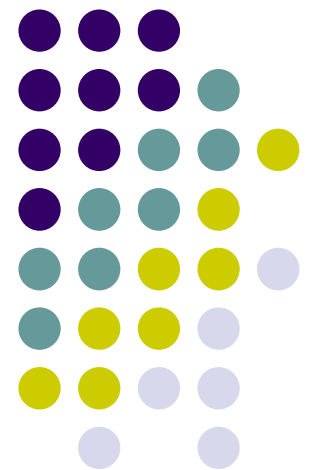# Ubiquitous and Mobile Computing
CS 403x: *BeWell: A Smartphone Application to Monitor, Model and Promote Wellbeing*

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Problem Introduction/Motivation

- No smartphone system that provides automatic, intelligent feedback on daily activities

- Lifestyle choices have impact on personal health

- Alternatives require manual data input

- Main focus is on sleep, physical activity and social interactions

The Vision

- Monitor sleep, physical activity and social interactions
- Summarize the effects from the gathered data
- Provide feedback enabling users to make better lifestyle choices
- Main goal is convenience

Related Work

- Fitbit

- Google Fit

- BALANCE

- AndWellness

Methodology - Approach & Design

- Approach
  - Automatic tracking
  - 3 wellbeing dimensions
  - Phone sensors
- Design
  - Monitor behavior
  - Model wellbeing
  - Promote and inform end users
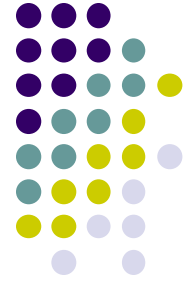 - 3 wellbeing scores given (out of 100)

Methodology - Implementation

Smartphone

- Sensing Daemon

- Mobile Ambient Wellbeing Display

- Mobile BeWell Portal

Methodology - Implementation
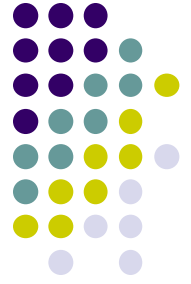
Server & Desktop

- Desktop BeWell Portal

- BeWell Cloud Infrastructure

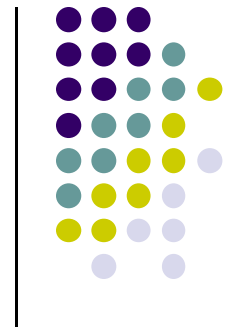# Methodology - Assumptions & Limitations of Work

- Doesn't take into account certain factors
- Still reliant on user input for some aspects
- 1 week is enough for a proof of concept
- Privacy

Design Tradeoffs

- Records a lot of data each day
- Battery life is reduced due to daemon constantly running
- Privacy
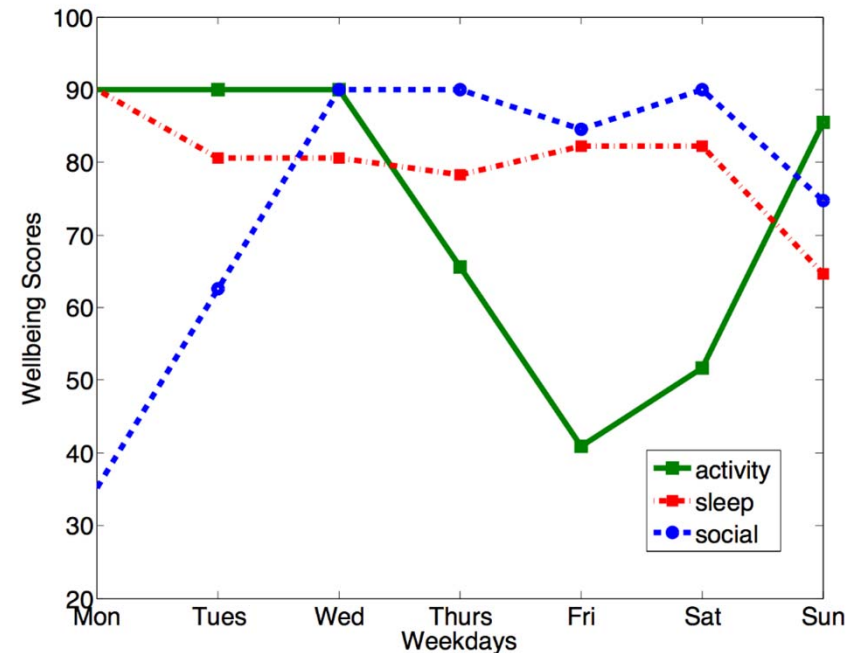- Manual v.s. Automatic data entry

Results

Benchmarks:

- Max CPU: 31%,
- Max RAM: 16MB,
- Average battery: 15h

Improved activity detection

	Voicing	Walking	Stationary	Running
Accuracy	85.3%	90.3%	94.3%	98.1%

TABLE II
BEHAVIOR CLASSIFICATION ACCURACY

Errors: ±1.5h sleep, +14% social, ±22% physical activities

Discussion and Conclusions

- Successfully monitors user activity with little to no user input

- Proves concept of a minimal interaction mobile health app

- Novel social activity measurement

Future Work

- Mobile phone calorie expenditure estimating
- Improvements to conversation recognition
- Improvements to physical activity recognition

References

- BeWell paper: http://pac.cs.cornell.edu/pubs/PervasiveHealth_BeWell.pdf