

ATLAS

ATLAS is a Marie Curie Innovative Training Network

ATLAS stands for

“AuTonomous intraLuminAl Surgery”

Intraluminal navigation, a particularly challenging branch, reappears in many minimal invasive surgical (MIS) interventions that rely on steering flexible instruments through fragile lumens or vessels.



Such interventions are characterized by poor visual conditions, and executed by instruments suffering from low dexterity, friction, slack and compliancy.



ATLAS aims to mitigate the mental load of the surgeons by endowing partial autonomy in the task execution.

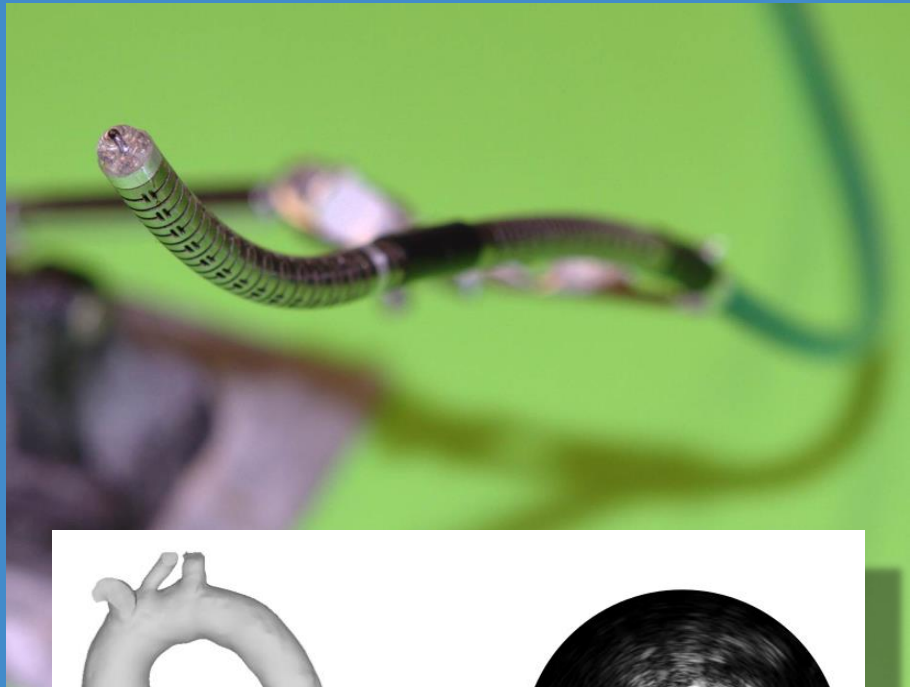
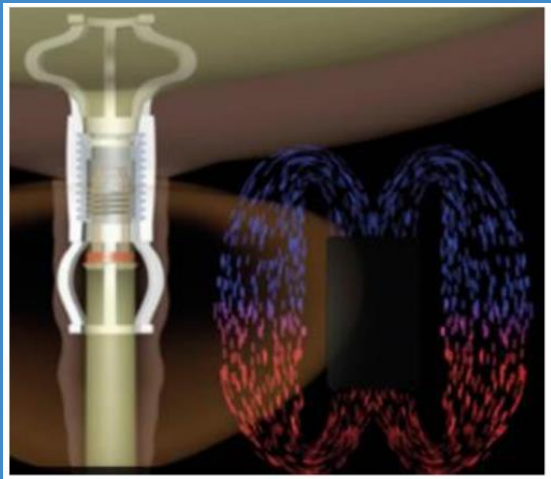




