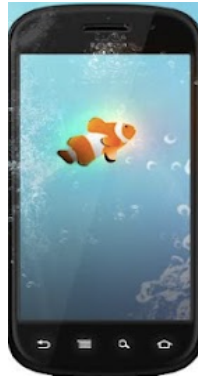


Using sensor hubs to support energy efficient sensor monitoring

**Haichen Shen, Aruna Balasubramanian,
Anthony Lamarca, David Wetherall**

Continuous sensor monitoring apps are becoming popular



BeWell, Acoustic: Lifestyle monitoring



Ambulation: Healthcare
monitoring



MobiPerf: Participatory
sensing

...but are huge energy consumers...



A Google User - August 22, 2012 - Samsung Galaxy Nexus with version 3.0.120704r635

★★★★★ Destroys your battery

Appears to
Assumes
your battery



Locale app, \$10



A Google User - June 17, 2012 - Samsung Galaxy S with version 3.0.2

★★★★★ Love the app. Hate the power drain.

Sucks up

Like many people I installed Locale to help me control power usage. What I found lately is that Locale is causing a race condition in wakelocks that is preventing my phone from entering deep sleep. Disabled locale and all is well again. I am using CM9 on a Galaxy S. Please investigate and fix this issue so I can start using the app again.



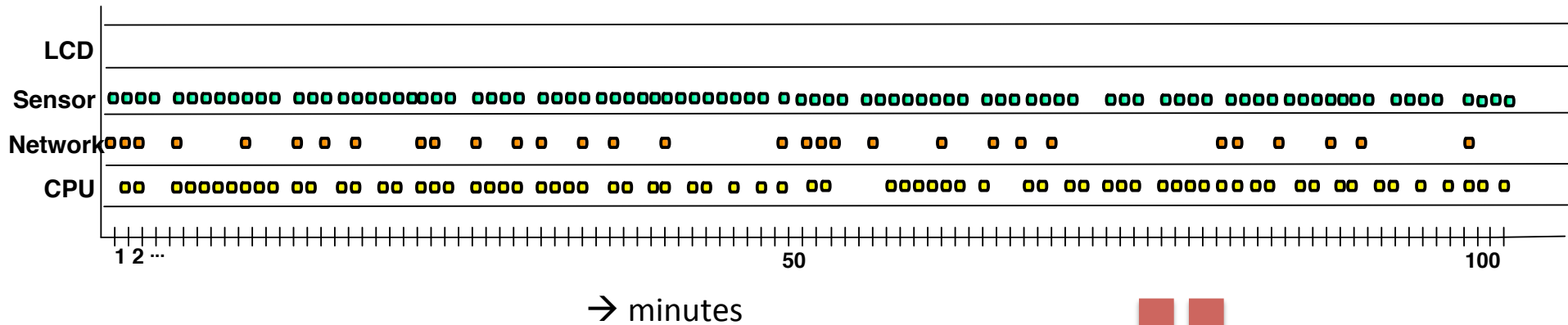
A Google User

★★★

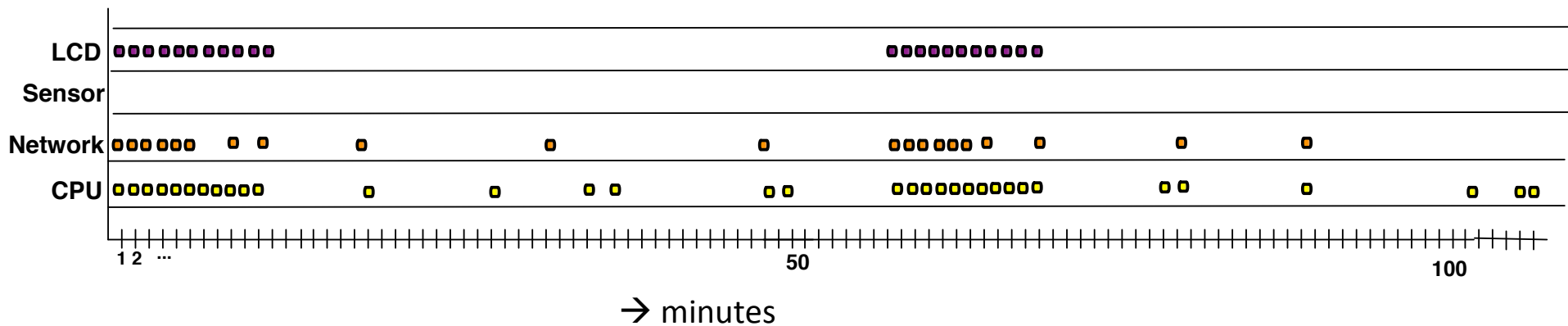
This app does what it says, but it alone was consuming about 10% of my battery and about half my memory. As if I didn't have enough performance issues already with my phone. Uninstalled!

