



Skin-like, scalable, and accessible wearables for mental health

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Abstract: Worldwide, 615 million people suffer from the common mental disorders of depression and anxiety. Yet, there is no existing technology that accurately and objectively monitors mental health. The obstacles towards mental health care are complex and multi-faceted: social stigma, high cost, and limited or no access to local care - all hinder patients suffering from mental health conditions to seek out and receive help. To address this chronic need, using recent advances in electronic-skin and wearable technologies, we designed a wearable that continuously measures physiological parameters linked to chronic stress and other mental health and wellness conditions, namely, heart rate variability, skin conductance, sweat rate, and the stress hormone, cortisol. We used additive manufacturing and flexible hybrid electronics to make the device scalable and low-cost. Utilizing the sensor data and analytics, we can characterize mental states quantitatively, allowing the capability to prevent and treat mental illness irrespective of the local environment. In this talk, I will demonstrate the first-of-its-kind wearable for mental health and present a multi-part study that combines both user-centered design and engineering-centered data collection to inform future design efforts for mental health wearables. Such wearable devices, in conjunction with mobile technologies, enable the possibility of remote care, which can allow discrete monitoring, potentially circumventing the stigma often associated with mental health treatment. Overall, in this talk, I will discuss engineering innovations in medical devices to address one of the most pressing global health burdens.

Biography: Yasser Khan is a postdoctoral scholar at Stanford University, advised by Professor Zhenan Bao in Chemical Engineering and Professor Boris Murmann in Electrical Engineering. Yasser completed his Ph.D. in Electrical Engineering and Computer Sciences from the University of California, Berkeley, in Professor Ana Claudia Arias' Group. He received his B.S. and M.S. in Electrical Engineering from the University of Texas at Dallas and King Abdullah University of Science and Technology, respectively. Yasser's research focuses on additive manufacturing and hardware AI to produce skin-like wearables, implantables, and ingestibles. These medical devices are being used for precision health and psychiatry.

Yasser received the EECS departmental fellowship at UC Berkeley, discovery scholarship and graduate fellowship at KAUST, and academic excellence scholarship at UT Dallas. Yasser published over 40 research publications in the most reputed platforms in the field, which were highlighted by BBC News, Wall Street Journal, NSF News, and attracted over \$2 million in research funding.