Navigation and Augmented Reality

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Image Guided Computer Assisted Surgery
R&D Objectives

3D Modelling

Planning & Simulation

Pre-Op

Intraoperative AR Guidance

Intraoperative Image

Registration

Analysis

Intraoperative AR Guidance
The different steps

- Optimization of the surgical **planification** with a 3D patient specific anatomy
- Development of a program of preoperative **simulation** of patient-specific surgery
- **Navigation** during the surgical procedure by a real-time imaging (ultrasound fusion or intraoperative CT-scan) or development of augmented reality (image overlay in the operative field allowing identification of anatomical structures) with development of deformable models in real time
- And finally, the **Automation** of operative procedures
Characteristics of an ideal planning

• Virtual interaction with the model to simulate the procedure
  – Intuitive
  – Real time interaction
  – Simulate various resection choices
  – Propose anatomic resection
3D-Surg

Create New Free Glasses 3D Screen
Robotics & Visible Patient: Plug & Play

Robotized Pancreatic Surgery
Augmented Reality Guidance

Virtual 3D image + video image = Augmented Reality
Augmented Reality Guided Personalized

Filtrer les mouvements respiratoires
Pneumoperitoneum effect

deforation due to pneumoperitoneum is inhomogeneous

Large deformation of shape: not only translation
Main Project: Lasar

Intraoperative Image

Registration

SIEMENS
Intraop AR Guidance

Feature Tracking for automatic Augmented Reality
Automated Augmented Reality on soft tissue
Deformable models in real time
R&D: Hololens Surgical planning
Future: Holographic Augmented Reality
An Augmented Surgeon?

Imagine the Future…
"New Perspectives in Hepatobiliary and Pancreatic Surgery"
Advanced Course

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Conclusion

Future based on Hybrid Surgery