



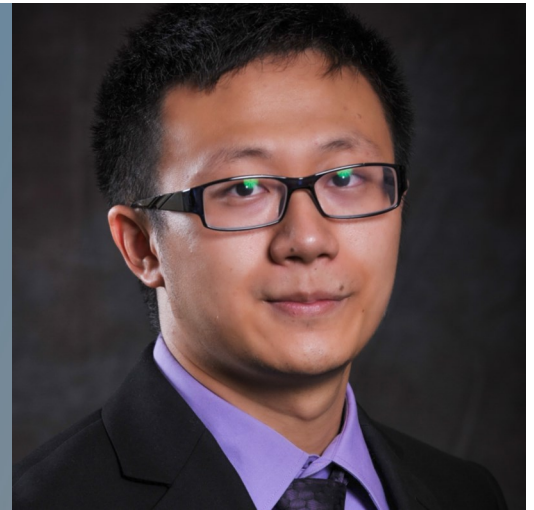
CENTER FOR
HEALTHCARE ENGINEERING & PATIENT SAFETY
UNIVERSITY OF MICHIGAN

Providing Better Healthcare Through Systems Engineering: Seminars and Discussions

Smartphones Medicalized, with Data Analytics for Complex Diseases Management

Shuai Huang, PhD

Monday September 16 at 4:30PM in 1123 LBME



The data-rich environments in healthcare and ubiquitous use of smartphones hold great promises to accelerate the paradigm transition of U.S. healthcare from reactive care to preventive care. One question is how we could translate the disease data into better care management of patients through an emerging ecosystem of healthcare apps, made possible by smartphones now considered as medical devices. It is known that many diseases manifest complex progression process, involving both temporal dynamics and spatial evolution that could be captured by a rich array of sensors in a smartphone. How could we model, monitor, and modify these processes are challenging problems. For example, diseases such as Alzheimer's disease and Type 1 Diabetes share the commonality that they involve slow and predictable progression processes. Knowing how a disease progresses is helpful, particularly if we'd like to prevent the disease as early as we could for maximum therapeutic efficacy and improved quality of life. The modeling of the progression process is statistically challenging given the high-dimensionality of the data, the mixed types variables, and the data's longitudinal nature. Another commonality of these diseases is that, since they are chronic conditions, being able to recognize subtle symptoms that indicate significant clinical events or suggest worse outcomes is crucial for preventative care. Further, patients need to be dynamically prioritized by their projected risk for resource allocation optimization. This needs robust models that build on the statistical knowledge provided by disease modeling and monitoring, to guide the selection of high-risk patients for targeted care. In this talk, I will share some of our works to tackle these challenges by developing novel models and algorithms to provide data-driven decision-making capabilities for better disease management implemented through smartphone apps.

Dr. Shuai Huang is an Associate Professor at the Department of Industrial and Systems Engineering at the University of Washington. He received a B.S. degree on Statistics from the School of Gifted Young at the University of Science and Technology of China in 2007 and a Ph.D. degree on Industrial Engineering from the Arizona State University in 2012. He is also an adjunct faculty member at the Department of Biomedical Informatics and Medical Education (BIME) and the Integrated Brain Imaging Center (IBIC) at the University of Washington. Dr. Huang develops methodologies for modeling, monitoring, diagnosis, and prognosis of complex networked systems such as the brain connectivity networks and disease progression process that have multiple stages and pathways. He also develops statistical and data mining models to integrate massive and heterogeneous datasets such as neuroimaging, genomics, proteomics, laboratory tests, demographics, and clinical variables, for facilitating scientific discoveries in biomedical research and better decision-makings in clinical practices. His research is funded by the National Science Foundation, Defense Advanced Research Projects Agency (DARPA), Juvenile Diabetes Research Foundation (JDRF), Helmsley Foundation, NIH, and several biomedical research institutes. Dr. Huang currently serves as Associate Editor for the IIE Transactions in Healthcare Systems Engineering and Quality Technology and Quantitative Management.

1123 LBME is room 1123 in the Ann & Robert H. [Lurie Biomedical Engineering Building \(LBME\)](#). The street address is 1101 Beal Avenue. A map and directions are available at: <http://www.bme.umich.edu/about/directions.php>.

This seminar series is presented by the U-M Center for Healthcare Engineering and Patient Safety (CHEPS): Our mission is to improve the safety and quality of healthcare delivery through a multi-disciplinary, systems-engineering approach.

For additional information and to be added to the weekly e-mail for the series, please contact genehkim@umich.edu. Photographs and video taken at this event may be used to promote CHEPS, College of Engineering, and the University.