Continuous sensing characteristics

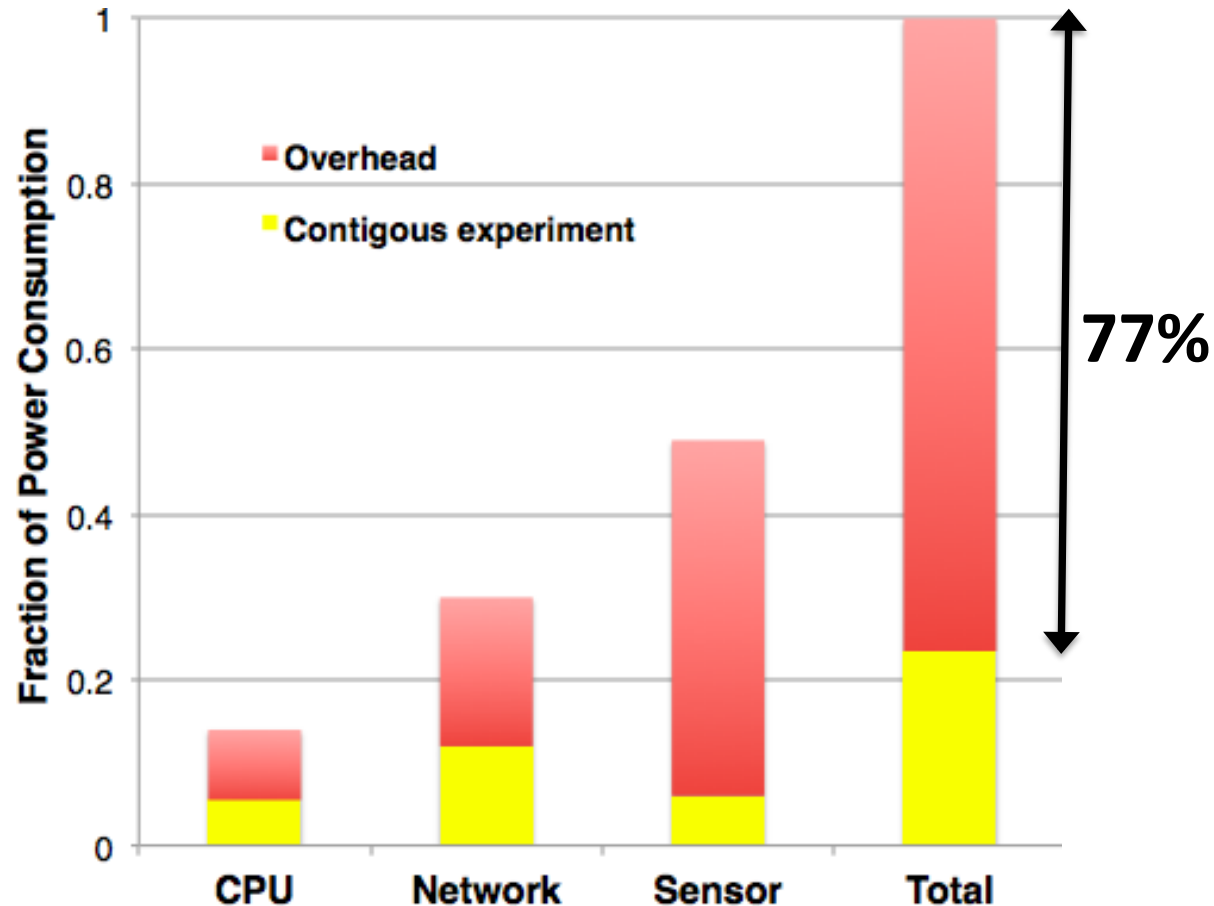
Continuous sensing active times: MobiPerf, Ambulation, and Acoustics



