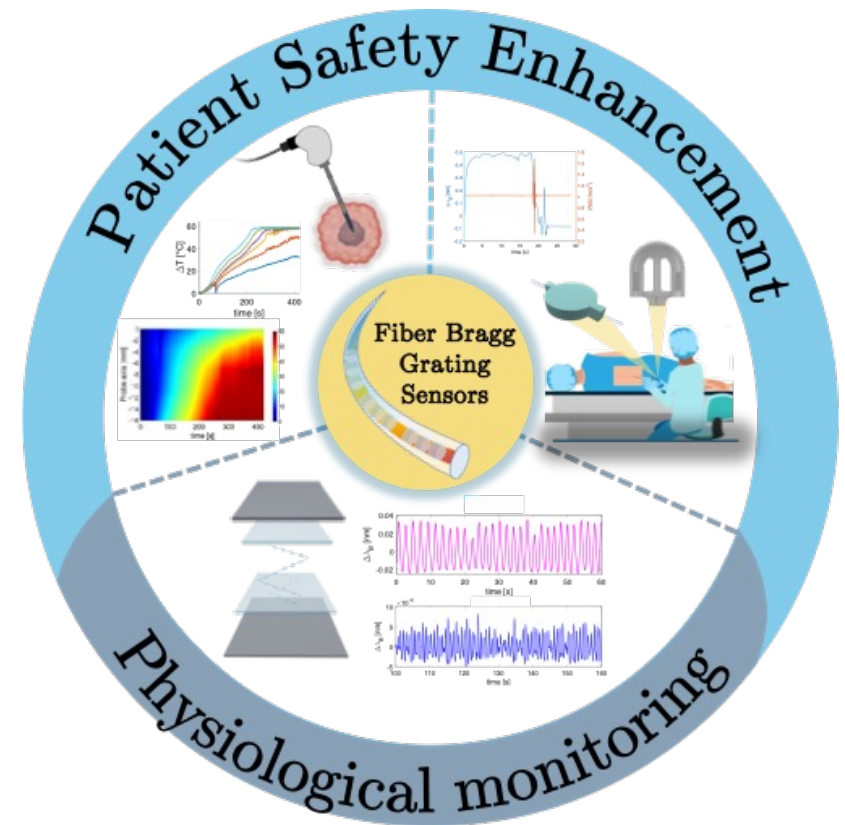


Università Campus Bio-Medico di Roma



Fiber Bragg Grating-Based Systems for Physiological Monitoring and Patient Safety Enhancement



