

# DEEP FRIDAYS

Seminars and meetings with D.L. researchers from academia and industries

## Autumn Session 2022: applications in industrial and scientific research

Organizer: Prof. **Andrea Asperti**

**When:** all Fridays at 16.15 p.m.

**Where:** Aula Ercolani 1, via Mura Anteo Zamboni 2B and on line, via Teams

**Participants:** **eSteps, Marcegaglia SpA, HPC Cineca, MerMec Engineering, NuS-TAR Infrastructure Team.**

## Calendar

November 11 2022

**affiliation:** **Marcegaglia Ravenna SpA**

**title:** Digital Steel Projects in Marcegaglia Ravenna

**abstract:** The product and process development for the automotive sector is mandatory and needs sophisticated mathematical models in order to achieve a metallurgically based design of the process conditions. The new frontier, opened only few years ago, in the development of advanced steel grades is represented by the digital integration of different processes via a sophisticated combination of predictive mathematical models and advanced monitoring devices (Industry 4.0 concept). In this talk, we present a few projects launched at different Marcegaglia plants during the last 4 years aiming to fully digitalize/integrate many processes, from hot rolling, pickling, cold rolling down to galvanizing.

**speaker:** **Stefano Orselli.** Quality Department Marcegaglia Ravenna SpA. Expert in electrical engineering and automation; since 1995 in Marcegaglia with involvement in laboratory, process data analysis and participation in research and development projects.

November 18 2021

**affiliation:** **eSteps**

**title:** eSteps insoles: smart, high-tech and environmentally sustainable devices as a monitoring solution for patients with Multiple Sclerosis

**abstract:** Human daily activity recognition using mobile personal sensing technology plays a central role in the field of pervasive healthcare. The company eSteps deals with the increasing motor disability of the lower limbs, proposing pre-, during and post-hospitalisation monitoring solutions with biomechanics and telerehabilitation protocol. It has developed a smart, customised, and sustainable device to monitor motor activity, fatigue, and injury risk for patients. And through a special app, it is possible to share data with the trainer and medical specialist. The aim is to develop a prediction network that recognizes human activities thanks to devices from eSteps company applied on healthy people and then tested on people with Multiple Sclerosis.

**speakers:**

**Nidhal Louhichi.** CEO di eSteps e Ingegnere Biomedico.

**Zarina Ursino.** AI researcher in eSteps. Graduated in Computer Engineering with full marks at the University of Catania; pursuing the Master degree in AI at the University of Bologna. Polyglot: I have a double Italian-French diploma and several English Cambridge' certifications, I speak creole and I understand Hindi. Tutor: Because of my love for languages, and also for teaching, I have been giving private lessons for almost 10 years.

**November 25 2022 (starting at 16:30)**

**affiliation:** **HPC Cineca**

**title:** Cineca: Supercomputing For The Age Of Artificial Intelligence

**abstract:** Computing resources are an important asset for training and deploying Machine and Deep Learning models. Cineca is a major international player in High Performance Computing (HPC) and has a continuative presence in the top500 list of the of the fastest supercomputers in the world.

In the first part, the seminar will explain Cineca's infrastructure for data science and how to access it. The focus will be on GPU-equipped supercomputers, the current Marconi100 and the soon-to-open Leonardo, and the related software for AI.

The second part of the seminar will be devoted in examining different case studies in the field of Artificial Intelligent where the Cineca Data Analytics team has directly collaborated in several fields such as: predictive maintenance, natural language processing, recommendation system, climate analysis and application of AI for the digital humanities.

**speaker:** **Giorgio Pedrazzi** Giorgio Pedrazzi currently works as a Data Scientist at Cineca in the HPC High Performance Computing department. His main areas of interest are data analytics, machine learning and deep learning. As part of the HPC department he collaborates on several European projects such as AIDA (Artificial Intelligence Data Analysis) for the analysis of helium-physical data and EU-HUBS4DATA for the creation of a federation of Data Innovation HUBs to provide services to small and medium-sized enterprises, start-ups and web entrepreneurs. In 1995 he received his Ph.D. in Statistical Methodology for Scientific Research from the Faculty of Statistical Sciences, University of Bologna. He coordinates the Big Data Laboratory module in the Bologna Business School (BBS) Master in Data Science and Business Analytics.

