Many sophisticated sensing apps are proposed in research community. Apps in commercial app market are mostly non-sensing apps. Building sensing inference model is hard—difficult to acquire data, require expertise in machine learning… Need easy-to-use high level abstractions.

3. “Virtual Sensor” Abstraction

Need high level “virtual sensor” abstractions
- Can be used as if they are physical sensors
Need to enable easier development of “virtual sensors”

4. Design Overview

1. A Gap Exists
- Many sophisticated sensing apps are proposed in research community
- Apps in commercial app market are mostly non-sensing apps

2. Rethink the Gap
- Building sensing inference model is hard
  - Difficult to acquire data, require expertise in machine learning…
- Need easy-to-use high level abstractions

3. “Virtual Sensor” Abstraction
- Need high level “virtual sensor” abstractions
  - Can be used as if they are physical sensors
- Need to enable easier development of “virtual sensors”

4. Design Overview

5. The Future of Sensing Apps using Virtual Sensors
- Sensing through VS (May aggregate across devices)
- Automate building VS with limited labeled data
- Establish new VS on top of existing ones

6. Preliminary Results
- Co-training among training users
- Model adaptation across all users

7. Ongoing Work
- Real life deployment
- Privacy concern
- Optimize energy consumption