Research
Activities

Didactical
Activities

Research Activities



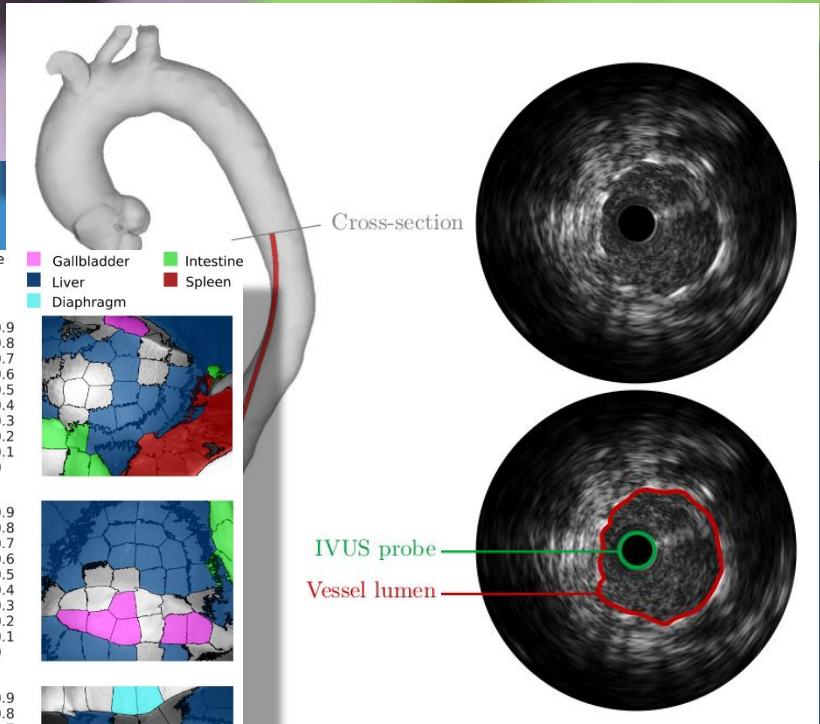
Automatically detect surgical instruments



Input video of surgical procedure



Output video with surgical instruments detected

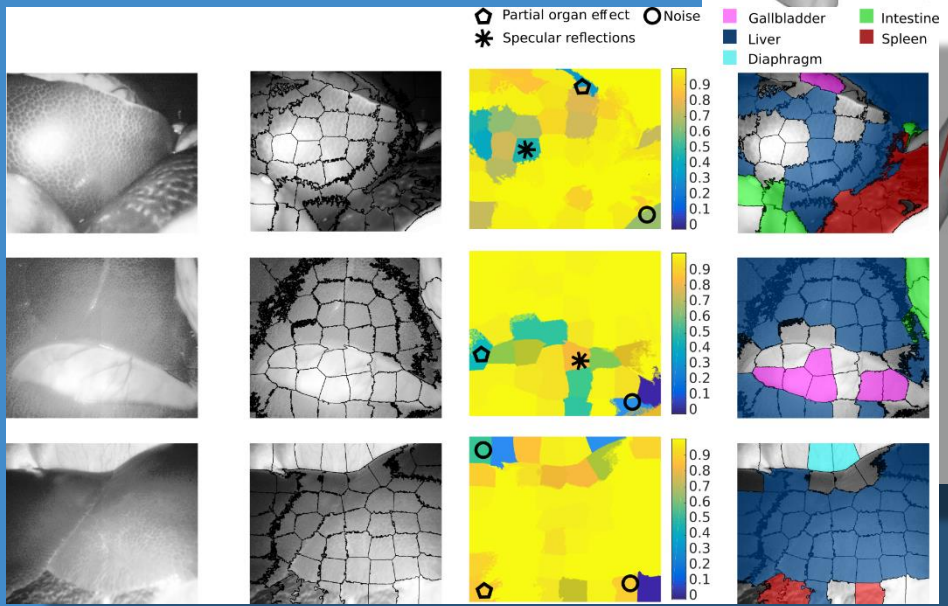


Cross-section

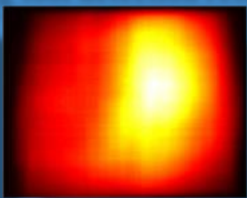
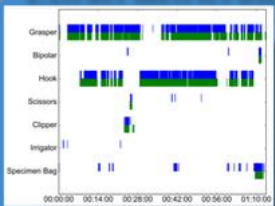
IVUS probe

Vessel lumen

- ⬠ Partial organ effect
- ⬠ Noise
- ⬠ Gallbladder
- ⬠ Liver
- ⬠ Diaphragm
- ⬠ Intestine
- ⬠ Spleen
- ⬠ Specular reflections



Extract metrics using tool detection results to assess operative skill



Didactical
Activities

Skills

understanding **clinical needs**

understanding **actuation technologies**

understanding **sensing technologies**

understanding **modelling**

understanding the issues of **integration**

ATLAS Consortium



UNIVERSITAT POLITÈCNICA
DE CATALUNYA
BARCELONATECH

KU LEUVEN

UNIVERSITÉ DE STRASBOURG



UNIVERSITÀ
di **VERONA**



ATLAS

Consortium, *Partners*

Institut De Recherche Contre Les Cancers De L'appareil Digestif

Olv Robotic Surgery Institute

Fundacio Hospital Universitari Vall D'hebron - Institut De Recerca

Istituto Europeo Di Oncologia Srl

Institut National de Recherche en Informatique et Automatique (INRIA)

Fondazione Istituto Italiano Di Tecnologia (IIT)

Imperial College Of Science, Technology And Medicine

Deam

Fbgs International N.V.

