Concept

FAROS - Functionally Accurate RObotic Surgery aims at improving functional accuracy through embedding physical intelligence in surgical robotics.

Illustrator: Thibault Chandanson (SpineGuard)

Definition

Functional accuracy: the degree to which the functional outcome of the surgery conforms to the expected value for a successful complication-free operation (functional objective).

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Consortium

KU Leuven, Belgium
Sorbonne University, France
King’s College London, United Kingdom
University of Zurich, Switzerland
The FAROS partners will deliver surgeon-like robotic autonomous behaviour through superhuman sensing and actuation coupled with fast adaptive control, thanks to various spectrum of non-visual sensing and physical intelligence.

Core question: How to improve functional accuracy in the presence of uncertainty?

Core concept:
- exploit non-conventional, wide array of non-visual sensors integrated in a spine-surgical robotic system.
- understand/learn what matters for improving functional outcome: functional models link sensor data to outcome.
- embody physical intelligence in autonomous robotic systems to improve functional outcome in the presence of large amounts of uncertainty, variability and environmental changes.

Challenges faced by conventional approaches:
- poor visual feedback
- radiation-based approaches
- dense anatomy, tight space
- large variability in tissue/bone
- large forces and deformations
- extreme accuracy needed
- nearby vital structures (nerves, vessels)
- critical parameters are poorly known

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Project website: https://h2020faros.eu