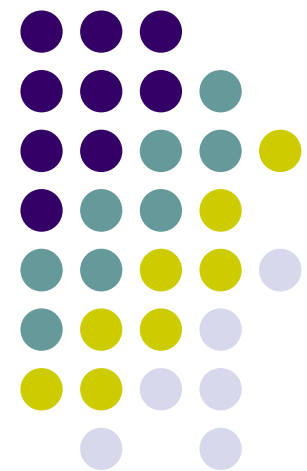# Ubiquitous and Mobile Computing
CS 403x: *StudentLife*

Alexi Kessler, Fiona Heaney, and Zachary Robbins
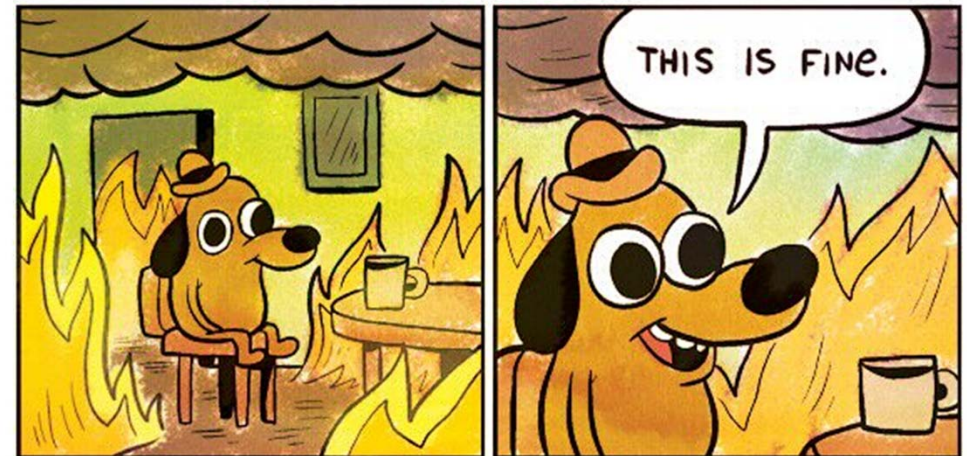
Computer Science Dept.

Worcester Polytechnic Institute (WPI)

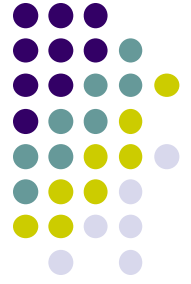# College is hard...

- Unique blend
  - Lack of sleep
  - Tests/quizzes
  - Homework
  - Loneliness
- Impact
  - Academic Performance
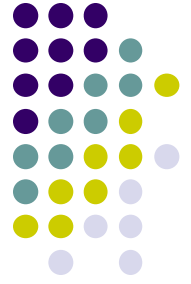 - Psychological well-being

How mobile apps can help

- Monitoring of psychological well-being
- Continuous sensing
  - Little user involvement
- Convenient surveys
- Identify general stress patterns
  - Term life cycle
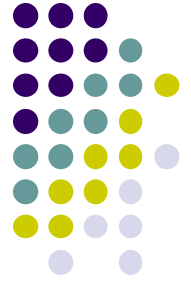- Pinpoint factors that increase depression/stress

Potential Usages

- Student planning and stress management
  - Improve Professors' understanding of student stress

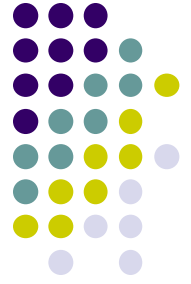- Improve Administration's understanding of students' workload

