Watt's Happening:
A Battery Monitoring Application

Created By:

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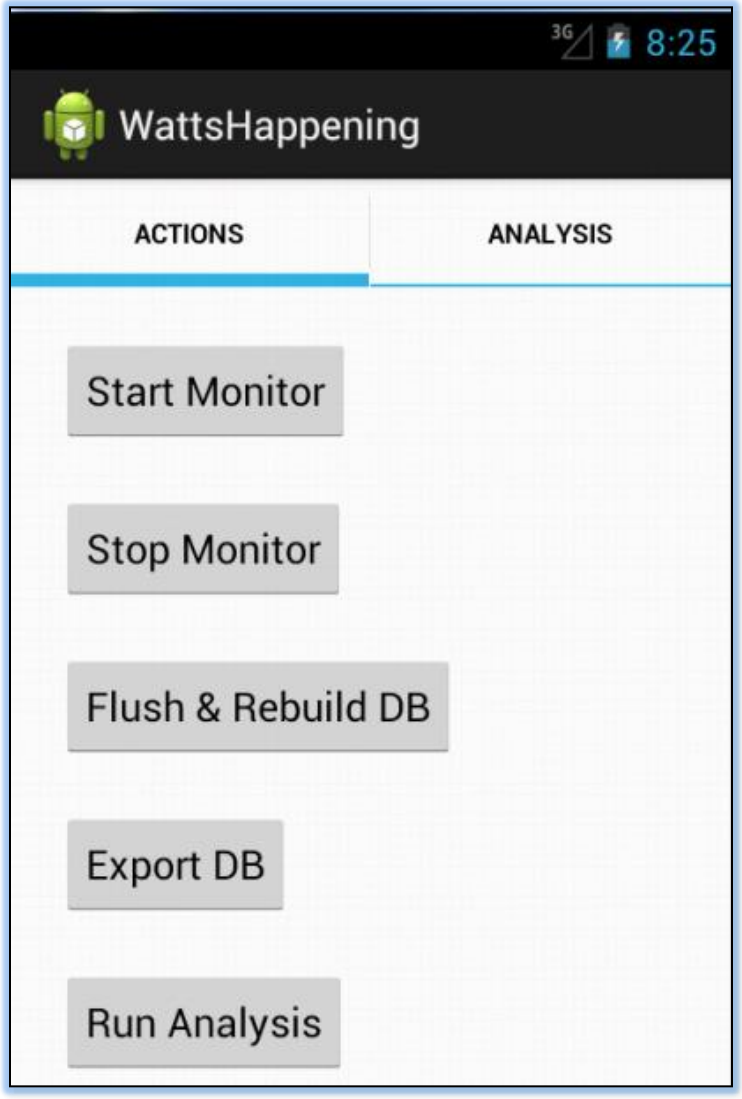


