

Mobile Phone Sensors in Health Applications

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Ubiquitous mobile phones

Facts

- Most popular communication device
- By 2015 every other man will use it
- Tend to be powerful computing platform
- Can support several wireless communication techniques



Modern mobile phone components

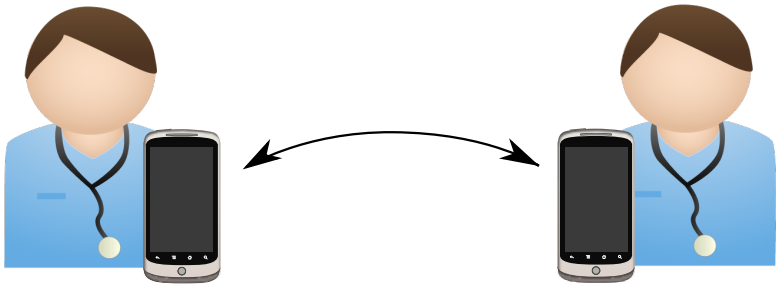


Embedded sensors

- Microphone
- Camera
- Accelerometer
- Magnetometer
- Gyroscope

Mobile phone microphone in healthcare

- Communication and training for healthcare workers



Example. MDNet project.



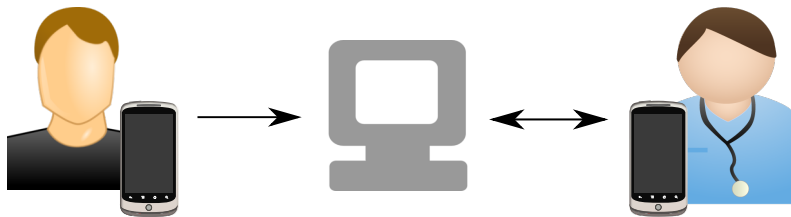
Provides free doctor-to-doctor calls and other communications for healthcare professionals in African countries

Benefits

- Improved communication about patient management
- Doctors reach out to more experienced colleagues for advice
- Increased level of healthcare

Mobile phone microphone in healthcare

- Automatic patient feels assessment



System benefits

- 1 Reduce the number of the doctor visits
- 2 Monitor patients without hospitalization

Example. Myotonia disorder

Myotonia - slow relaxation of muscles after contraction, which may cause a difficulty to move.

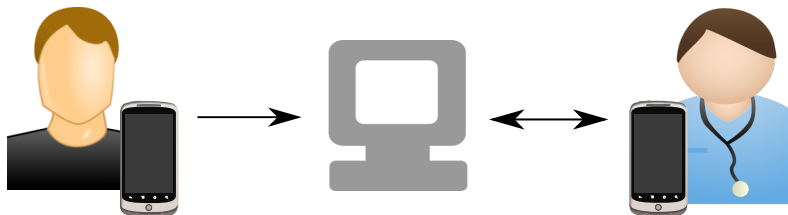
System use case

- 1 Patient regularly calls to data collection service and talk about health
- 2 Automated voice response system classified symptoms:
 - muscle stiffness
 - weakness
 - pain
 - tiredness



Phone camera in remote consultation

- Teledermatology
- Diagnosis of soft tissue injuries



Data transmission strategies

- Store and forward (SAF)
- Real time interaction



Example. ClickMedix



ClickMedix is a global mobile health (mHealth) social enterprise

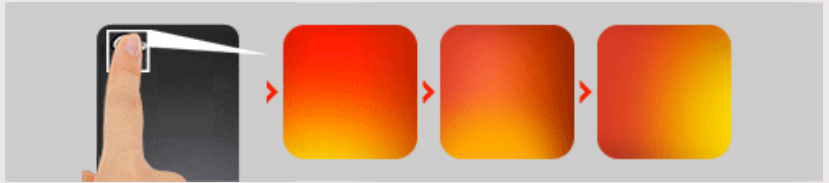
How it works for patient

- 1 Registration in the system
- 2 Get instruction on how to take a photos of their skin correctly
- 3 Takes photos of skin and sends it to the data collection server
- 4 Retrieve diagnosis result from doctor



Phone camera for pulse detection

Changes in blood flow at a finger



Subtle changes in color of human face



Examples

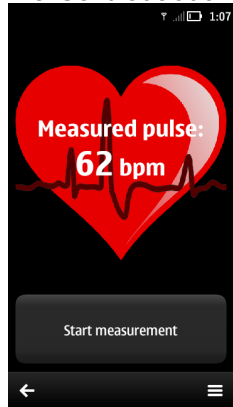
Instant heart rate



Cardio

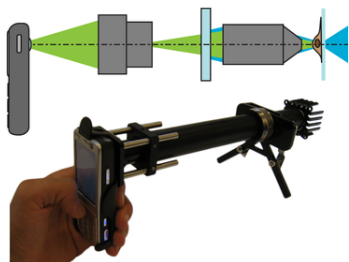


Pulse detector



Phone camera as a light microscope

External devices can expand the use of mobile phones for healthcare purposes.



- Detects blood cell and microorganism morphology
- Can make diagnosis based on local analysis results
- Do not require high operator qualification

Cell phone with accelerometer as pedometer

Pedometer - step counting device.

Accupedo



Walk



- Useful for physical activity tracking
- Does not require any additional devices

Cell phone with accelerometer as fall detection system

Cell phone based fall detection system



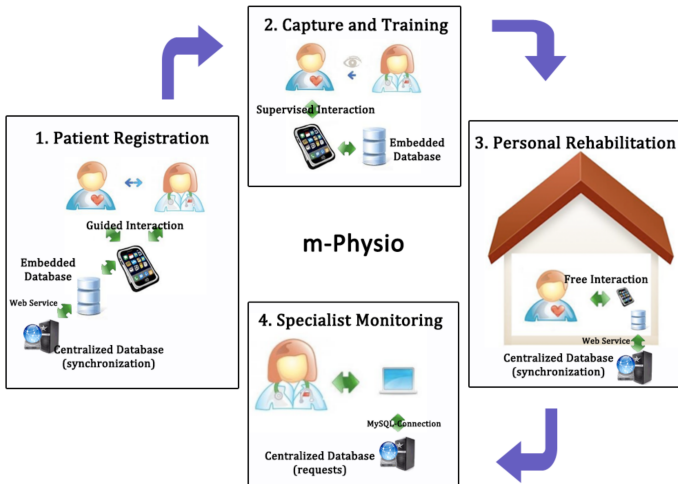
- Does not require addition devices
- Works everywhere

Typical fall detection system



- Includes two addition devices
- Works locally (at home)

Cell phone with accelerometer as rehabilitation assistant (m-Physio)



Conclusion

- Variety of mobile sensors are used in existing application
- It can improve quality and decrease cost of healthcare services

Thank you for attention!
Questions?