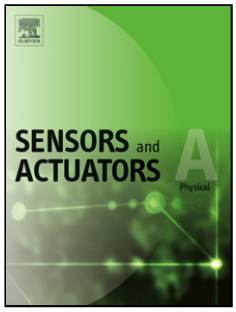

Title: Development of a Smart Garment for the Assessment of Cardiac Mechanical Performance and Other Vital Signs During Sleep in Microgravity

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PII: S0924-4247(17)32196-9
DOI: https://doi.org/10.1016/j.sna.2018.02.034
Reference: SNA 10656

To appear in: *Sensors and Actuators A*

Received date: 12-12-2017
Revised date: 24-1-2018
Accepted date: 23-2-2018

Please cite this article as: Di Rienzo M, Vaini E, Lombardi P, Development of a Smart Garment for the Assessment of Cardiac Mechanical Performance and Other Vital Signs During Sleep in Microgravity, *Sensors and Actuators: A Physical* (2010), https://doi.org/10.1016/j.sna.2018.02.034

Development of a Smart Garment for the Assessment of Cardiac Mechanical Performance and Other Vital Signs During Sleep in Microgravity

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Highlights

- • The first garment with textile sensors was developed for the monitoring of vital signs in space.
- ECG, respiration, skin temperature and seismocardiogram were collected.
- Indexes of cardiac mechanics were derived for each beat from the seismocardiogram
- The system was used to monitor one astronaut during sleep aboard the International Space Station
- Seven in-flight sleep recordings were made with a positive performance of the device

ABSTRACT

Several aspects of sleep physiology in microgravity are still unclear. In the frame of the Wearable Monitoring project, part of the Futura Mission of the Italian Space Agency, we developed a new smart garment (MagIC-Space) for the monitoring of the cardiac mechanical activity and other vital signs during sleep in space missions. The system is composed of 4 components: 1) a sensorized vest, including textile sensors for the detection of ECG and respiratory frequency, 2) an electronic module, collecting data from the vest and including two accelerometers for the seismocardiogram measure, from which indexes of cardiac mechanics are derived on a beat-to-beat basis, 3) an external probe for the assessment of the thorax skin temperature, and 4) a battery unit for the system power supply. From January till June 2015 seven inflight sleep recordings were made