Overview

- Motivation
- Logging
- Analyzing
- Recommending
- Future Work
- Questions

Watt's Happening

Motivation

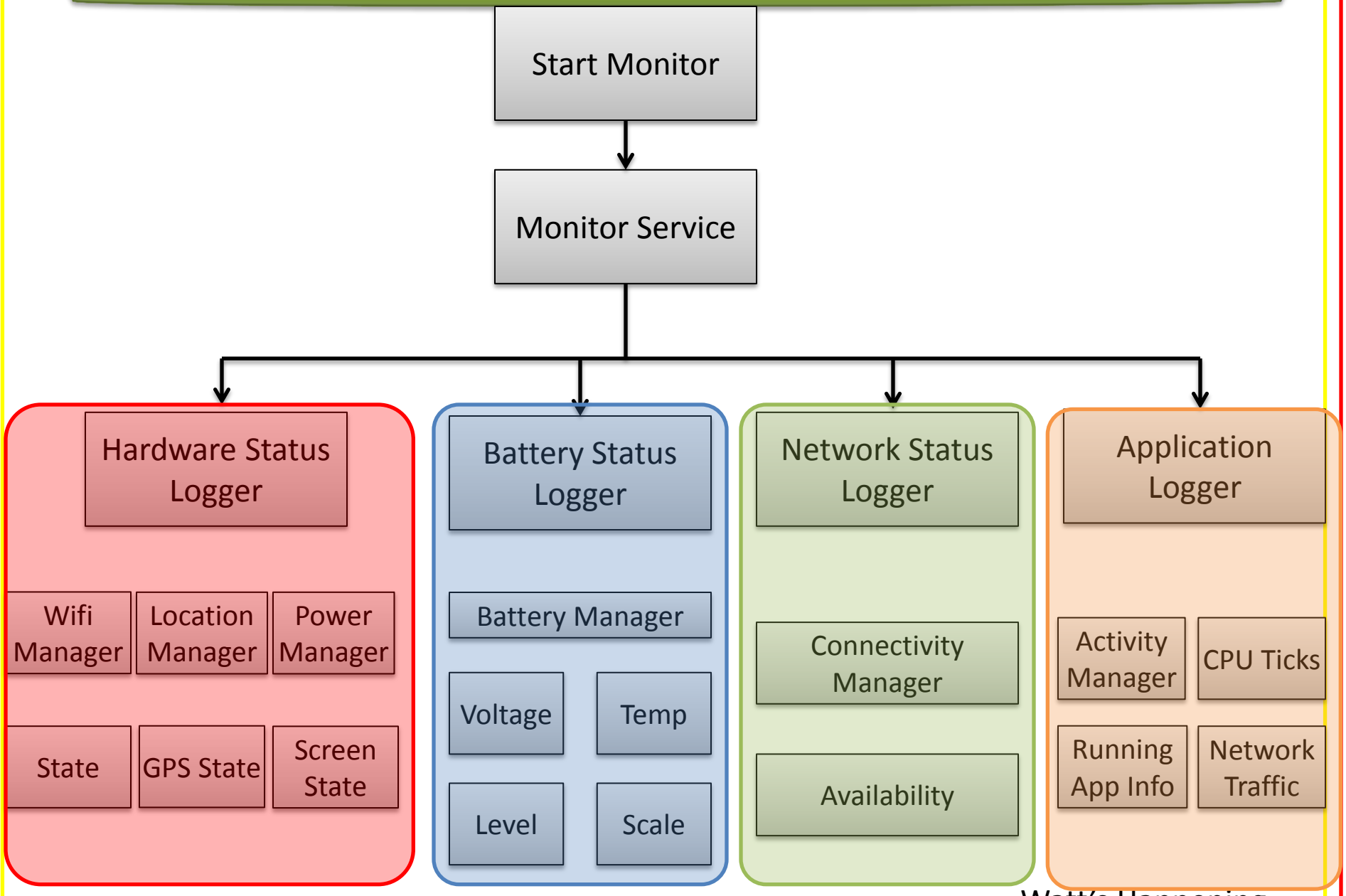

You have 10 seconds of battery life left
...sorry.


3:41 PM
PowerTutor
Freeze display
Statstics
Save
CPU Power
WiFi Power
LCD Power
GPS Power
3:42 PM
PowerTutor
This app runs a background service to log power
Time duration for display
Last 2 minutes
Maganification of recent data
Start power profiler!
Select Application
Display Result

Logging Decisions

- Poll vs. Continuously Monitoring
- Passive Pull (GPS, Bluetooth)
- Alarm System
- Time Between Pulls
- Short running Applications

Code Structure



Example Tables

ID	Timeslice_ID	Voltage	Temp	Percentage
1	1	4144.0	220.0	0.9
2	2	4131.0	220.0	0.9

Battery Table

ID	Timeslice_ID	Name	Enabled	Status
1101	276	Bluetooth	0	, Scanmode: None
1102	276	WIFI	0	Disabled

Hardware Table

ID	Timeslice_ID	Name	State	Connection
3320	277	Ethernet	IDLE	IsAvailable: 1 IsConnected: 0
3321	277	Mobile_supl	IDLE	IsAvailable: 1 IsConnected: 0

Network Table

ID	Timeslice_ID	Name	App_ID	CPU	RX_Bytes	TX_Bytes
13053	277	Maps	10008	481.0	4933.0	2120.0
13054	277	Contacts	10005	310.0	0.0	0.0

