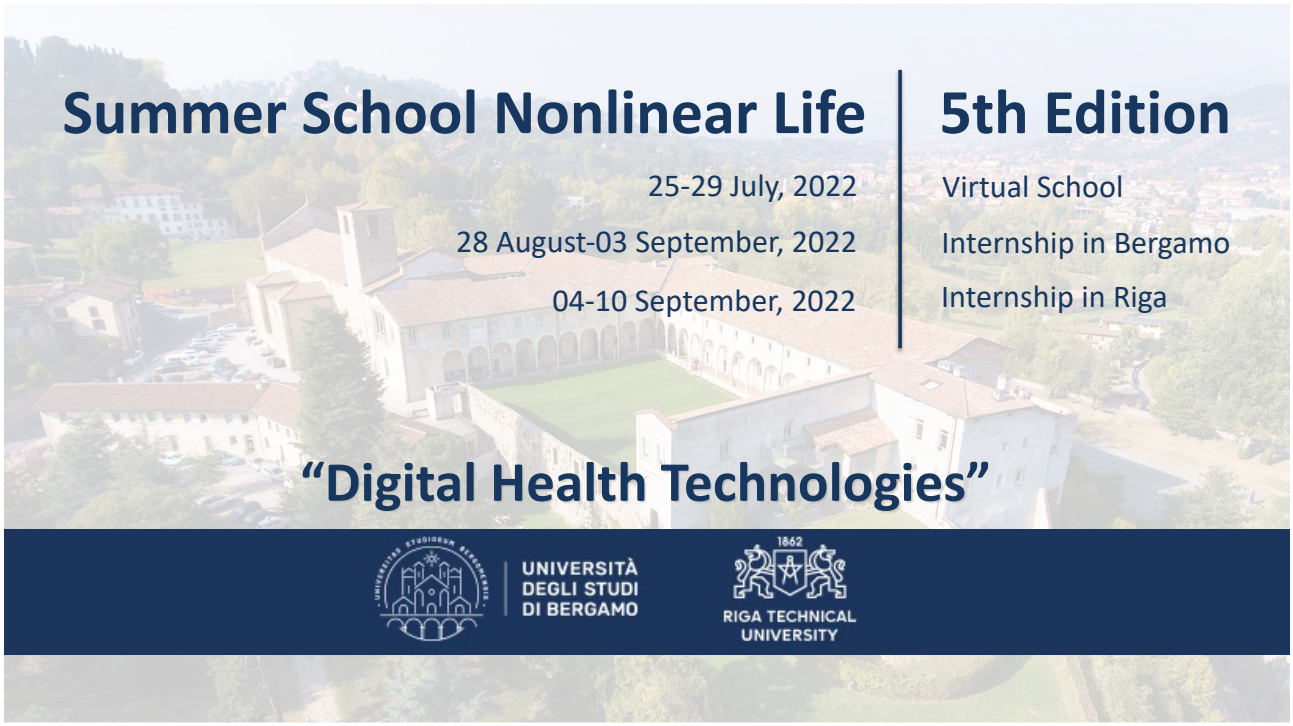

Topics and faculty of the virtual school | 25-29 July, 2022

The **virtual school** will focus on two macro-themes:

- New electronic devices for health, wearable sensors and IoT systems for diagnosis and care (Coordinator: Prof. Gianluca Traversi, University of Bergamo)
- New digital solutions for 3D acquisition, modelling and simulation of the human body to improve patient's assessment and rehabilitation (Coordinator: Prof. Daniele Regazzoni, University of Bergamo)

The list of confirmed contributions per macro-theme, which is subject to further extensions in the weeks to come, is provided below. A half-day of the virtual school will be devoted to a workshop held by PhD candidates and post-doc research fellows presenting and discussing their research topics.

New electronic devices for health, wearable sensors and IoT systems for diagnosis and care

The lectures focus on new electronic systems for health.