Foreground active times: Angry birds

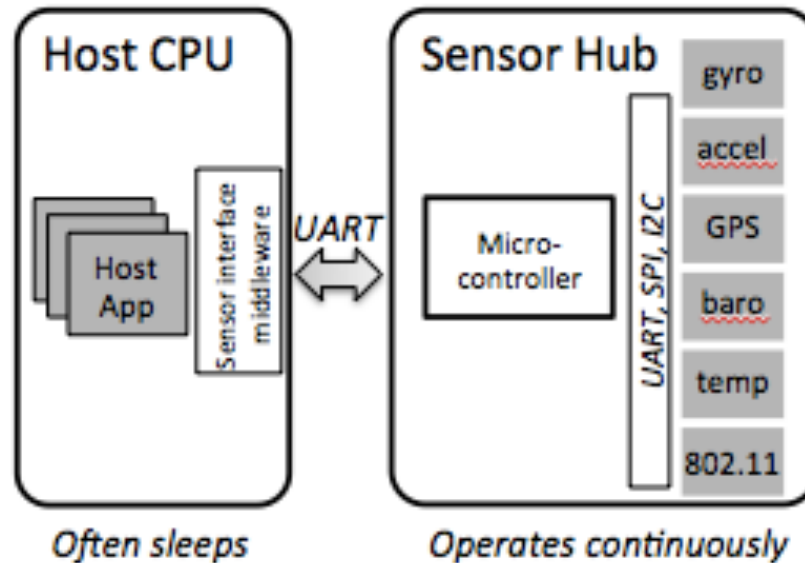


Large fraction of power consumption is overhead



Existing power saving techniques are ill-suited for sensing apps

Sensor hubs



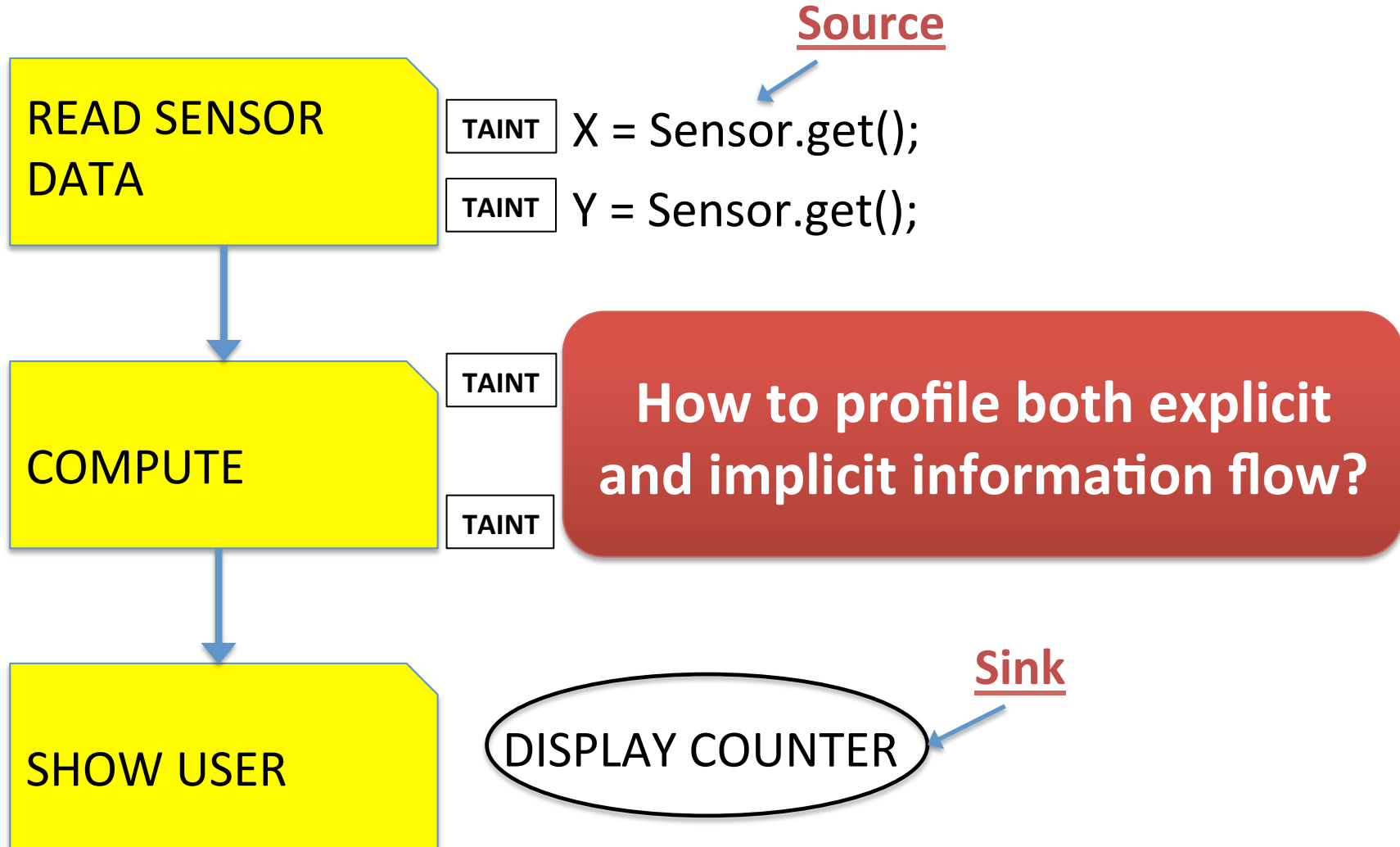
- What should we do with the sensor hub?
- How can applications seamlessly leverage the sensor hub?