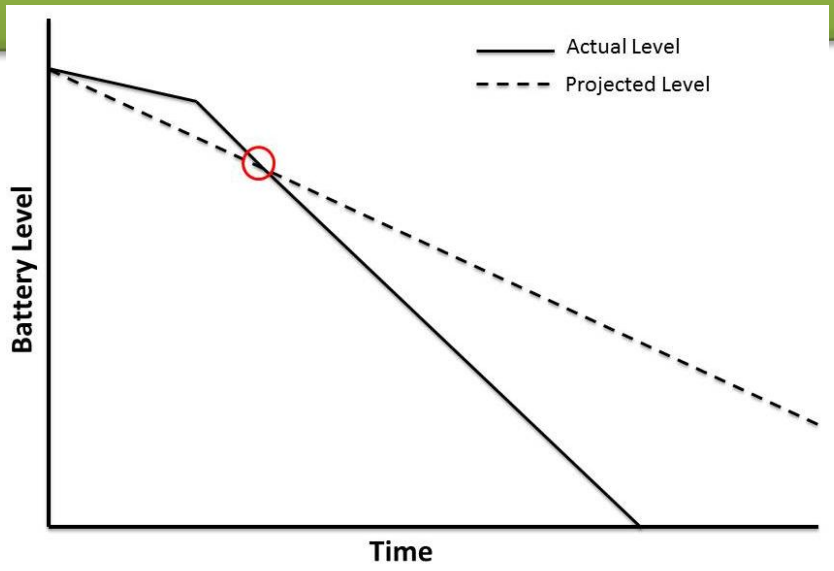
App Table

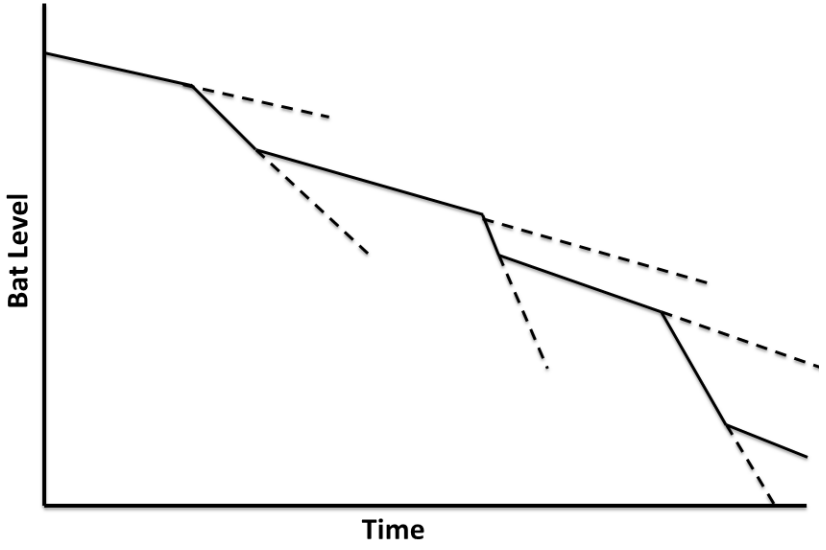
ID	App_UID	Hist_CPU	Hist_Net	Hist_HW	#_of_Updates
210	10207	0.0	0.0	0.0	120
211	10221	0.0	19908.0	0.0	98