1. Embedded systems development and design (Elisa Riceputi, Department of Engineering and Applied Sciences, University of Bergamo, Italy)
2. Machine Learning in multispectral diagnostics of skin diseases (Katrina Boločko, Dmitrijs Bļizņuks, Faculty of Computer Science and Information Technology, Riga Technical University, Latvia)
3. Novel wearable sensor systems for cardiovascular monitoring (Gianluca Traversi, Department of Engineering and Applied Sciences, University of Bergamo, Italy)
4. Hardware and software development platforms for embedded IoT applications with AI at the edge (Roberto Sannino, STMicroelectronics, Italy)
5. Bosch sensing solution: the enabler for customer electronics and IoT applications, (Oliver Kohn, Marco Favaretto, Bosch Sensortec, Italy)
6. Smart devices for fitness and healthcare: a system design and embedded signal processing perspective (Daniele Comotti, 221e, Italy)
7. Biomedical signal processing for wearable cardiorespiratory monitoring (Jesús Lázaro, Department of Computer Science and Systems Engineering, University of Zaragoza, Spain)
8. Automated blood glucose regulation: the artificial pancreas (Antonio Ferramosca, Department of Management, Information and Production Engineering, University of Bergamo, Italy)
9. Sol-gel technique: new opportunities for developing textiles for healthcare and medical applications (Giuseppe Rosace, Department of Engineering and Applied Sciences, University of Bergamo, Italy)
10. Introduction to radioactivity: interaction of radiation with matter and biological effects (Ilaria Vai, Department of Engineering and Applied Sciences, University of Bergamo, Italy)
11. Application of particle detectors in dosimetry (Ilaria Vai, Department of Engineering and Applied Sciences, University of Bergamo, Italy)
12. Nanodosimetry: necessity and experimental approaches (Yuri Dekhtyar, Institute of Biomedical Engineering and Nanotechnologies, Faculty of Mechanical Engineering, Transport and Aeronautics, Riga Technical University, Latvia)

New digital solutions for 3D acquisition, modelling and simulation of the human body to improve patient's assessment and rehabilitation

The lectures focus on human modelling, morphology and movement acquisition, virtual/augmented reality, and additive manufacturing techniques to foster patient's assessment and rehabilitation with digital solutions.

1. 3D scanning of the human body: from the acquisition of the morphology of human districts to the creation of interactive 3D models (Andrea Vitali, Department of Management, Information and Production Engineering, University of Bergamo, Italy)
2. Digital human modelling: evolution of the models, fields of application and future challenges (Daniele Regazzoni, Department of Management, Information and Production Engineering, University of Bergamo, Italy)
3. Motion capture: challenges and limitations of human body tracking for medical and rehabilitation purposes (Daniele Regazzoni, Department of Management, Information and Production Engineering, University of Bergamo, Italy)
4. Application of augmented reality in medicine and surgery (Lucio De Paolis, Department of Innovation Engineering, University of Salento, Italy)
5. Digital solutions for smart rehabilitation. Methods, tools and technologies driving the evolution of (tele)rehabilitation practices: case studies and practical examples (Andrea Vitali, Department of Management, Information and Production Engineering, University of Bergamo, Italy)
6. Smart textile for gamification in medicine (Alexei Katashev, Institute of Biomedical Engineering and Nanotechnologies, Faculty of Mechanical Engineering, Transport and Aeronautics, Riga Technical University, Latvia)
7. Gamification and sportification in medical rehabilitation practices. Serious games are playing an increasing role: how to create them? (Andrea Vitali, Department of Management, Information and Production Engineering, University of Bergamo, Italy)
8. Additive technologies and new materials (Sergio Lorenzi, Department of Engineering and Applied Sciences, University of Bergamo, Italy)

Doctoral and post-doc workshop

1. From diagnostic images (DICOM) to the design of custom patient-fit prosthesis: Total Knee Arthroplasty, challenges and limitations (Anna Ghidotti, Department of Management, Information and Production Engineering, University of Bergamo, Italy)
2. Shape memory polymers and 4D printing for pharmaceutical applications (Nicoletta Inverardi, Department of Mechanical and Industrial Engineering, University of Brescia, Italy)
3. Virtual reality for neuro-rehabilitation: interaction with virtual worlds to assess and improve patient's condition (Daniel Lanzoni, Department of Management, Information and Production Engineering, University of Bergamo, Italy)
4. Additive manufacturing for the realization of hybrid scaffolds for tissue engineering (Chiara Pasini, Department of Mechanical and Industrial Engineering, University of Brescia, Italy)