Mobile Health Sensors
https://MD2K.org

The University of Memphis leads a National Center of Excellence funded through the National Institutes of Health Big Data-to-Knowledge initiative. The **Center of Excellence for Mobile Sensor Data-to-Knowledge (MD2K)** is a 12-organization partnership working to create generalizable theory, methods and software that addresses the barriers to processing complex mobile sensor data. Led by Computer Science Professor Santosh Kumar, MD2K's primary research goal is to lay the scientific foundations for turning the wealth of mobile sensor data available through new and rapidly evolving wearable sensors into reliable and actionable health information for use in just-in-time prediction and intervention. MD2K is currently working on nearly $50 million in funded research projects with support from the National Institutes of Health, the National Science Foundation, and the IARPA.

MD2K Research Areas
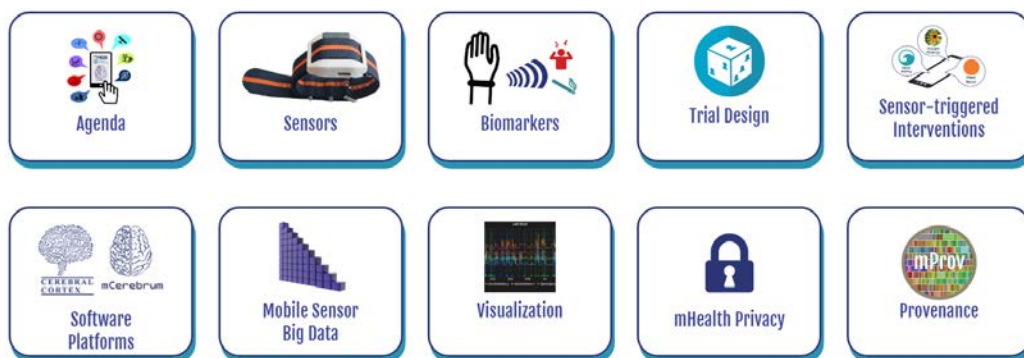
Field Study Focus Areas

-Available Resources-

MD2K's engineers, computer scientists, behavioral scientists and physician researchers have conducted user studies with smokers, Congestive Hearth Failure patients, researchers, and clinicians to inform the design of MD2K tools and to evaluate their utility, usability, and validity for biomedical research and care delivery.

MD2K has developed a **standards-based, interoperable, extensible and open-source big data software platform** that is freely available on our website. Deployments of this platform have processed more than 4 trillion data points from over 2,200 users representing more than 106,800 person-days. In addition, several sensors have been developed and deployed in mHealth field studies:

- EasySense: a contactless microradar sensor that can detect heart and lung motion and assess change in lung fluid
- MotionSenseHRV: a wrist-worn sensor that can measure hand gestures via accelerometers and gyroscopes and interbeat intervals via optical sensors for computing heart rate variability indices
- AutoSense: a chest-worn sensor suite that can measure cardiorespiratory parameters via ECG and respiration, and movement of the torso via accelerometers
- iShadow: computational eyeglasses, that are currently being evaluated for their utility in assessing fatigue and visual exposure to cues (e.g., alcohol advertisements).

-Research goals-

- Develop principles, computational methods, and a toolbox for inferring markers of patient health, as well as markers of the behavioral, physical, social, and environmental risk factors found in a wide variability of behaviors. In addition, develop methods to address known and unknown confounders, errors in self-report data, and the variable quality and availability of sensor data.

- Develop time series pattern mining algorithms and interactive visualization tools to help biomedical researchers accurately discover vulnerable states from sensor-based markers. The goal is to be able to predict adverse health events, ahead of the onset of adverse clinical events, and to develop online learning algorithms for delivering just-in-time adaptive interventions.