Aggregate App Table

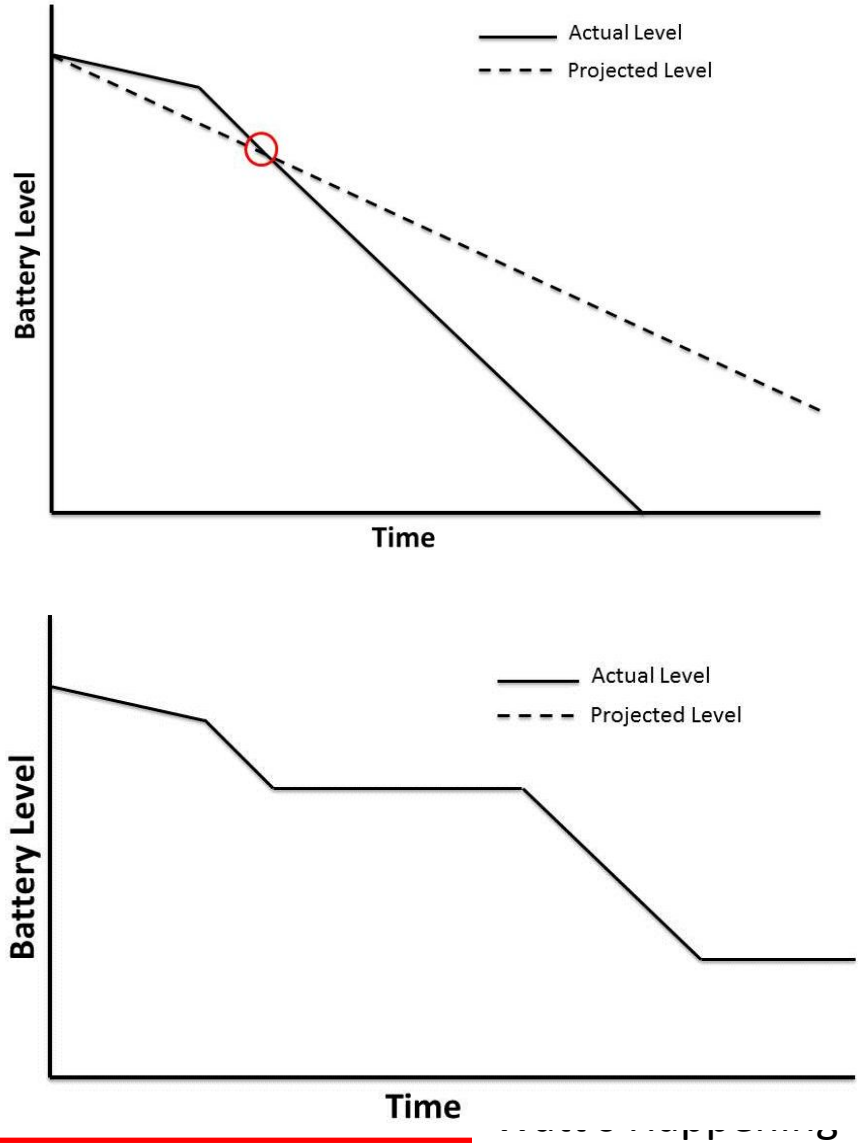
Estimated Time Remaining

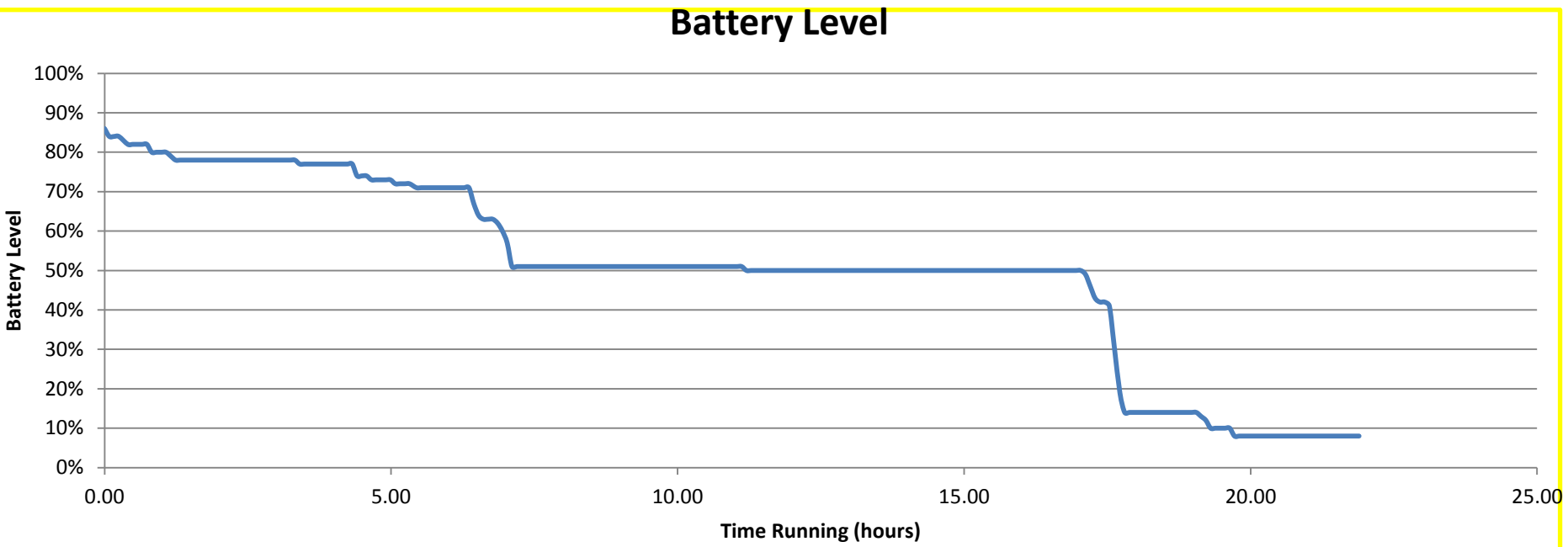
- Goal: Estimate the amount of time remaining before the battery dies.
- Problem: overestimation and underestimation
  - Overestimation: Estimating that the time remaining is longer than the actual remaining battery life.
  - Underestimation: Estimating that the time remaining is less than the actual remaining battery life.
- Which outcome is more desirable?
- Estimation Calculation

