A Framework of Events of Interest (EoI) Capture Using Novel Body-worn Fully-passive Wireless Sensors for S&CC

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Project web-portal: https://www.memphis.edu/esarp/nsf_scc/index.php

Project web-server: http://sccmobilehealth.com/

SCC Health Challenges:

- High incidence of chronic disease.
- Utilization of smartphone technology for communication of SCC Health.
- Technological barrier: inability of integrated sensors to collect clinically important physiological signals.

Proposed Objectives:

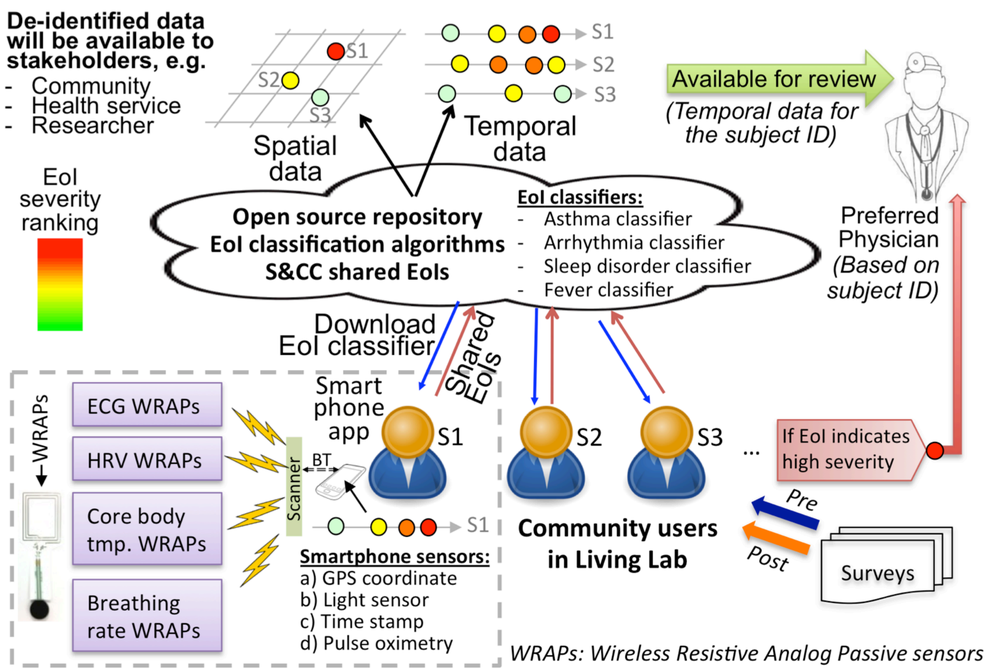
- Design and develop wireless fully-passive body-worn WRAP sensors for multi-modal health data capture.
- Develop an open-source framework for Events of Interest (EoI) classifiers via a smartphone app for self-monitoring and secure knowledge sharing with S&CC.
- Deploy the system in a "Living Lab" pilot study. Data will be collected and classified in real-time to generate EoIs for multiple health conditions (Fig. 1).

Scientific Impact:

- Very low-cost, battery-less, easy-to-use disposable sensors for clinically relevant signal capture.
- EoI algorithms for real-time accurate and sensitive monitoring of disease.
- Open framework, spatiotemporal data.

Broader Impact:

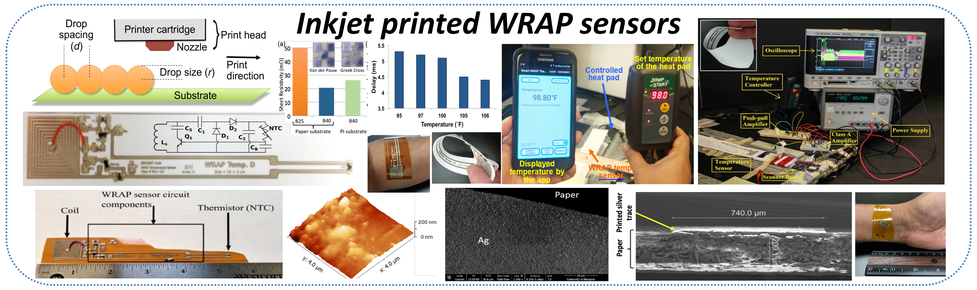
- Better management of chronic diseases and collective sharing of anonymous EoIs with S&CC.
- Possible reduction in frequent and avoidable hospital visits.
- Spatiotemporal EoI visualization for clinical/community decision support.