How do apps use sensor data?

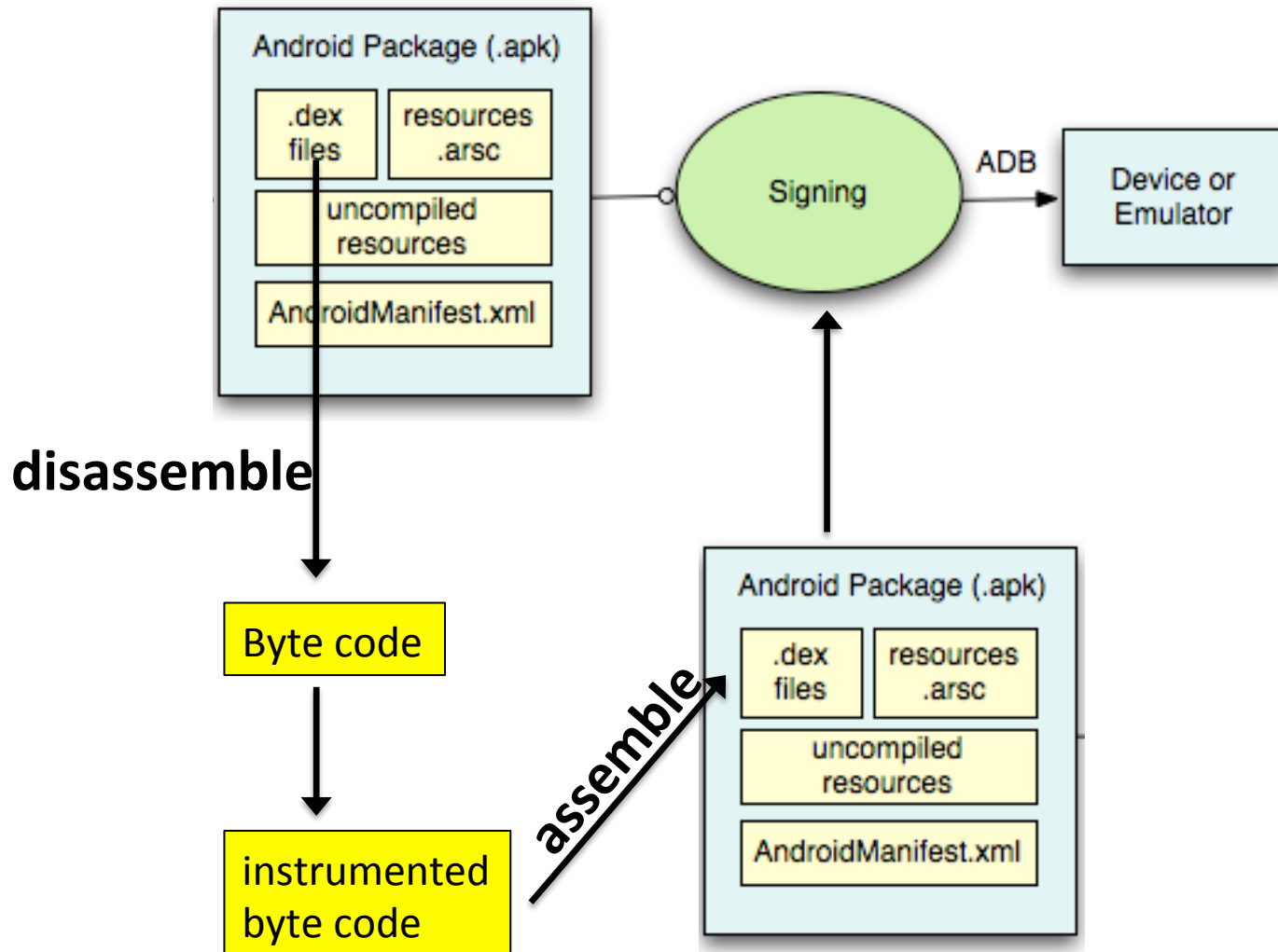
- How often is a collected sensor data used?
- What is the time between when sensor data is collected and used?
- How is sensor data used by the application?

