Guest Lecture Series SS 2025 – Embracing knowledge with the World-TWIN-Project

Please register here for your virtual participation:

Students: https://thws.moveon4.de/form/669e6029cdfa8dbaf20a789b/eng

Staff: https://thws.moveon4.de/form/67e10b228c72dffbbc02c9d5/eng

Prof. Alexander Nemecek, FHWN, Wiener Neustadt/Austria

Modern Automation Using Industrial Robots

How do you program an industrial robot? What movements can it perform, and how can collisions be avoided? We will create a 3D simulation of the virtual robot using a software tool and automate a pick-and-place task. This example application of an industrial robot can be used to further analyze current challenges of modern automation.

When? 22nd May 2025, 13.30 – 15h

Where? 9.E.24, Konrad-Geiger-Campus, Schweinfurt in hybrid presentation

Prof. Muhammad Ahsan Naeem, UET, Lahore/Pakistan

Robot Programming in Augmented Reality

Part I: Introduction to Unity3D

In this lecture, participants will be introduced to the fundamentals of Augmented Reality (AR) and the core development platform, Unity3D. Students will begin by creating a simple 3D game to gain hands-on experience with Unity3D. Key concepts covered will include GameObjects,

basic scripting, colliders, physics, the input system, user interface (UI) elements, and other foundational tools essential for AR development.

When? 12th June 2025, 13.30 – 15h

Where? 9.E.24, Konrad-Geiger-Campus, Schweinfurt in hybrid presentation

Part II: Augmented Reality and Robot Programming

This session will focus on integrating Augmented Reality with robotic simulations. Students will explore various AR frameworks compatible with Unity3D, with a particular focus on Google ARCore and its Ground Plane Detection feature. By the end of the lecture, students will develop a basic AR application that creates and programs robotic links in an interactive AR environment.

When? 26th June 2025, 13.30 – 15h

Where? 9.E.24, Konrad-Geiger-Campus, Schweinfurt in hybrid presentation

Prof. Ali Raza, UET, Lahore/Pakistan

Mechatronic Bio-mimicking Simulator Platform for Cardio-Pulmonary Resuscitation

Our recent work at the Ihya Lab of Bio-Mechatronics and Resuscitation Research, at the University of Engineering and Technology Lahore, addresses the limitations of current automated CPR devices, which haven't shown significant improvements over manual techniques and whose combined effectiveness remains largely unknown. To tackle this, we've developed a novel mechatronic bio-mimicking simulator featuring a fluid-filled elastomeric circulatory system and a programmable actuation system. This platform allows us to rigorously test various traditional and innovative CPR compression sequences, adjusting force, speed, and timing.

Our initial experiments evaluating configurations mimicking existing devices like LUCAS, Autopulse, and Lifestick provided baseline performance metrics. Interestingly, a novel compression strategy involving sustained abdominal compression followed by thoracic compression and a collective release demonstrated significantly higher mean aortic pressures, suggesting a potential for improved outcomes. This leads us to propose a venous-backflow hypothesis to better understand CPR hemodynamics and guide future interventions. We've also

developed a comprehensive computational model of the cardiovascular system in Simscape to simulate cardiac arrest and optimize CPR protocols. Our simulations have identified CPR strategies that significantly enhance cardiac output. To foster collaboration and transparency, this cardiovascular model has been made open-source, and our findings have informed the design of innovative CPR devices. Together, these in-vitro and in-silico approaches offer a powerful pathway to discover and refine CPR techniques with the ultimate goal of improving resuscitation outcomes.

When? 3rd July 2025, 13.30 – 15h

Where? 9.E.24, Konrad-Geiger-Campus, Schweinfurt in hybrid presentation