Wireless & Mobile Health to Address COVID-19

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Wireless & Mobile Health to Address COVID-19

- Technologies that have been *already deployed*
- Solutions that are under way — with focus on *open sourced*
- Projects developing in my *class* by student groups
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~ 80 MIT collaborators
At Least 9,000 U.S. Health Care Workers Sickened With COVID-19, CDC Data Shows

The New York Times

Virus Knocks Thousands of Health Workers Out of Action in Europe

The thinning ranks of doctors and nurses, particularly in Spain, are hampering the ability to fight the epidemic, straining hospitals and raising fears that health workers are spreading the coronavirus.
Can we reduce risk of *contagion* to health workers & enable *at-home monitoring* of COVID-19 patients?
Non-Contact Respiration Monitoring

Figure 1
Real-time Breath Monitor

Breath magnitude

Time (seconds)
Non-contact Respiration Monitoring

- Technology has been used in monitoring a COVID-19 Patient
- Deployed in *Heritage Assisted Living* in Boston suburb
- Medical doctors from Harvard Medical School analyzed remotely
Monitoring COVID-19 Patient

The patient’s breathing decreased as it went back to normal.
The patient's movements also demonstrate a marked improvement.
Beyond Monitoring Recovery

• Can contactless vital sign monitoring be used for early diagnosis?

• How do vital signs correlate with recovery? Are their different forms of recovery?

• Can we use mobility patterns to discover impact of social isolation on mental health?
Can we develop sub-$5 solutions to alert users when they are about to touch their face?
Saving Face Project

BLE (headset+watch)

Ultrasound (earphones)

Magnetic

Inertial (Wristband)
Saving Face Project

**Idea:** Measure tilt using accelerometer (use knowledge of gravity vector)

GitHub: [https://github.com/mitmedialab/SmartBand](https://github.com/mitmedialab/SmartBand) ($10 fitness tracker already!)
Saving Face Project

Ultrasound (earphones)
**Idea:** Measure Doppler of the reflection from mic to the face
Saving Face Project

Ultrasound (earphones)

Idea: Measure Doppler of the reflection from mic to the face

GitHub: https://github.com/camilorgq/SavingFaceApp
Idea: Measure the BLE RSSI between smartwatch and earphones
Saving Face Project

BLE (headset+watch)

Idea: Measure the BLE RSSI between smartwatch and earphones
Saving Face Project

Magnetic ring

Magnetometer (w/ vibration)
Saving Face Project

GitHub: https://github.com/irmandyw/magsense
Saving Face Project

BLE (headset+watch)  Ultrasonic (earphones)

Magnetic  Inertial (Wristband)

Can help essential workers now & the rest of us as we start getting back to work
A teaching-focused “Call to Arms”
Student Class Projects

Inform cleaning protocols in grocery stores

Track PPE shrinkage from warehouses & hospitals

Remote gesture recognition to minimize surface contact

Sensor fusion for social distancing & contact tracing
COVID SafePaths

Privacy-first approach for contact tracing

• **Focus:** Exposure notification
• **Participants:** MIT, WHO, Mayo Clinic, Google/Apple
• **Technologies:** GPS, WiFi, BT, Cellular
• **Moving forward:** hotspot predictions, immunity passport

GitHub: [https://github.com/tripleblindmarket/covid-safe-paths](https://github.com/tripleblindmarket/covid-safe-paths)

The most active COVID19 GitHub repository
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