

# Ubiquitous and Mobile Computing

## CS 528: Mood Sensor from Smartphone Usage Patterns

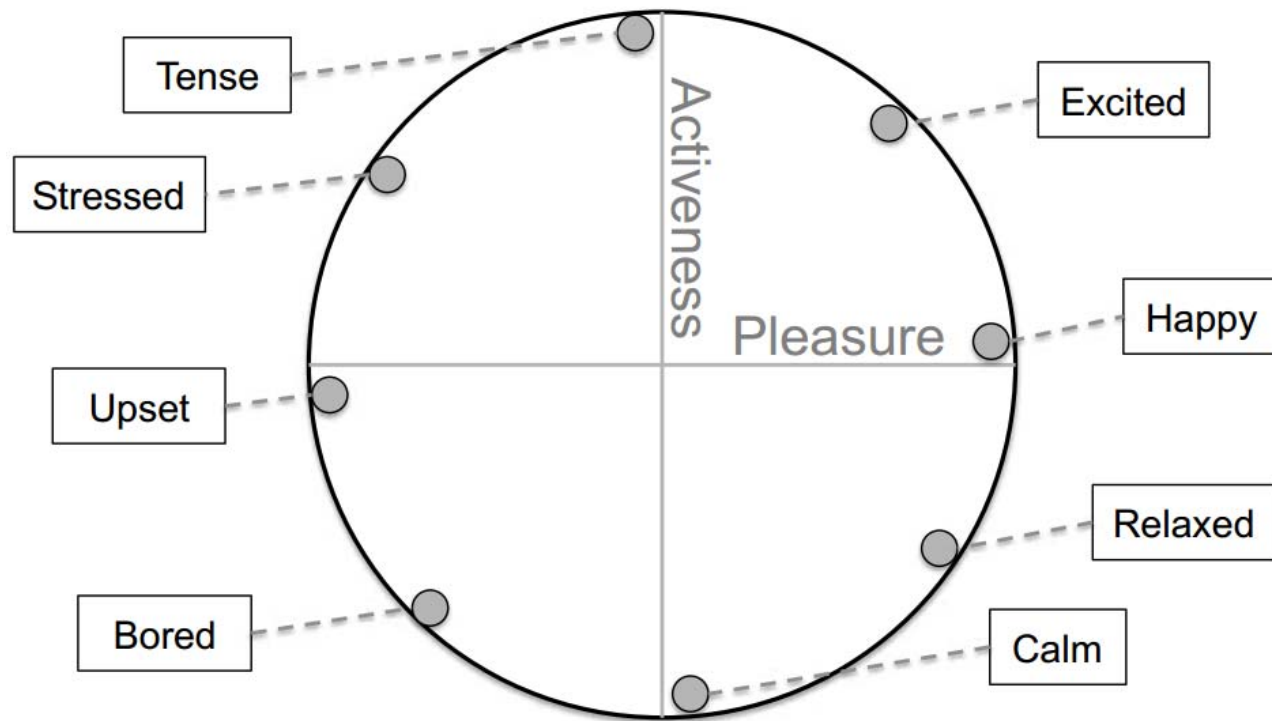
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Jun Tang