Answer those questions without knowing the source code.

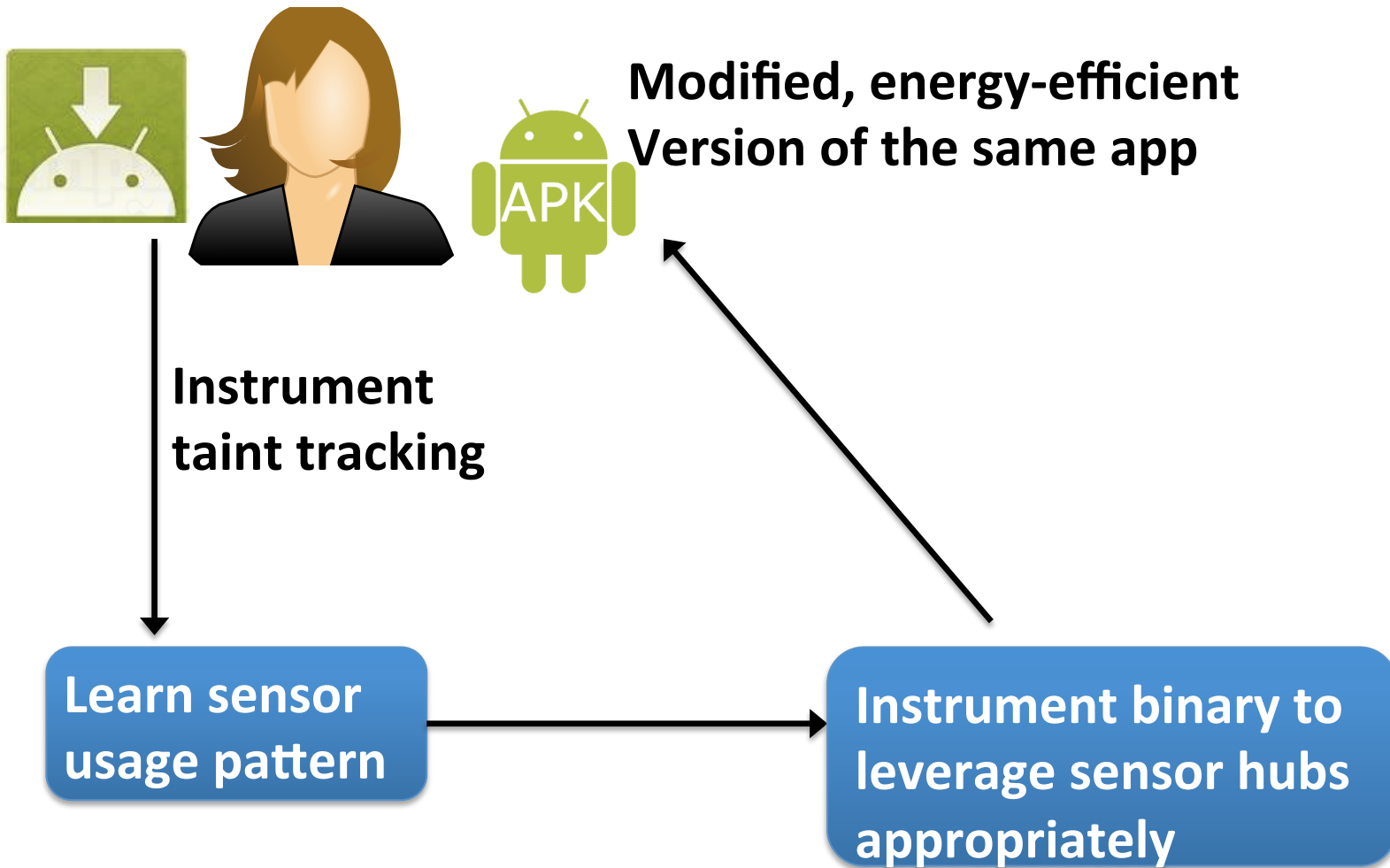
Our approach: Taint tracking



Instrumenting android byte code



Goal



Questions?

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