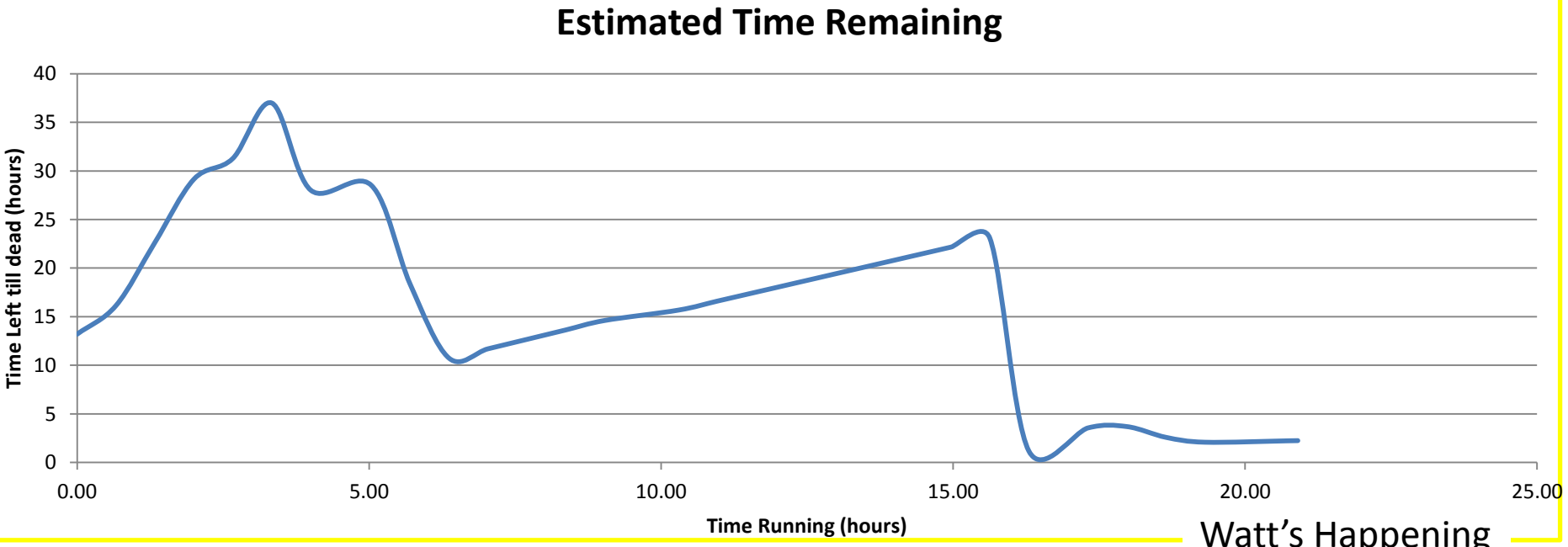




- Long Term: Use when there is no short term data
- Short Term:
  - Why would there be no short term data?