Related Work

- Technical
  - Friends and family study
  - Reality Mining
  - Senior monitoring
- Psychological
  - Health Buddy
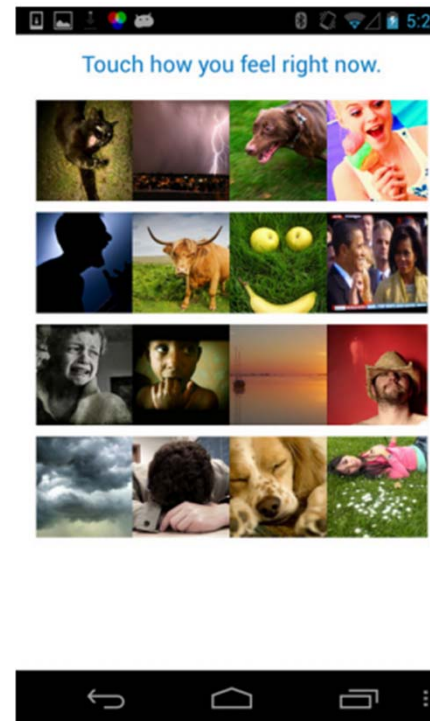 - Health-related academic performance
  - Ginger.io

What makes StudentLife unique?

- Continuous sensing
- Targeted at college students
