Upcoming oberseminars

The seminar takes place continuously (also during the semester break). In order to arrange a talk, please register through our Oberseminar registration form. This can only be done by the project supervisors.

Location: MI 03.13.010 (Seminar Room)

Mobile view: If you are having trouble seeing the schedule on your phone screen, please switch to the desktop version using the button on the top left corner.

	Presentation	Discussion
Kick-offs	10 min	5 min
Finals	20 min	10 min

Schedule:

Date	Time	Student	Title	Type	Supervisor
08.Nov (Fr)	10:30	Paolo Notaro	Radar Pulse Sequence Classification with Deep Learning	MA Final	Magda Paschali
08.Nov (Fr)	11:00	Stefano Gasperini	Deinterleaving and Clustering of RF Signals	MA Final	Magda Paschali
13.Dez (Fr)	10:30	Claudio Benedetti	Deep Learning Based Medical Tool Detection for the Use on a Head-Mounted-Display	IDP Final	Alexander Winkler

Detailed information about the above presentations:

Date & Time	08.November 2019 -- 10:30
Title	Radar Pulse Sequence Classification with Deep Learning
Student	Paolo Notaro
Type	MA Final
Supervisor	Magda Paschali
Director	Nassir Navab
Abstract	Radar emitter classification is a well-established problem in the domain of Electronic Support Measures (ESM). It has been tackled in the past through the use of rule-based systems, and more recently with the use of data-driven approaches, like machine learning. This work proposes to apply modern Deep Learning solutions for sequence labelling and classification to the ESM domain, aims at investigating which approach produces the best results in terms of prediction accuracy, and focuses on robustness, in relation to possibly missing information and as a protection against adversarial attacks.

Date & Time	08.November 2019 -- 11:00
Title	Deinterleaving and Clustering of RF Signals
Student	Stefano Gasperini
Type	MA Final
Supervisor	Magda Paschali
Director	Nassir Navab
Abstract	This master thesis aims to separate the pulsed signals in real-time with deep learning techniques, and replace traditional methods. We will explore a mixture of spectrogram analysis through image segmentation and deep-learning-based clustering and compare it with traditional clustering techniques like DBSCAN.

Date & Time	13.Dezember 2019 -- 10:30
Title	Deep Learning Based Medical Tool Detection for the Use on a Head-Mounted-Display
Student	Claudio Benedetti
Type	IDP Final
Supervisor	Alexander Winkler
Additional supervisors	Philipp Stefan, Hooman Esfandiari
Director	Nassir Navab
Abstract	Traditionally for medical education and training, the apprenticeship model "See One, Do One, Teach One" guaranteed mastery in the healthcare profession through an adequate exposure to a broad range of cases. Due to several working-hour restrictions, surgery has seen training opportunities in the field continuously decreasing while the complexity of interventions is continuously increasing. This discrepancy has led to the development of simulated training environments from cadavers and synthetic models to computer-based simulators. However, trainees progressing from computer-based simulation to cadaver trainings and ultimately patient treatment face a steep learning curve and need methodologies that facilitate this transition. There is a body of work targeting the use of Virtual and Augmented Reality (VR/AR) for training of healthcare professionals. Most of them are however aimed at the physicians who perform arguably the most critical part of the procedure, are however strongly dependent on the other staff in the operating room as well: Scrub nurses, also called perioperative nurses who support the surgeon while also maintaining patient safety. Scrub nurses are a major role in the success of surgery as they conduct a large number of tasks, including ensuring the operating room is ready to be set up, preparing the instruments and equipment needed for the surgery, selecting and passing instruments to the surgeon, counting all instruments, sponges and other tools and transporting the patient to the recovery area. Because scrub nurses are so vital to surgical procedures, they may work long hours. They must also have excellent communication skills, because one of their primary duties is working with the surgeon and assisting her with anything she needs during the operation. A large part of the learning critical to being an experienced scrub nurse is knowledge about the specific workflow of specific procedures, the tools for a specific procedure and when which tools are needed. AR Head-Mounted-Displays (HMDs) are semitransparent displays devices, worn on the head in front of the users' eyes superimposing virtual objects on the real world (optical see through). HMDs for AR applications have been around since the 1960s. With bulkiness and a high price tag, their use was however limited to laboratory settings for the longest part of their existence. With the advent of the current generation of HMDs that target the consumer and gaming market, their price has considerably dropped and usability and overall quality has improved. The goal of this interdisciplinary project, is to create an HMD application assisting a scrub nurse. As a first step such a system could be used for training of the nurse, but could ultimately also be transferred into clinical use. For the tasks of the nurse handing specific tools to the surgeon in specific steps in the workflow in the operating room, the main goal of this IDP is the development and integration of an object detection feature into an off the shelf HMD, so that the nurse can pass the correct tool to the surgeon. The special technical challenge in this instance of the problem is a general challenge of AR: Computational speed on a computationally limited platform. There is an abundance of object detection algorithms based on Deep Learning available, however they usually rely on powerful compute hardware, which is expensive, large and has a high power consumption which all are features which prohibit the use in an HMD. On the other hand light weight DL techniques exhibit detection rates, too low for use in healthcare. In this project we propose a hybrid approach, to use the HMD as an in- and output device, however stream data in real time to a powerful workstation, that can perform the detection task. There are currently several medical training, planning, guidance and assistance systems being developed at Prof. Dr. Navab's NARVIS lab. As a proof of concept one of them should be integrated in the HMD application to evaluate and demonstrate its benefits. In this lab the student is also provided access to HMDs as well as a workstation for the machine learning tasks.