December 2 2022

**affiliation:** **Mermec Engineering**

**title:** SPaCe Project - Timely insights from public transport

**abstract:** The coordination and the integration of various components of urban mobility are fundamental elements to make cities increasingly on a human scale and at the same time contribute to the ecological transition of our future society. In fact, with a view to a more sustainable society, it is necessary to take into consideration the issue of coordinating public transport to reduce transport waste.

A public transport service capable of involving collective and individual vehicles and able to provide the passenger with all the information, timely and in real time, on the means to be used to reach the desired place, would lead to having our cities with few people on board of private vehicles compared to the number of public transport users.

MerMec Engineering is addressing the problem with the use of artificial intelligence systems to provide ongoing insights on the use and the deploy of the entire public transport fleet.

**speakers:**

**Simone Nardi:** Graduated with honors in Mathematics at the University of Pisa in 2007, he holds a PhD in applied mathematics in collaboration with the Centro Piaggio and the Department of Computer Engineering of the University of Pisa. He has been in the aerospace industry since 2008 and has experience in developing CAD and GIS applications. He has designed distributed control algorithms for managing heterogeneous and autonomous vehicle swarms. He has long experience in drafting technical proposals and offers for both national and European funded projects. He was a member of the NATO NIAG SG-205 Group for the feasibility analysis and certification for the flight of unmanned aircraft in non-segregated airspace. He is the author and co-author of various scientific articles in international journals. Its current activities concern the field of computer vision, with the application of machine/deep learning techniques to the analysis of images and video streams.

**Davide Castagni Fabbri:** PhD in theoretical physics from the University of Turin and research fellow at KU Leuven (Belgium), he graduated in Physics in 1997 at the University of Pisa as a student of the Scuola Normale Superiore. In his twenty years of experience in the aerospace/defense industry, and as leader of an R&D department, he has been responsible for the entire life cycle of CAD/CAE components and software products in the fields of electromagnetic simulation (EMC/EMI , simulation of the radar cross section and infrared signature) and air navigation (flight procedure design, flyability, GNSS availability and integrity analysis, by simulation of signal propagation, interference, multipath and calculation of RAIM FD/FDE ). More recently he has been involved in the development of autonomous driving capabilities of unmanned vehicles and vessels (UAVs, UGVs and USVs), and the design of data fusion algorithms of heterogeneous sensors, both in support of the autonomous navigation logics of drones, and for geolocation purposes in railway applications, as well as for satellite antenna pointing systems.

December 9 2022

**affiliation:** GSI Helmholtzzentrum für Schwerionenforschung

**title:** DESPEC experiments at GSI and FAIR

**abstract:** The DESPEC experiment is part of the NUSTAR (NUclear STructure, Astrophysics and Reactions) collaboration, which represents one of the four pillars that comprise the scientific program for the FAIR accelerator facility currently under construction in Darmstadt, Germany. The DESPEC setup is a complex detector suite comprising multiple detector technologies wherein exotic ions are implanted and subsequent decay radiation is detected, yielding information about the underlying nuclear structure. This talk will provide an overview of the physics goals and experimental setup, as well as first results from a new program to apply machine-learning methods to improve detector performance and enhance the DESPEC data analysis framework that began in 2021.

**speaker:** **Helena Albers** Scientific Staff at GSI, Germany. After completing her PhD at the University of Edinburgh in 2013, she spent two years doing post-doctoral research in the Physics Division at the Argonne National Lab before joining the Superheavy-Element Chemistry group at GSI in Darmstadt, Germany, in 2015. In 2019, she moved to the Nuclear Spectroscopy group as a Staff Scientist, where she is an active member of the HISPEC/DESPEC Collaboration and is heavily involved in the technical coordination of NUSTAR experiments at the future FAIR facility. Her research interests are centered around studying the nuclear structure of exotic nuclei far from stability, and in the application of Artificial Intelligence and machine-learning methods to nuclear physics experiments.