NATO mutli-year science for peace project (NATO SPS)

G5825 – "Smart Patch for Life Support Systems - SP4LIFE"

Project duration: 10.03.2021 – 10.03. 2024

The official web site of the project: https://www.um.sav.sk/SP4LIFE/

Wearable real-time systems collecting and smartly analysing information on respiration, heartbeat, SpO2 and blood pressure could help medical personnel adopting most suitable countermeasure in case of highly stressful situations in military and civil scenarios as a result of terrorist attacks, IEDs' or rescue operations. The system gives an alert if the health status of a person is changed, to prevent an overlook of critical health changes. SP4LIFE will propose design and development of a patch-like device prototypes and methodology enabling continuous evaluation of personnel or victims' vital parameters, using Artificial Intelligence to create software capable of real-time intervention during the first and the second triage.

The objectives of the project are to:

- develop wearable monitoring platforms with:
    - sensitive respiration, heartbeat and auditory sensors based on graphene, ECG and PPG sensors
    - determination of HR, RR, SpO2 and Blood preasure
- create a biocompatible wearable body-sensing interface hosting electronics, alarm, low-power transmission for light-weight, portable applications
- create a software that will generate alert in real time, at the moment of critical physiological parameter changes or changes of the triage medical status according to START algorithm,
- analyze existing (AS-IS) processes and consider their re-design (TO-BE processes) in organization of patient management on the site of accident with respect to wearable monitoring technology being developed.

Capacitive and strain sensors technologies prevail in the realm of monitoring respiration and heartbeat. The capacitance between a wearable electrode and the skin changes dynamically during breathing or with changing electrical signals that accompany heartbeats. Strain sensors measure the chest motion due to respiration and heartbeat. In the project we propose to enhance the existing technologies by creating new capacitive and strain sensors using graphene, that has showed superb sensitivity in early work performed in lab conditions.

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