to teach students about the concepts of variables, loops, conditional statement, logical and mathematical operations.
- Used a hands on guided approach to teaching the material.

iDTech Programming Academy **Lake forest, IL**
Instructor *July 2013–August 2013*

- Taught C++ , Java , Python and JavaScript to beginner programmers
- Helped students in designing and building their games.
- Observed what barriers and facilitators that face teenagers upon learning how code in order to understand the best way to design IntuiteCoder (Master's thesis).

King Saud University **Riyadh, Saudi Arabia**
Teaching and Research Assistant *July 2013–August 2013*

Subjects taught: Java Programming 1 and 2, Network Fundamentals, and Network security

Professional Experience

Ericsson **Riyadh, Saudi Arabia**
Service Engineer *February 2011 – June 2012*

Configured, integrated and troubleshooted new and existing solutions on the Service Delivery Platform using UNIX, Shell, Java, and Network skills.

Conference Presentations

Oral

To Mask or Not to Mask?: Balancing Privacy with Visual Confirmation Utility Wearable Cameras *UbiComp '19*

I Can't Be Myself: Effects of Wearable Cameras on the Capture of Authentic Behavior in the Wild *UbiComp '18*

Poster

Obesity week '18

Detecting real time episodic overeating for just in time interventions *SBM '18*

Intuito: Opportunistic tangible programming by demonstration for physical components *CHI '17*

Willsense: Adherence barriers for passive sensing systems that track eating behavior *CHI'17*

Awards

SIGCHI Student Travel Grant *2019*
UbiComp Travel Award *2018*
PerCom NSF Travel Award *2016*
Master's funding *2014-2016*
Top Five High School Graduate National Award *2007*

Mentoring

HABits Lab
Mariam Tolba, Ziqin Xu, Yuze Li, Pranay Prabhakar *2018-Present*

Services

Reviewer
IMWUT '19 - Interactive, Mobile, Wearable and Ubiquitous Technologies *2019*
BHI '19 - IEEE EMBS International Conference on Biomedical & Health Informatics *2019*
CHI '19 - Extended Abstracts of the 2019 CHI Conference on Human Factors in Computing Systems *2019*
CHI '19 - Proceedings of the 2019 CHI Conference on Human Factors in Computing Systems *2018*

Conference Volunteer
Ubicomp '18 Student Volunteer *2018*