



University of Verona
(coordinator): control of the
 surgical actions, management



Ospedale San Raffaele:
 knowledge acquisition,
 reasoning and validation,
 dissemination;



Tallinn University of Technology:
 organ model calibration and
 registration



Oslo
universitetssykehus

Oslo University Hospital: intra-
 operative sensing and reasoning



Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

Swiss Federal Institute of
Technology Zurich: robotic
 instrument analysis and
 development



YEDITEPE UNIVERSITY

Yeditepe University: surgeon-
 robot communication



PROJECT COORDINATOR:
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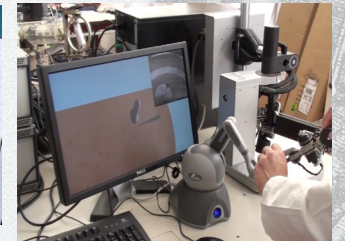
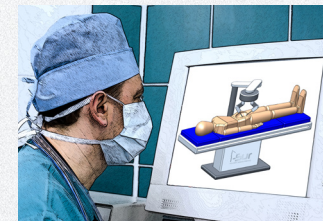
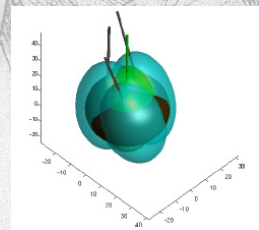
www.isur.eu



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 funding scheme: collaborative project
 timetable: from 3/2011 to 8/2014
 total cost: 3,929,667.00
 EC funding: 2,980,000.00



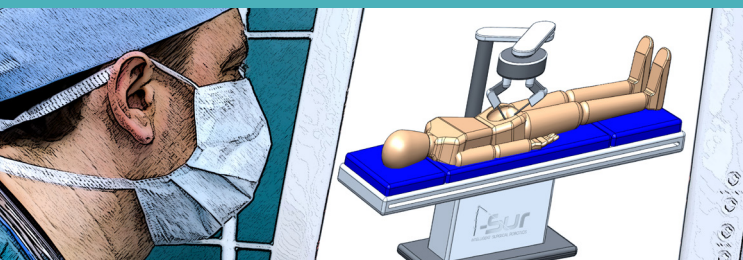
AUTOMATION IN SURGERY



THE PROJECT

Providing surgical robotics with cognitive abilities allows surgeons to focus on more critical aspects of surgical procedures.

The I-SUR project brings surgical knowledge into mathematical models, and allows surgical robots to autonomously perform simple tasks. For the first time an autonomous robot is involved in surgical actions and tested on synthetic organs. No tests are performed on humans or animals.



AUTONOMOUS ROBOTIC SYSTEM PERFORMANCES

1. Understand the surgeon's intentions
2. Plan the operation, with the surgeon's final approval before the task starts
3. Execute the operation with the supervision of a Control Architecture
4. Detect possible problems and propose solutions to the surgeon

SURGICAL TASKS

- **Puncturing in the cryoablation process:** executing critical steps of cryoablation (treatment of tumor through cycles of freezing and thawing). Our goal is to automate needle alignment and insertion medical knowledge in a formal way into a defined target along an optimal trajectory.
- **Suturing:** closing an incision in a tissue by means of a thread
- **Cutting:** incision of a synthetic abdominal wall

PROJECT OUTCOMES

1. Methods for representing the medical knowledge in a formal way
2. Algorithm for real-time calibration of organ

models

3. Methods for intervention execution and monitoring
4. Innovative sensorised robotic instruments;
5. Specific control algorithms
6. Effective communication framework between the surgeon and the robotic system

BENEFITS OF THE I-SUR APPROACH

The developed methodology leads to:

- fewer CT scans for cryoablation
- improved safety and accuracy
- reduced workload, fatigue and the risk of human error
- improved pre- and intra-operative sensing and imaging infos available to the surgeon
- anatomically realistic virtual and synthetic organ models