*Computer Science Dept.  
Worcester Polytechnic Institute (WPI)*



# How are you feeling



**Figure 1: The circumplex mood model**

# Knowing Mood is Important

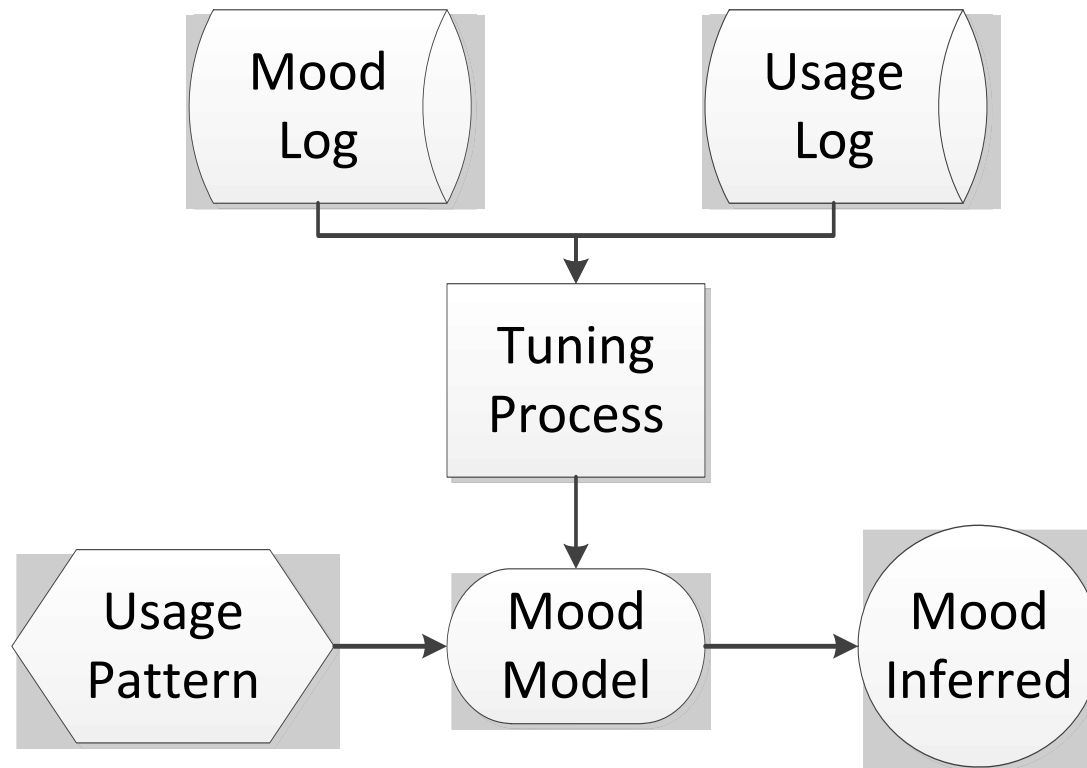
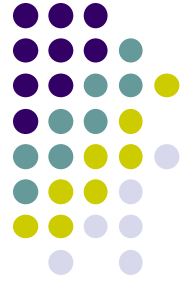