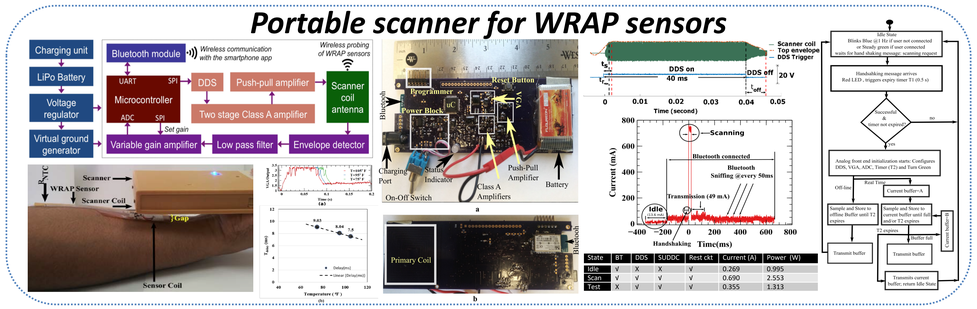
WRAPs: Wireless Resistive Analog Passive sensors

Fig. 1. The SCC Health project framework for disease severity monitoring.

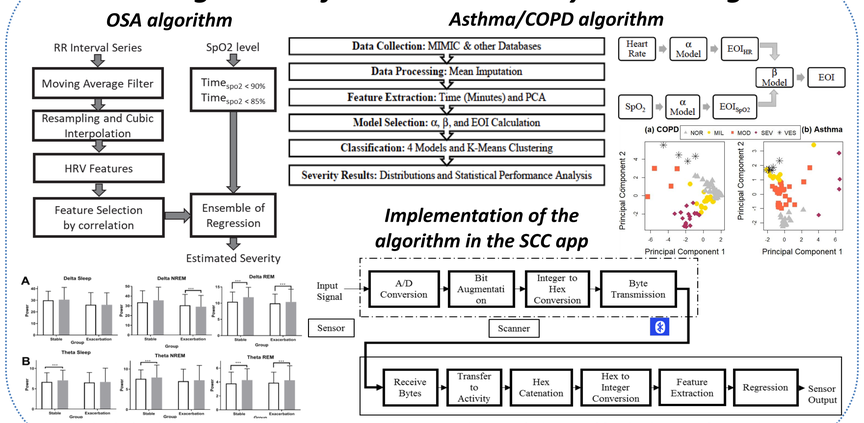
Inkjet printed WRAP sensors



Portable scanner for WRAP sensors

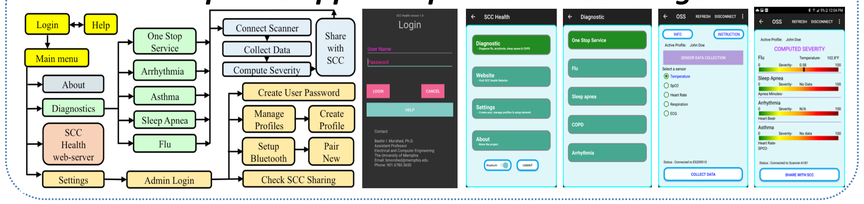


EoI algorithms for disease severity monitoring



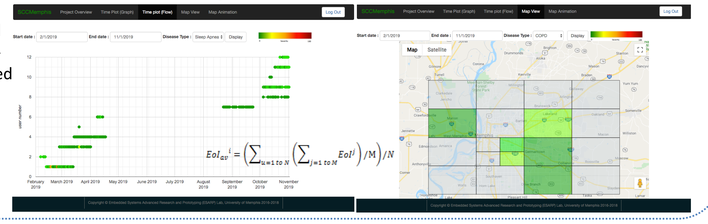
Github (public access of app codes and sensor designs): https://github.com/esarplab

SCC Smartphone app to implement the EoI algorithms



SCC-server and spatiotemporal visualization

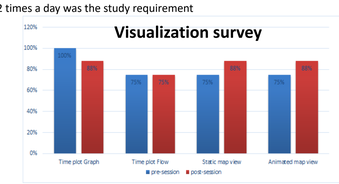
Snapshots of spatiotemporal plots from SCC-server generated from real data collected through this study in Memphis community



Statistics of pre-/post-session & visualization surveys

Post-Survey Questions about Sensors[a] M(SD) (N=4)[b]	
Met Expectations	4.50 (1.00)
Were Easy to Use	4.75 (0.50)
Interfered with Daily Activities	1.00 (0.00)
Helped me Monitor my Health	3.00 (1.83)
Caused me Pain or Discomfort	1.25 (0.50)
Helped me Talk to my Doctor	3.00 (1.63)
Post-Survey Questions about Sharing Data n(% Yes)[b]	
Comfortable Sharing with Mock Physician	4 (57.1)
Comfortable Sharing with Study Server	4 (57.1)
Monitoring Health n(% 1-2 times/day)[b,c]	
Number of Days Used Sensors	3 (42.9)
Number of Days Used Other Tools	2 (28.6)

[a] Response options ranged from Strongly Disagree (1) to Strongly Agree (5)
[b] Due to surveys not yet entered (N=2) or responses of "Not Applicable" N is less than study total of N=7
[c] 2 times a day was the study requirement



SCC Health Memphis Project

Project Duration: Aug. 2016 - Jan. 2020

Institution: The University of Memphis

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