University of Basel
Department of Biomedical Engineering

Project MIRACLE
Planning and Navigation
CIAN

Planning and Navigation: an Overview of Scientific Activities

Sara Freund, Antal Horvath and Philippe C. Cattin
CIAN, Department of Biomedical Engineering, University of Basel

Planning and Navigation

The Planning and Navigation team develops novel navigation technologies to safely plan and control the surgical interventions of the MIRACLE robot. To meet the requirements for its diverse field of research, the group is an interdisciplinary team of physicists, biomedical engineers, computer scientists, and mathematicians.

Bone Segmentation and Labelling

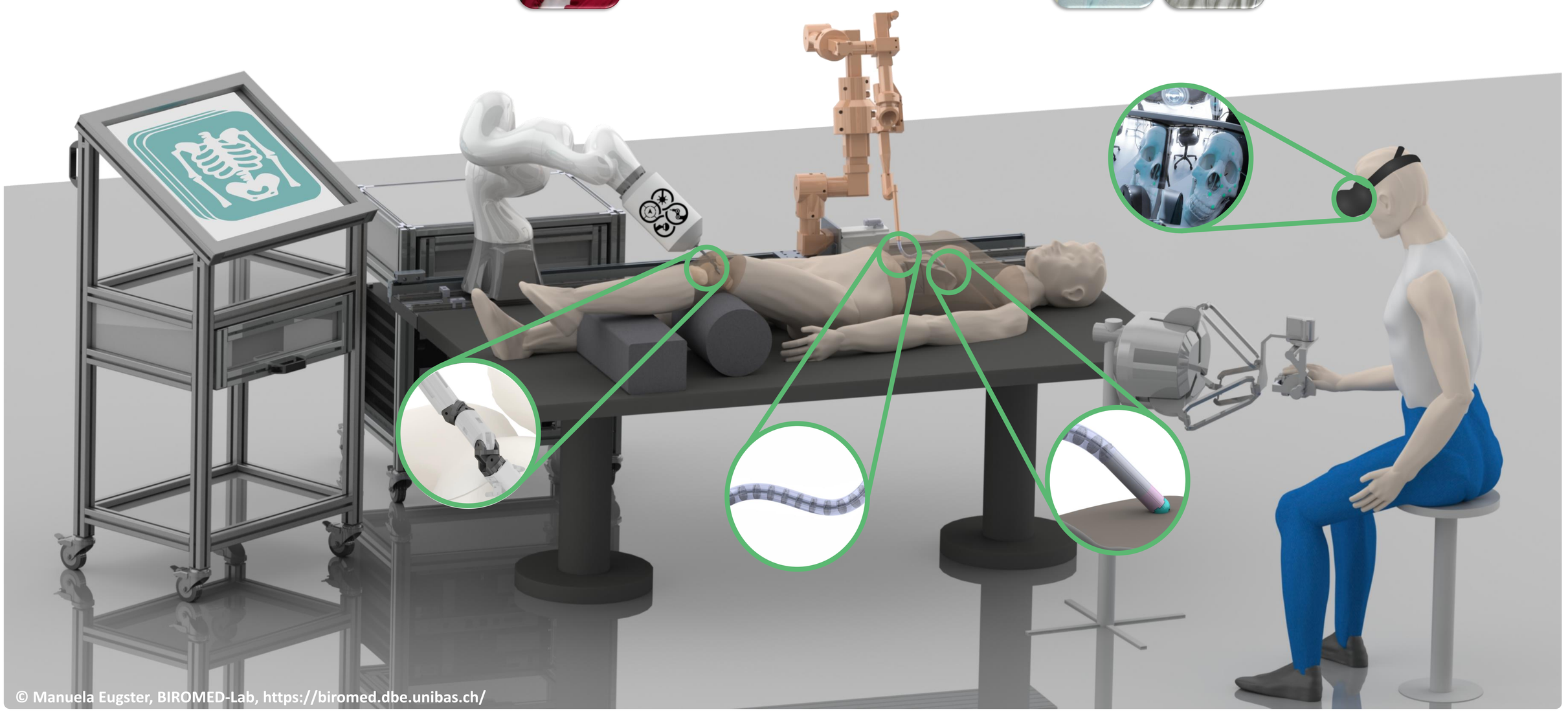
In this project, we work with Big volumetric data and state-of-the-art Artificial Intelligence methods to develop an algorithm for automated bone detection.

Project leader:
Eva Schnider
eva.schnider@unibas.ch

Planning System Software

Using Virtual and Augmented Reality techniques, we develop systems to intuitively plan and visualize the intervention of the MIRACLE robot before and during surgery [1].

Project leaders:
Marek Zelechowski
marek.zelechowski@unibas.ch
Balazs Faludi
balazs.faludi@unibas.ch



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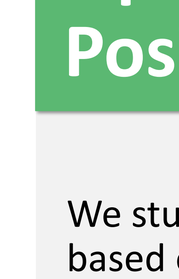
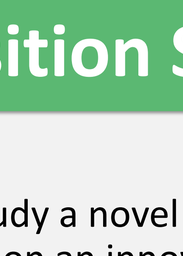
Opto-Mechanical Position Sensor

We study a novel approach, based on an innovative angular sensor, to accurately determine the position and shape of an articulated endoscope [2].





Project Leaders:
Lorenzo Iafolla
lorenzo.iafolla@unibas.ch
Massimiliano Filipozzi
massimiliano.filipozzi@unibas.ch

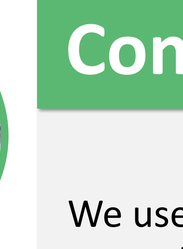
Fiber Shape Tracking System

In this project, we develop a real-time navigation system for flexible robotic endoscopes based on fiber shape sensing technologies [3].

Project leader:
Samaneh Manavi
samaneh.manavi@unibas.ch

Laser Depth Control

We use acoustic waves to reconstruct the structure of the bone and surrounding tissues, in order to estimate the depth of the laser cut [4].



Project leader:
Carlo Seppi
carlo.seppi@unibas.ch

References

[1] https://www.diffuse.ch/
[2]L. Iafolla, *et al*. *Sensor and Acuators A* **280** 390-398 (2018).
[3] S. Manavi, *et al*. In: *Advanced Photonics 2018,* Zurich Switzerland.
[4] U. Nahum, *et al*. (2019). In: Vrtovec T., Yao J., Zheng G., Pozo J. (eds) Computational Methods and Clinical Applications in Musculoskeletal Imaging. MSKI 2018. Lecture Notes in Computer Science, vol 11404. Springer, Cham.

WSS
WERNER SIEMENS-STIFTUNG

sara.freund@unibas.ch

antal.horvath@unibas.ch

philippe.cattin@unibas.ch