- Mood logger and browser
- Mood sharing
- Mood-enhanced applications

# But How



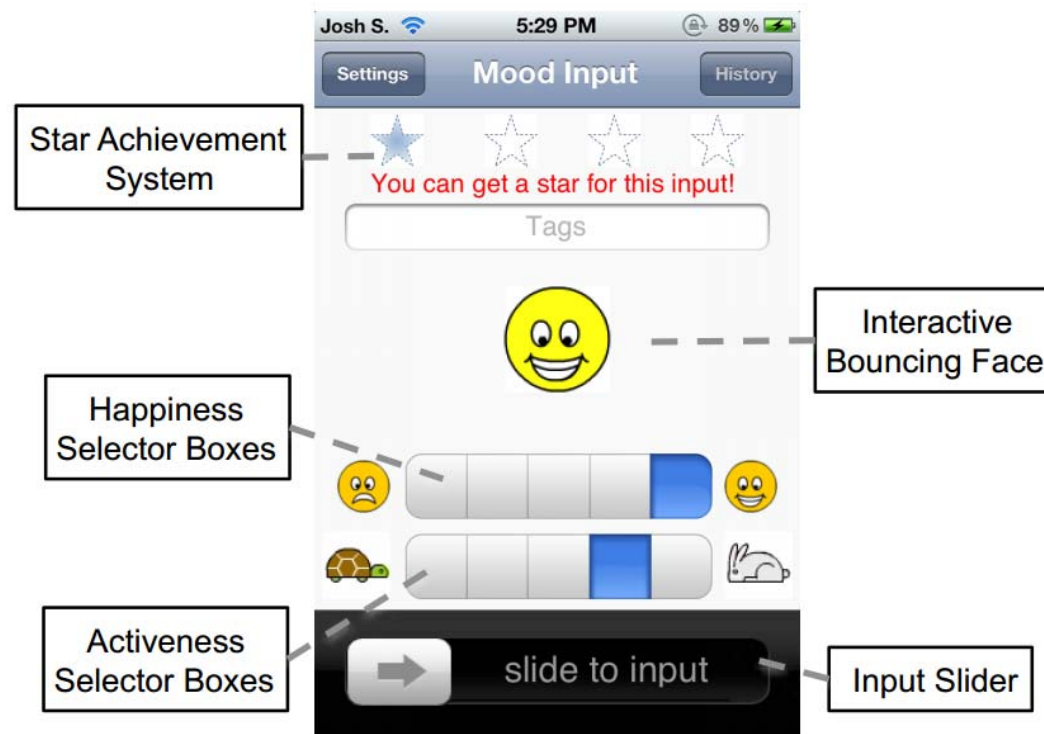
# Mood Inference Engine 1/5



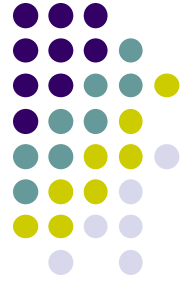


# Mood Inference Engine 2/5

- Data Source  
32 users, 2 months



**Figure 2: Mood journaling application view**



# Mood Inference Engine 3/5

- Features

## Sequential Forward Selection

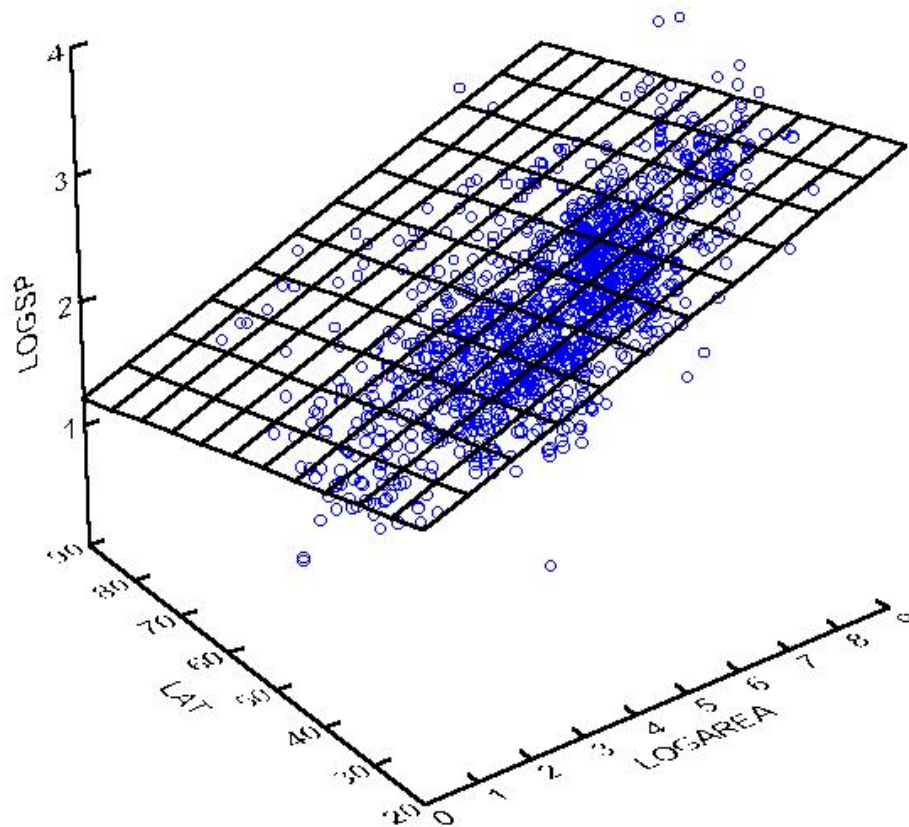
**Table 1: Feature table of usage histograms  
(and previous mood averages)**

<b>Data Type</b>	<b>Histogram by:</b>	<b>Dimensions</b>
Email contacts	# Messages	10
	# Characters	10
SMS contacts	# Messages	10
	# Characters	10
Phone call contacts	# Calls	10
	Call Duration	10
Website domains	# Visits	10
Location Clusters	# Visits	10
Apps	# App launches	10
	App Duration	10
Categories of Apps	# App launches	12
	App Duration	12
Previous 2 Pleasure and Activeness Averages	N/A	4



# Mood Inference Engine 4/5

- Multi-linear Regression





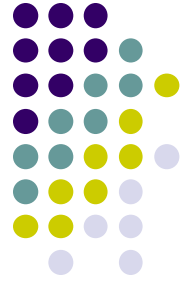


# Mood Inference Engine 5/5

- Result

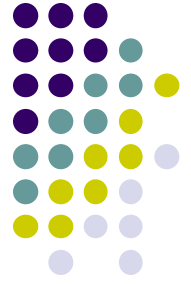
**Table 2: Strawman model performance comparison**

<b>Model</b>	<b>Pleas. MSE</b>	<b>Pleas. Acc.</b>	<b>Activ. MSE</b>	<b>Activ. Acc</b>
Model A: average mood	0.242	73%	0.229	74%
Model B: slow-varying mood	0.354	61%	0.318	65%
Model C: no phone features	0.258	70%	0.277	71%
All-user Model	0.296	66%	0.289	67%
Personalized Model	0.075	93%	0.085	93%



## Related Work

- Recognizing emotions from voice and video
  - Measures transient emotion, rather than mood
- Alternative physiological signals
  - Requires extra hardware
- Leveraging signals from smartphones



# Discussion & Related Work

- Large-scale validation.
- Unsupervised process – ideally
- Considering external factors
  - Weather, traffic jam, etc.
- Privacy preservation



## References

- LiKamWa, Robert, et al. "Moodscope: building a mood sensor from smartphone usage patterns." *Proceeding of the 11th annual international conference on Mobile systems, applications, and services*. ACM, 2013.
- <https://www.moodscope.com/>