

Edge Computing for Improving Medical Adherence

- Ooi Wei Tsang
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My research

Multimedia

Interaction

Networking and Systems

**How to send large amount of data
over the network for users to
interact with.**

- Zoomable Video Streaming
- Networked Virtual Environments
- Games

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“the degree to which patient accurately follows medical advice given by healthcare professionals”

- call the hotline if body temperature goes above 38C
- wear a mask if you are in a crowded place
- take medication

- Medication adherence
 - take the right medication?
 - correct dosage?
 - at the right time?
 - observing food restriction?

- Adherence rate has been low
 - **41%** among adolescent HIV patients, need >90% for optimal clinical outcome
 - **27-60%** for adolescent cancer patients

- “I forget”
- “Other priorities”
- “I didn’t want to”

- “Hide meds around friends, don’t want them to know.”
- “Having to do it in front of people, them asking questions.”
- “Staying the night at a friends’ house and forgetting to pack them.”
- ‘Medication and school schedules clash.’”

- No food two hours before and one hour after the medication
- About the same time every day
- Multiple medications a day (some in order of tens)

- Current method for collecting non-adherence data: self-reporting and interview
- Can we get more insights into why patients do not take their medication?

- Research shows 50% -> 68% improvement in using smart phone reminders
- Review of 160 reminders app show simple notification, few appeared to be personalized

- Most remind patients to take the medication only
- Not bring it with them, not to observe food restrictions, etc.

- Daily Activity Recognition using Wearable Sensors
 - eating
 - drinking
 - writing
 - typing
 - using smartphones
 - brushing teeth
 - taking transport
 - ambulation (walking, running)

- Do what, where, and when?
- Correlate with medication adherence data
- **Goal 1:** To better understand why patients did not take their pills

- **Goal 2:** To opportunistically remind the patients to:
 - bring the medication
 - take the medication
 - observe food restriction

e.g., if routine is disrupted

e.g., if traveling in a train

- **Privacy** is a major concern.
- Data should not be sent to the cloud and processed at devices trusted by the users (watch, phone, home PCs)

- How to distribute the computation, data, learning model across various devices (depending on the available resources, context, privacy needs)?

- How to adapt frequency of data collection without sacrificing accuracy (rate-accuracy tradeoff) ?

- What sorts of programming abstractions are appropriate for building of such systems?

- What to sense?
 - IMU sensors (where else besides a ring?)
 - Audio sensing (without violating privacy?)
 - Location
 - RF-sensing
- Other sources (calendars, social media)?

- HCI perspective
 - persuasive visualization
 - gamification
- Behavioural Economics



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