

## Program

---

### IFL LABOR

- 17:00-17:30 "Augmented Reality in Laparoscopic Surgery – New Concepts for Intraoperative Multimodal Imaging."  
*(Marco Feuerstein)*
- 17:30-18:00 "Multimodal Integration of Medical Ultrasound for Treatment Planning and Interventions."  
*(Wolfgang Wein)*
- 18:00-19:00 Get Together
- 19:00-end Dinner & Celebration

## Locations

---



Pavillon  
Klinikum rechts der Isar  
Ismaninger Str. 22  
Room: Hörsaal Pavillon



Interdisziplinäres Forschungslabor  
Klinikum rechts der Isar  
Ismaninger Str. 22  
Room: 01.01.3a-c (basement floor)

## Contact & Registration

---

Contact: Martina Hilla  
Tel: +49 (89) 289 17058  
email: hilla@in.tum.de



Computer Aided Medical Procedures | TUM  
Prof. Dr. Nassir Navab

CAMP is proud to present its first PhD graduates



## Dissertation Celebration of Marco Feuerstein and Wolfgang Wein

Monday, October 15th, 5pm  
Pavillon Lecture Theatre  
Klinikum rechts der Isar

<http://campar.in.tum.de/WebHome>



TUM



ARI



## ***Augmented Reality in Laparoscopic Surgery – New Concepts for Intraoperative Multimodal Imaging***

*Marco Feuerstein*

This work introduces several new concepts for the application of augmented reality techniques to laparoscopic surgery. One main idea is to utilize multiple intraoperative imaging devices for the acquisition of up-to-date patient data. Optical and electromagnetic tracking systems are applied to determine the position and orientation of both rigid (mobile C-arm, laparoscope) and flexible (laparoscopic ultrasound) imaging devices. The acquired patient data is intrinsically registered to the tracked laparoscope in one common coordinate system, so it can be directly superimposed on the images of the laparoscope camera in real time without intraoperative registration steps. This intuitive superimposition can visually assist and direct the surgeon, as hidden anatomy such as vessels or tumors below the surface of an organ are revealed.

The dissertation bases its validation on many experiments, including animal experiments, performed in close partnership with several surgeons.



## ***Multimodal Integration of Medical Ultrasound for Treatment Planning and Interventions***

*Wolfgang Wein*

The core of this thesis is the development of novel methods for fully automatic alignment (i.e. registration) of 3D freehand ultrasound and CT data, based on the image content and the physical properties of both modalities.

In particular, a new method is proposed which simultaneously optimizes the linear combination of different ultrasonic effects simulated from CT, and the parameters for spatial alignment. This original concept allows local as well as global optimization of the simulation parameters, resulting in optimal registration of any modalities, where usual registration solutions do not succeed and explicit simulation of complex effects are necessary.

Furthermore, we introduce new techniques for 3D freehand ultrasound calibration and reconstruction, as well as visualization of fused CT and ultrasound data.

