

Wearable, Wireless, Noninvasive Physiological Sensing

MOTIVATION

- To develop wearable, wireless, noninvasive physiological monitoring of soldiers during combat and training missions, firefighters, high risk mission specialists, and mass casualties in disaster areas
- To develop computational algorithms and propose predictive indices to interpret the most likely physiological status of a wounded person based on real-time information derived from multiple physiological measurements
- To provide military and civilian field commanders important information regarding current and predicted physiological status of their mission specialists and casualties
- Commercial noninvasive physiological sensors are inadequate for combat and civilian field applications because they:
 - Do not operate reliably under adverse environmental conditions
 - Are tethered by unwieldy wires
 - Can limit normal body activities
 - Are affected by body movements

- When a person is wounded, wearable sensors will provide the medic with valuable physiological data before arrival at the casualty site, facilitating *Remote Triage*

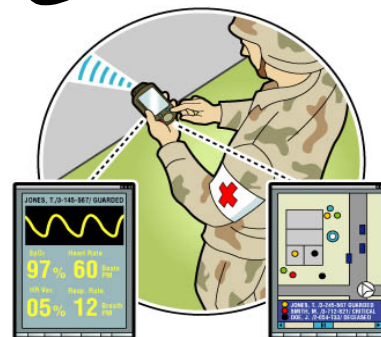
APPLICATIONS

- Military medicine (training and battlefield)
- Disaster response
- Firefighters
- First responders



ADVANTAGES FOR MEDICS

- Direct a medic to the casualties for which they can make a life-saving difference
- Commence triage within moments after injury
- Receive accurate information about severity and progression of critical injuries
- Provide effective intervention by optimizing field treatment and expeditious evacuation



SYSTEMS CONFIGURATION



Sensor data from the head-band are transmitted in real-time via a receiver module to a PC using a serial or USB connection utilizing a low-power wireless communication link.

- Non-obstructive, non-invasive
- Multiple parameters
- Alerts automatically by exception

SIMULTANEOUS MEASUREMENTS OF MULTIPLE VARIABLES

- Arterial Oxygen Saturation (SpO₂)
- Heart Rate (HR)
- Heart Rate Variability (HRV)
- Respiration Rate (RR)
- Orientation
- Activity

UNDER DEVELOPMENT

- Improved power management
- Secured wireless communication
- Reduced motion artifacts
- Field testing

UNIQUE FEATURES

- Wireless
- Lightweight
- Small
- Rugged
- Low power consumption
- Low cost
- User friendly

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