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NUCoach: modular platform for mHealth research and coaching

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Opportunity

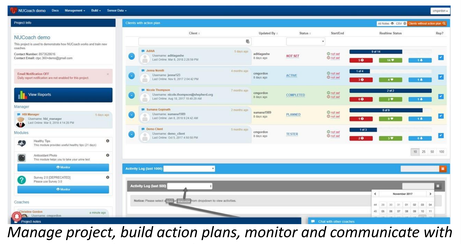
mHealth is a growing area of research that utilizes the ubiquity of mobile phones and other connected devices to learn about the behavior of individuals in the wild, giving researchers and clinicians the unprecedented opportunity to deploy tailored interventions in the right context at just the right time.

mHealth research is often heavy on development, which requires money, time, and expertise. This can be an insurmountable barrier for anyone starting out in this area. Currently available research and intervention tools are either resource-hungry, functionally limited, or both.

The NUCoach platform, developed at Northeastern University, can help early stage investigators, students, and coaching practices to easily conduct mHealth studies and interventions without the immense investment of time and funding normally required, which is ideal for launching innovative pilot studies to collect preliminary data. Furthermore, we have a team of experts ready and available to help researchers develop and deploy their studies quickly and effectively.

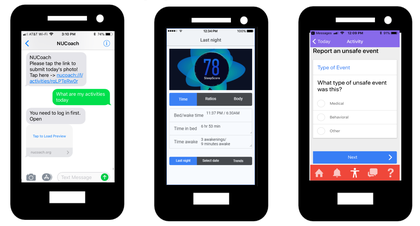
Approach

Coaching console



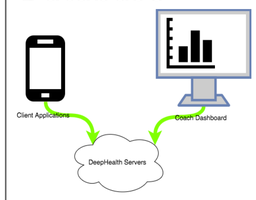
Manage project, build action plans, monitor and communicate with participants and team members

Mobile app



Coach participants with messages and feedback, collect survey data, connect with companion apps for sensor data collection

Database



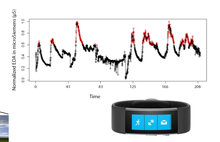
Data is stored securely in the cloud. Each user type has different access to the data depending on need.

Connected devices

Activity trackers + HR monitors

Bed sensor for sleep + stress recovery

Camera for physical exercise

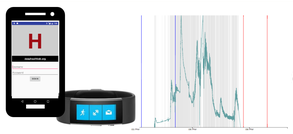


Skin conductance for stress monitoring

We can add just about any connected device or service

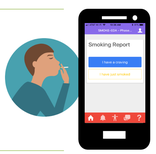
Data

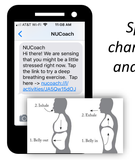
Smoking Study



Collect and monitor electrodermal activity (EDA) with the MS Band 2 and DeepHealth companion app

Participants report cigarette cravings and smoking behavior through NUCoach





Spikes in EDA are characterized as stress and trigger NUCoach EMA or stress interventions

Statistics

Number of users	150+
Number of activities	6K+
Number of messages	11.5K+
Number of person days	1,500+

AHM study

Morning

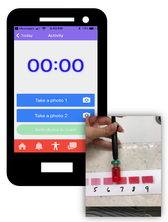
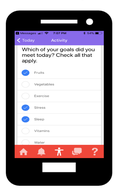


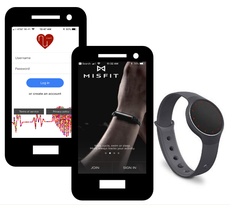
Photo upload module for AHM home stress test data collection. Includes a timer to help subjects use the test correctly.

Evening

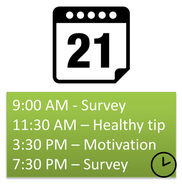


Survey for end-of-day goal tracking

Hypertension Study



Participants download the NUCoach and Misfit apps and receive the Misfit Flash activity tracker



For 21 consecutive days, participants wear the Misfit Flash, receive messages that encourage healthy behaviors, and answer one morning and one evening survey

The Studies

- **Self-Management of Hypertension Lifestyle Behaviors** [Douglas]. Using a combination of mobile activity tracking and ecological momentary assessment/intervention, this study is examining the acceptability and usability of an intervention to support hypertension self-management behavior through engagement and physical activity with 51 Black women aged 60+.
- **Cigarettes Use Among Individuals at High Risk for Lung Cancer** [Poghosyan]. We are testing the feasibility, accuracy, and usability of a wearable electrodermal activity sensor and mobile assessment tool to understand the stress levels and stress precipitators of cigarette craving and smoking triggers in older non-white smokers.
- **Stress Test At Home** [Jimison]. The goal of this study was to assess the validity and usability of the Antioxidant Home Monitoring free radical test kit and pilot the use of the test kit in concert with a wellness coaching protocol. We test the feasibility of subjects measuring the level of MDA in their urine using a color chart. We also tested the usability and satisfaction with the overall system that includes the urine sampling kit and a general health coaching intervention.
- **Sleep, Stress, and Safety in TBI Patients** [Jimison/Seel]. In this project, we are testing the usability of active and passive sensors to collect data on sleep quality, stress, and activity; and the ability to integrate sensor data into a data bank/virtual coaching platform for the purpose of informing the participant of progress.

Sleep, Stress, & Safety Study

The Emfit QS sleep sensor is installed under the TBI patient's mattress

Patients wear Android watch or Fitbit ChargeHR for activity tracking and deep breathing

Patients/caregivers receive sleep feedback sleep and report unsafe events

Impact

What makes NUCoach unique?

1. *Modular development* makes the NUCoach platform flexible enough to meet the needs of many mHealth studies and coaching interventions.
2. *Sensor agnostic:* new modules can be developed for most any connected device, whether it be a commercial activity tracker or a student-built prototype.

NUCoach solves the following problems:

- Removes the resource barrier to conducting mHealth research
- Allows most participants to use their own phones, which often improves data quality when measuring behaviors in the wild
- Many features are automated and can be tailored to individual participants, reducing the burden on researchers and participants
- Existing features and modules are available to any project. Each time a new module is built, it becomes part of the module library, allowing the capabilities to NUCoach to grow over time
- Projects are not limited in the number of modules or participants. Researchers can access and analyze the data with a statistical tool of their choice. This approach allows for incredible scalability.

Email us: contact@nucoach.org

Acknowledgements
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