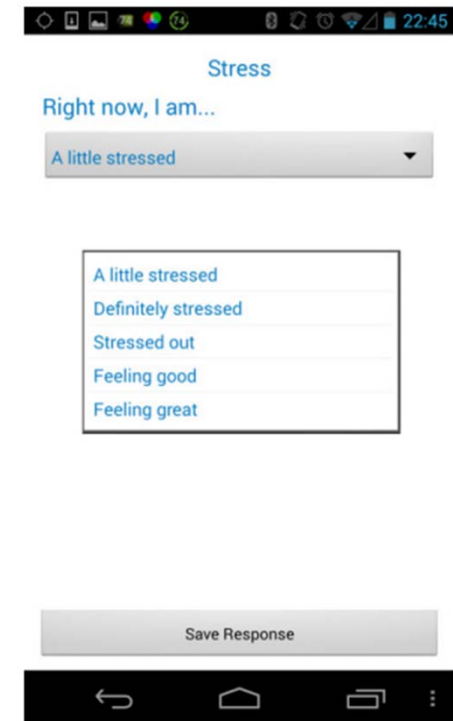- Larger combination of metrics

Program Design

- Entry and exit surveys
- 8 MobileEMA and PAM quizzes per day
- Automatic Sensing
- Activity Detection
- Conversation Detection
- Sleep Detection

(a) PAM EMA   (b) Stress EMA
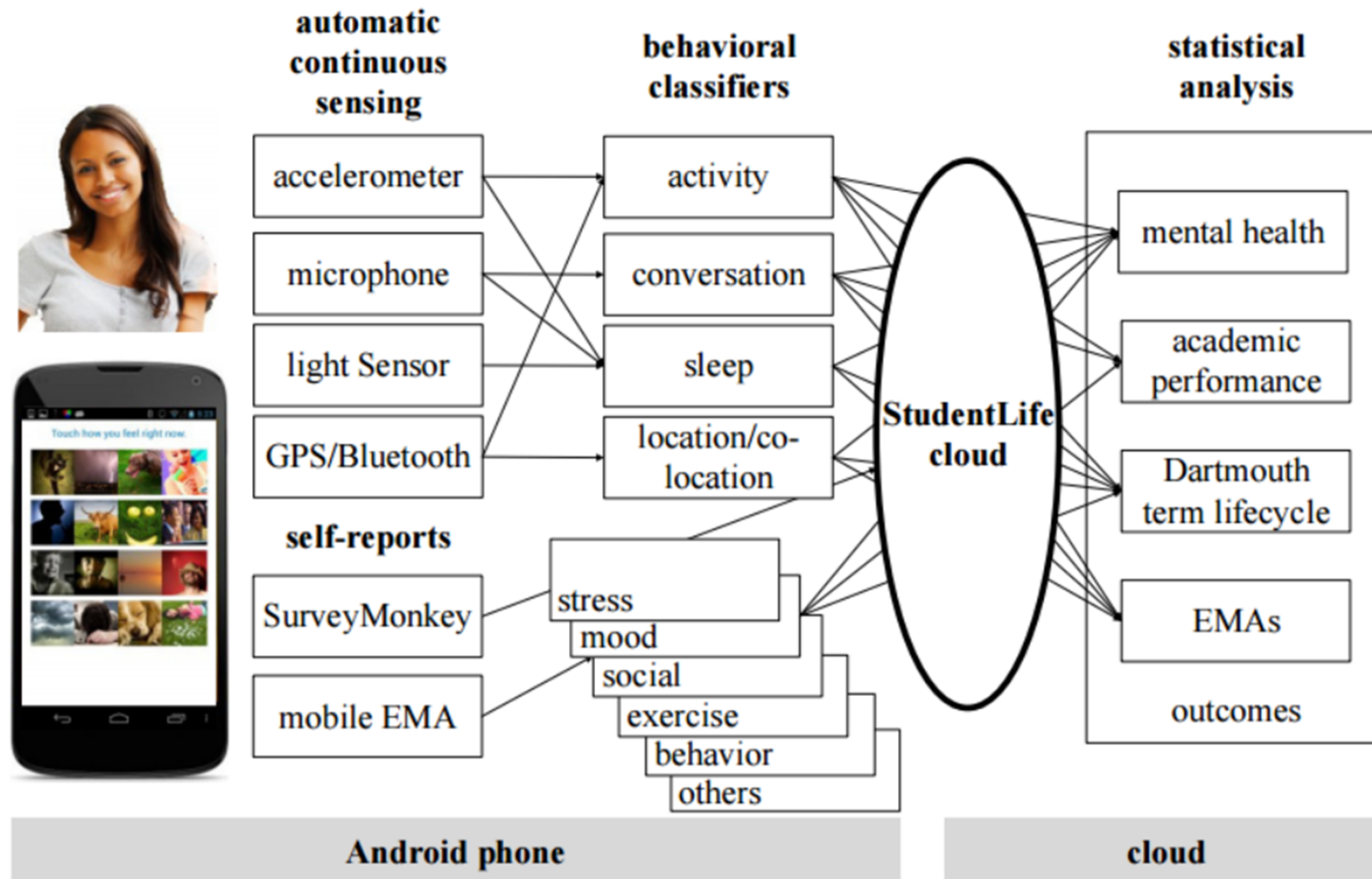
Implementation – App Design