Eye-Tech

Camelot Biomedical Systems Srl

Orobix Srl

Endocas- Università Di Pisa

AM2M Spolkaz ograniczona odpowiedzialnoscia spolka komandytowa

ESR 1: Development of ultra-thin multi-steerable catheter technology suited for soft-robotic navigation through complex vascular structures

ESR 2: Magnetic driving and actuation

ESR 3: Distributed proprioception for safe autonomous catheters

ESR 4: Intraluminal sensing for autonomous navigation in remote district

ESR 5: From local sensing to global lumen reconstruction

ESR 6: Computer vision and machine learning for tissue segmentation and localization

ESR 7: Simultaneous tissue identification and mapping for autonomous guidance

ESR 8: Image-based tool tissue interaction estimation

ESR 9: Surgical episode segmentation from multi-modal data

ESR 10: Automatic handsfree visualization of a 6 DoF agent within a complex anatomical space

ESR 11: Control of multi-DOF catheters in an unknown environment

ESR 12: Distributed follow-the leader control for minimizing tissue forces during soft-robotic endoscopic locomotion through fragile tubular environments

ESR 13: Path planning and real-time re-planning

ESR 14: Automatic endoscope repositioning with respect to the surgical task

ESR 15: Optimal learning method for autonomous control and navigation

WP1: Actuation technology

WP2: Intra-Operative Sensing

WP3: 4D Modelling and Reconstruction

WP4: Autonomous Intraluminal Navigation and Control

Training Activities

Management and Policy Aspects of Technology in Healthcare

Ethics in Research

Microrobotics for surgery

innovative actuation technology

BioInspired Design

Medical Robotics

Medical Device Development and Translation

Sensing and actuation for soft robotics

Best integration practices and robotic middleware

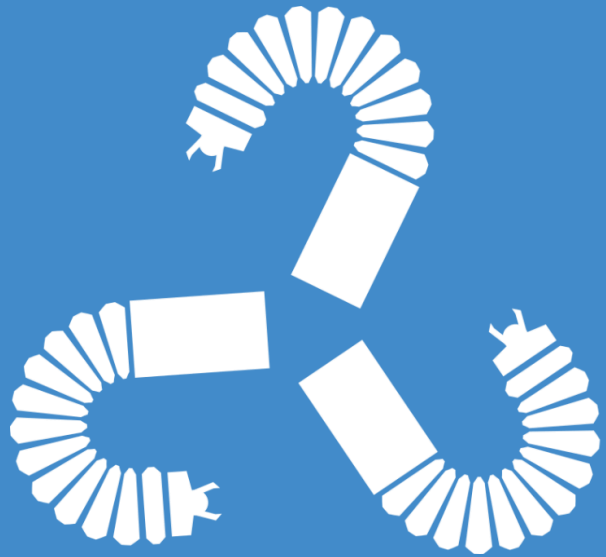
3D intraluminal modelling

Soft skills for soft robotics

Tech transfer for surgical robotics

Summer School on Cognitive Surgical Robotics

ATLAS session at CRAS



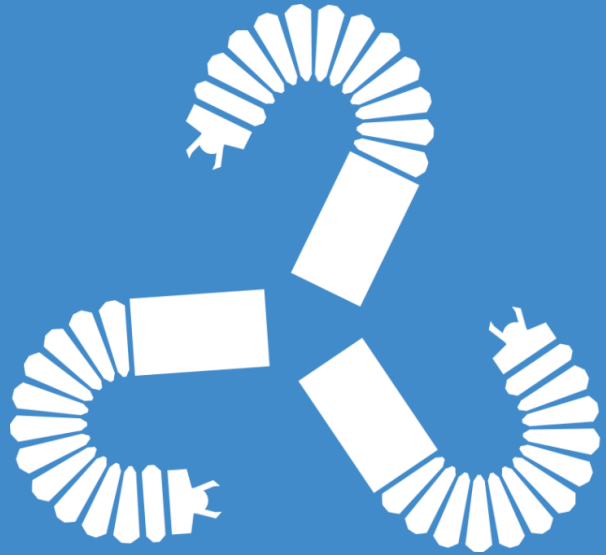
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For more information: <https://atlas-itn.eu>

WE ARE STILL LOOKING FOR CANDIDATES!

NEXT DEAD-LINE:

15th of April



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