University of Basel
Department of
Biomedical Engineering

Selected research topics in Biomedical Engineering:
Robot- & Computer-Assisted Surgery

Location: DBE, Hegenheimermattweg 167B, Lecture Hall 02.097
Date & Time: Wednesday 27.09.2023 14:15 – 15:00

Deploying AI Methods for Safe Laparoscopic Cholecystectomy

Prof. Nicolas Padoy

University of Strasbourg & IHU Strasbourg, France

Abstract

In this talk, I will present the concept of a Surgical Control Tower that makes use of intra-operative data to detect, analyze and support the surgical activities in the operating room. I will then focus on a specific clinical application: monitoring the critical view of safety, a safety manoeuvre for laparoscopic cholecystectomy procedures recommended by all surgical societies. I will first present the clinical need, and our approach to formalize the problem in a framework suitable for artificial intelligence. I will then describe how modern computer vision methods can be used to recognize the anatomy in laparoscopic videos, automatically assess the performance of this critical step, and perform objective documentation. Finally, I will present recent work showing how self-supervision and federated learning can be used to make the approach generalizable, as needed for deployment in multiple operating rooms.

Biosketch

Nicolas Padoy is Professor of Computer Science at the University of Strasbourg and Scientific Director at IHU Strasbourg. He leads the research group CAMMA on Computational Analysis and Modeling of Medical Activities, which focuses on computer vision, activity recognition, artificial intelligence and the applications thereof to surgical workflow analysis and human-machine cooperation during surgery. Nicolas Padoy graduated with a Maîtrise in Computer Science from the Ecole Normale Supérieure de Lyon in 2003 and with a Diploma in Computer Science from the Technische Universität München (TUM), Munich, in 2005. He completed his PhD jointly between the Chair for Computer Aided Medical Procedures at TUM and the INRIA group MAGRIT in Nancy. Subsequently, he was a postdoctoral researcher and later an Assistant Research Professor in the Laboratory for Computational Interactions and Robotics at the Johns Hopkins University, USA. In 2020, Nicolas Padoy was awarded a national AI Chair by the Agence Nationale de la Recherche (ANR) for his project AI4ORSafety. In 2023, he was awarded a European ERC Consolidator Grant for his project CompSURG. He is currently General Chair of the international conference on Information Processing in Computer-Assisted Interventions (IPCAI).

http://camma.u-strasbg.fr