Figure 2. StudentLife app, sensing and analytics system architecture.

Implementation – Metrics

- Patient Health Questionnaire (PHQ-9)
- Perceived Stress Scale
- Flourishing Scale
- UCLA loneliness survey

Implementation – Study Structure

- 60 Students begin
  - All enrolled in CS65 Smartphone Programming class
  - Lose 12 students during study
  - 30 undergrad/18 graduate level
  - 38 male/10 female
- Given incentives for most data collection at 3 and 6 week mark
- 10 week data collection

Findings

- Fewer conversations or co-locations correlate to a higher chance of depression

- Stressed students are more likely to experience depressive symptoms

- More social interactions correlate to higher flourishing and higher GPA scores and lower PSS

- More sleep correlates to lower PSS scores

Findings (cont'd)

- Less sleep correlates to a higher chance of depression

- Students that are less active and therefore less mobile are more likely to be lonely and have lower GPAs

- No correlation between class attendance and academic performance

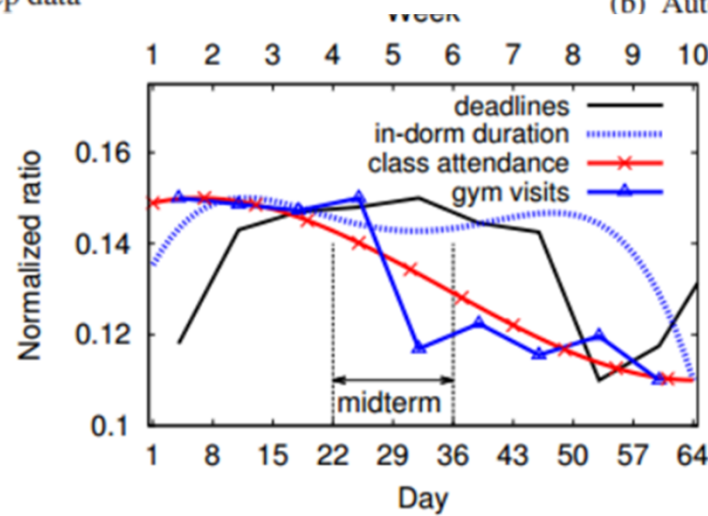- Positive affect and activity duration plummet as term progresses
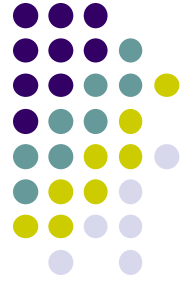
Findings (cont'd)
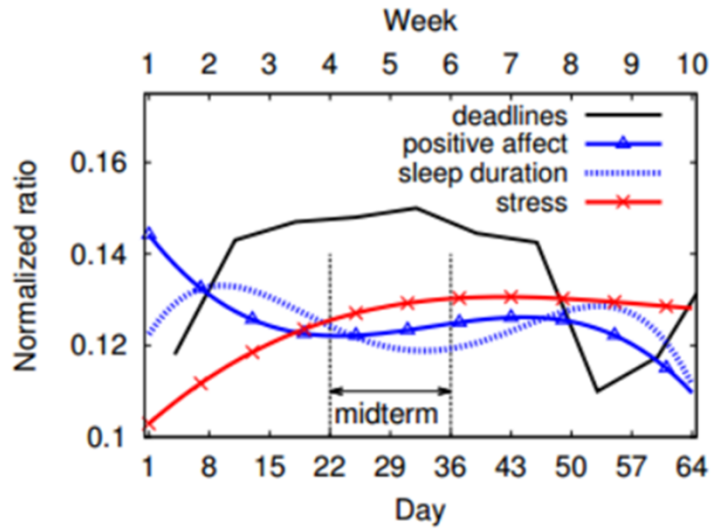
(a) EMA and sleep data
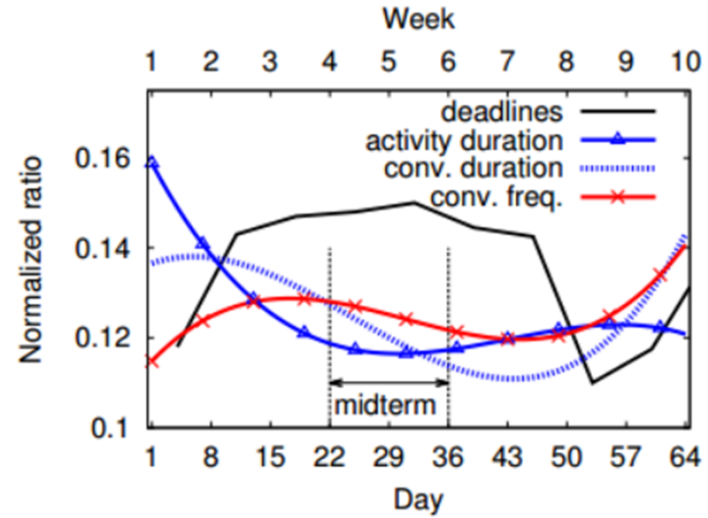
(b) Automatic sensing data

(c) Location-based data

Limitations/Trade Offs

- Sample Selection
  - Voluntary - CS65 Smartphone Programming class
- User participation
  - Surveys
  - Carrying phone
  - Disinterest (Longitudinal study, EMA annoyance)
- Lost participants
- Sleep measurement inaccuracy
  - Naps

Looking Forward and Discussion

- Expansion to Northeastern and Utexas – Austin
  - Semester vs 10 week term
  - Similar results?
- Explore academic impact of not attending classes
- Privacy concerns

Questions
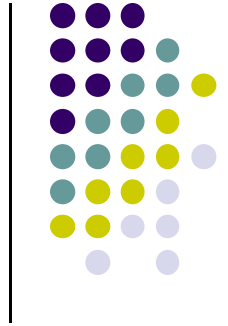
References

- Wang, R., Chen, F., Chen, Z., Li, T., Harari, G., Tignor, S., ... & Campbell, A. T. (2014, September). Studentlife: assessing mental health, academic performance and behavioral trends of college students using smartphones. In *Proceedings of the 2014 ACM International Joint Conference on Pervasive and Ubiquitous Computing* (pp. 3-14). ACM.
- http://i.imgur.com/YdmzDel.jpg
- http://blogs.csbsju.edu/mhemesath/wp-content/uploads/sites/4/2014/05/prof.jpg