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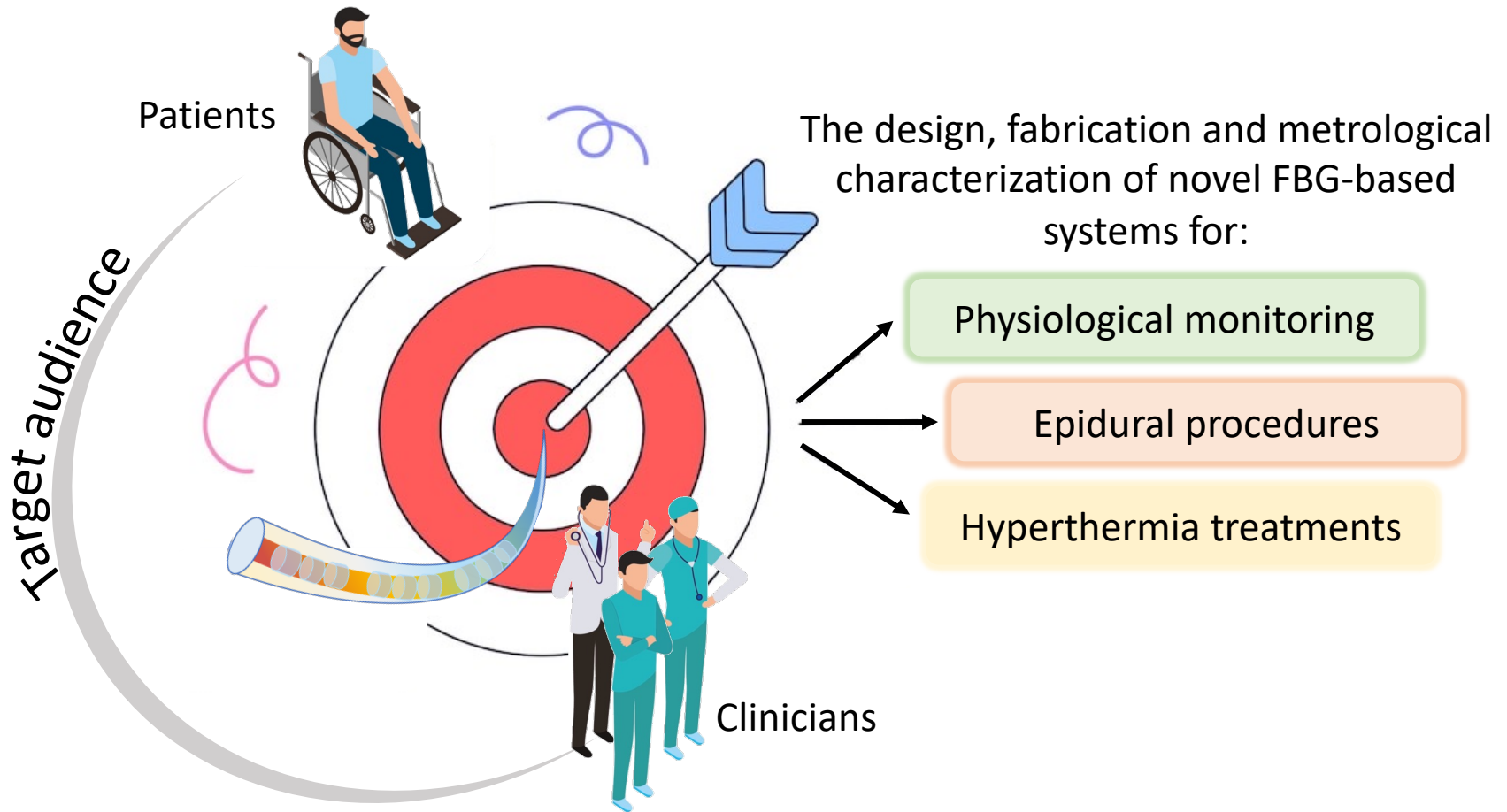
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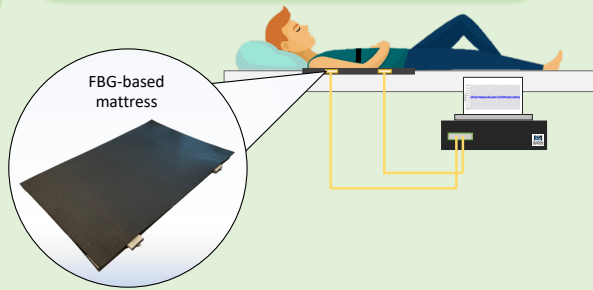
Description

The present thesis explores the integration of Fiber Bragg Gratings (FBG) technology in the Health 4.0 paradigm. It presents novel custom FBG-based systems for physiological monitoring and patient safety enhancement by leveraging the advantages of this technology (i.e., small dimensions, biocompatibility, non-toxicity, flexibility, immunity to electromagnetic interferences, multiplexing capabilities, and good metrological properties). The primary goal of the Ph.D. thesis is the design, fabrication, and metrological characterization of different FBG-based systems. It also explores their validation in lab settings and real scenarios for monitoring respiratory rate (RR) and heart rate (HR), estimating force in epidural procedures, and tracking tissue temperature during hyperthermia treatments.

