Emotion AI and Future Health

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Greetings ... we are half way through the 2014-15 academic year. **This is your fourth year in the doctoral program.**

You should be planning to **turn in your thesis this year**. Having just reviewed where everyone stands in the program I find that half of you 6/12 are still working on your proposal. Five are on track and working on their thesis and 1 person is still working on completing the general exams.

I don't like **adding stress** to a student's program but keeping on time is important for both your state of well being and for your faculty and their ability to plan according as it relates to **financial support/admissions**. I encourage you to contact K and set up a time to come and talk with me about your proposed schedule. I want to help you all get through this successfully.

THANK YOU!
1 in 4 Americans experience **mental health** problems in a given year
Infrequent assessments in response to problems
Continuous assessments in prevention to problems
Comfortable Sensing | Intelligent Modelling | Effective Intervention

To Promote Emotional Wellbeing
Comfortable Sensing
Intelligent Modelling
Effective Intervention
To Promote Emotional Wellbeing
Comfortable Sensing

Intelligent Modelling
Comfortable Sensing

Intelligent Modelling
Comfortable Sensing

Intelligent Modelling
Electrodermal Activity (aka GSR)

Skin Conductance
- Wires
- Fingers

Affective Computing group
- Wireless
- Wrist/ankle

Spin-off Companies
- Wireless
- Commercial sensors

- 1999
- 2010
- 2011
- 2014
- 2015
- 2016
Electrodermal Activity (aka GSR)


Electrodermal Activity (aka GSR)

Electrodermal Activity (aka GSR)
Photoplethysmography


Blood Volume Pulse (BVP)

Apple Watch

Skin occlusion

Band tightness
Remote Photoplethysmography
Remote Photoplethysmography

Chen W. and McDuff D. "DeepPhys: Video-Based Physiological Measurement Using Convolutional Attention Networks" In European Conference on Computer Vision (ECCV), 2018

Main contact: Weixuan 'Vincent' Chen <cvx@mit.edu>
Cardio-respiratory Body Vibrations
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Global Vitals

Cloud-based API for large scale and comfortable physiological sensing with motion sensors such as those of smartphones

Democratizing physiological sensing

www.globalvitals.com
info@globalvitals.com
Online Demo: Cloud-based Wearable!

Check your heart rate just by visiting a website!

1. Visit try.globalvitals.com from your phone
2. Place the phone on your lap or your chest
3. Press start
4. Remain still for 30 seconds

Perfect for remote and large-scale experiments
1. Low-cost
2. Comfortable

Global Vitals
www.globalvitals.com
info@globalvitals.com
Unwind by Sync Project (acquired by BOSE)

Personalized music to help you sleep

Unwind.syncproject.co

yadid@syncproject.co
Comfortable Sensing

Intelligent Modelling
Comfortable Sensing

Intelligent Modelling
6.9% of adults in the U.S. (16M) had at least one major depressive episode in the past year.

Depression may become #1 disease burden by 2030.

NIMH & WHO Statistics
Digital Phenotyping of Depression

- 22 patients with major depression
- Bi-weekly clinical assessments
- 8 weeks study

0.834 (p<0.01) correlation with Hamilton Depression Rating Scale
4.5 root mean squared error

Main digital depressive symptoms associated with: irregular sleep, less motion, fewer incoming messages, and higher EDA asymmetry.


Main contact: Asma Ghandeharioun <asma_gh@mit.edu>
25% of Americans have suffered from pain that lasts longer than 24 hours

100M Americans suffer from chronic pain

Pain is the leading cause of disability and it is a major contributor to health care costs
Personalized Pain Measurement

Facial Expressions

Wearables

Brain Signals


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Personalized Pain Measurement

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83% of US workers are **stressed**

**Stressed** employees spend 46% more on health care

**Stress** results in as much as **$300 billion** in lost productivity

Everest College & Health Advocate
Stress Measurement in the Wild

Call Center Employees

Children with Autism

Computer Users


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Stress Measurement in the Wild

Call Center Employees  Children with Autism  Computer Users


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Forecasting Tomorrow Stress

1231 days from 201 college students
Daily self-report scores
Data: survey, physiology, phone, mobility

Three models:
1. Short-term memory neural network (LSTM)
2. Logistic regression (LR)
3. Support vector machine (SVM)


Main contact: Terumi Umematsu <terumi@mit.edu>
New Opportunities for Sensing and Modelling
Existing wearables mostly focused on sensing at a specific body location.
Adaptive and Dynamic Wearables


Main contact: Artem Dementyev <artemd@mit.edu>
Closed-loop Wearables
(from sensing to intervention)


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Opportunistic (in Car) Health Monitoring

Work commute takes ~1 hour in USA
Frequent negative emotions
Controlled and sedentary position
Rich contextual information
Opportunistic (in Car) Health Monitoring

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Emotional Navigation SIG: enavigation.media.mit.edu
Comfortable Sensing

Intelligent Modelling
Comfortable Sensing

Intelligent Modelling

Affective Computing Group: https://www.media.mit.edu/groups/affective-computing
How can Emotion AI help improve your business?
Emotion AI and Future Health

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