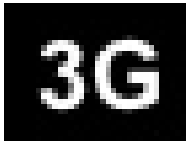




Watt's Happening

Analyzing Application Usage

- How do we know which applications are more intensive?
- Rank based on hardware usage
  - CPU usage
  - Network traffic usage

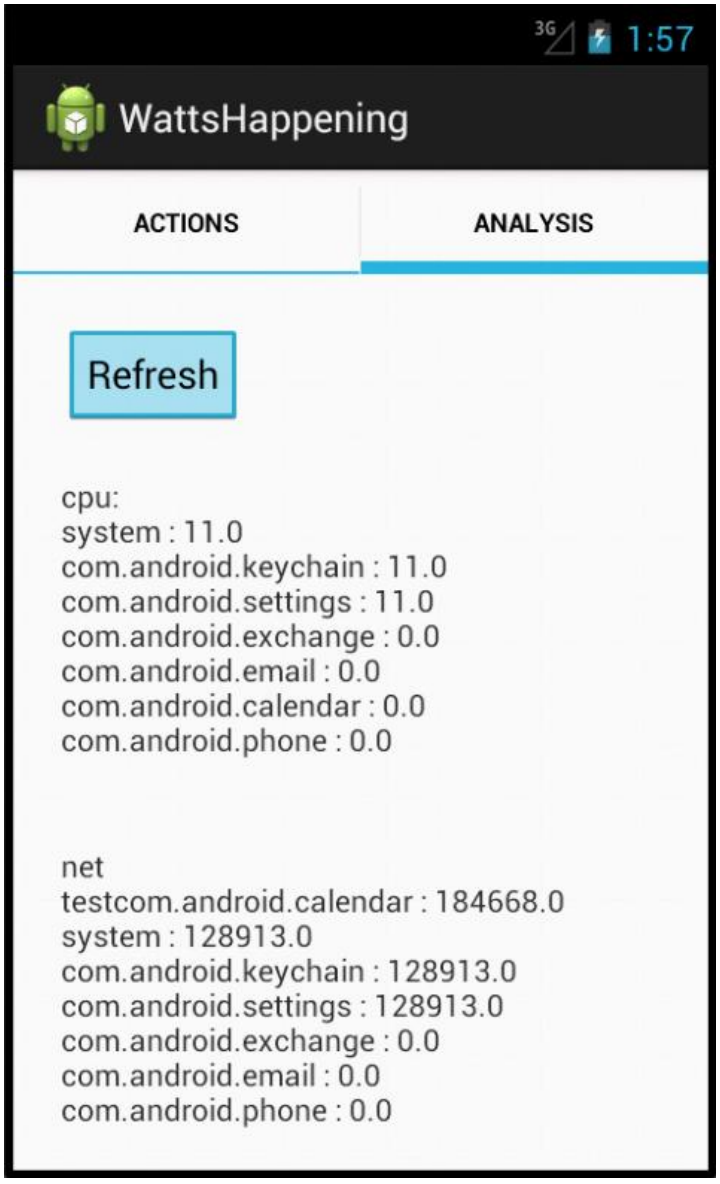


Our Metrics

- CPU Usage
  - CPU ticks used by application
  - CPU ticks used in total
  - Gives the % of CPU used by the application over that time
  - Track that average over long periodsc
- Network Usage
  - Number of RX and TX bytes
  - Which network is currently active
  - Gives the data transfer rates over time
  - Possible to correlate this with which network is active

Showing High Usage Applications

- Rank by CPU usage
- Rank by Network Usage



Possible Application

- Power Model of Hardware
  - Could give us battery usage of an application
- Determine a user's historic usage model to recommend hardware settings
- Recommend which applications to kill to make it to a certain time without your battery dying

Questions?