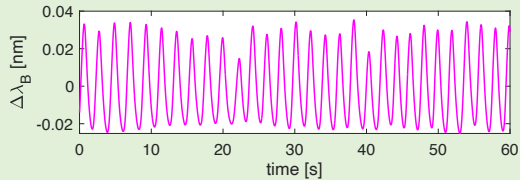
Objectives and target audience



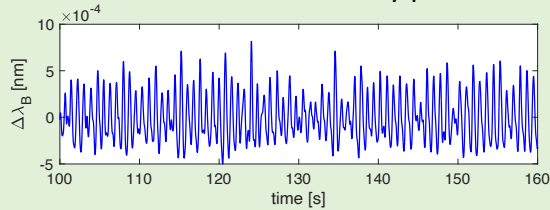
Physiological monitoring



Breathing pattern



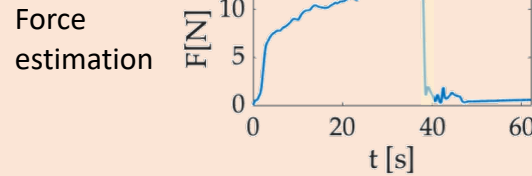
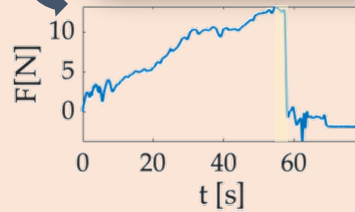
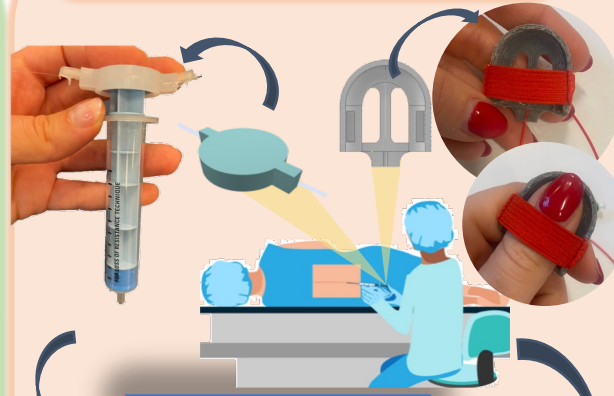
Mechanical heart activity pattern



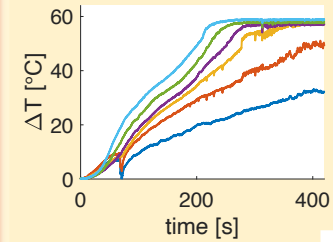
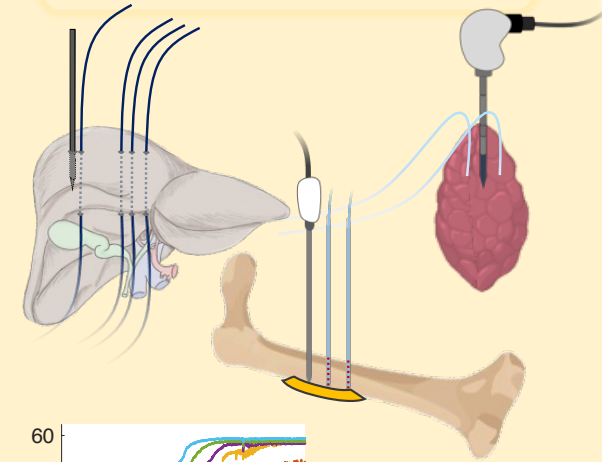
Respiratory rate: MAPE up to 2%

Heart rate: MAPE up to 3%

Epidural Procedure

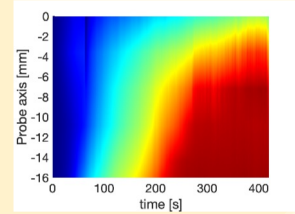


Hyperthermia treatments



Real-time temperature trends

Thermal map reconstruction





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