University of Stuttgart
Institute for Modelling and Simulation
of Biomechanical Systems

UniGe
DINOGMI

NEUREHAB

Summer School at University Campus of Savona

July 25th-29th, 2022

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www.neurehab.unige.net

SUMMER SCHOOL

The NeuRehab Summer School will be held from July 25th to July 29th, 2022 at the University Campus of Savona (University of Genova), in a small town with a rich history and a sandy beach providing the backdrop for an exciting and stimulating scientific program.

It will be open to Bachelor, Master and PhD students from all over Europe (limited to 38 selected participants) and it will take place with a full-day program over 5 days.

In the mornings, theoretical classes on human neuromechanics, signal processing, neuromusculoskeletal modelling, clinical evaluation and rehabilitation will be held by representatives of USTUTT and UniGe and selected international experts. The contents from the morning sessions will be consolidated through hands-on activities in the afternoon. Students will be divided in smaller groups and assigned practical exercises. The program will comprise networking, social activities and a roundtable.

REGISTRATION INFO

To participate in the Summer school, you must register on the website **www.neurehab.unige.net**

- Early bird registration: from May 20th until June 20th 2022.
  Free accommodation for the first 20 participants who will enroll.
- Regular registration: from June 21th until July 15th 2022.

The summer school enrollment includes:

- accommodation (4 nights): double room with shared bathroom within the University Campus of Savona. **Only for the first 20 participants.**
- breakfast at the University Campus bar.
- lunch at the University Canteen.
- welcome kit.
- get together activities.

NEUREHAB PROJECT

Fundamental challenge of an ageing society is maintaining its members active and independent. Strategic milestones for succeeding in this task, are sustainable programs of physical activity, and an effective policy of short and long-term rehabilitation. If properly used, those translate into longer, healthier, and happier lives, and reduce health-associated costs for individuals and the society. A punctual evaluation of the efficacy of those policies is however difficult, with the holistic instruments of rehabilitation, and a more systematic approach is necessary.

Mathematical modelling is widely used in domains such as physics,construction and mechanical engineering, economics and social sciences. In the last decades, new models emerged that faithfully describe human neuromechanics (neurophysiology and biomechanics), revealing unprecedented opportunities for understanding the basic functions of the human body and how those can benefit from external interventions.

The project focuses on applying the knowledge of human neuromechanics and rigor of mathematical modelling to improve the outcomes of rehabilitation and promote a healthier lifestyle in an ageing population.

The NeuRehab project leverages on the 7th goal of the University of Stuttgart "Emphatic commitment to sustainable development", and the new born initiative "Campus green" of the University of Genova. Both initiatives aim at promoting sustainability and efficiency in their respective campuses and place a strong accent on physical activity.

PRELIMINARY PROGRAM

JULY 25TH, 2022

9.30-12.45 am
open registration

2.30 pm
welcome

3 pm
lectio magistralis, **Prof. Dario Farina**

4 pm
lectio magistralis, **Prof. Oliver Röhrle**

5 pm
visit at the Control room Smart Grid

7pm
get together activities

JULY 26TH, 2022

9 am
keynote lecture **"Lighting up the black box of the human motor system by deconvolution of EMG and force signals"**, **Prof. Francesco Negro**

10 am
keynote lecture **"Motor adaptations principles and potential use in rehabilitation"**, **Prof. Giacomo Severini**

10.45 am
keynote lecture **"Building up bionic limbs:high-fidelity human-machine interaction"**, **Prof. Ivan Vujaklija**

11.30 am
break

11.45 am
lecture **"Motor Control: Applications in Neurorehabilitation"**,
Prof. Daniele Piscitelli

12.15 am
lecture **"Interfacing spinal motor neurons via high-density recordings from muscles"**, **Prof. Silvia Muceli**

12.45 am
participant presentations

1.15 pm
lunch

2.30 pm
free time

5 pm
hands on workshops on surface electromyography

7 pm
closing

JULY 27TH, 2022

9 am
keynote lecture **"Current technologies and future perspectives for analysis of movement qualities"**, **Prof. Gualtiero Volpe**

10 am
keynote lecture **"Arthrokinematic Analysis, from quantity to quality"**, **Prof. Erik Cattrysse**

10.45 am
keynote lecture **"Computational models for motor learning"**, **Prof. Adriano Capirchio**

11.30 am
break

11.45 am
lecture **"Markerless motion analisys in assisted living"**, **Prof. Francesca Odone** and **Prof. Nicoletta Noceti**

12.15 am
lecture **"Parkinson disease. Assessment, Monitoring and treatment supported by motion analysis"**, **Prof. Elisa Pelosin**

12.45 am
participant presentations

1.15 pm
lunch

2.30 pm
free time

5 pm
hands on workshops on movement analysis

7 pm
closing

JULY 28TH, 2022

9 am
keynote lecture **"The augmented world"**, **Prof. Manuela Chessa**

10 am
keynote lecture **"Virtual & Extended Reality for Clinical Setting in the Metaverse Era"**, **Prof. Gianni Vercelli**

10.45 am
keynote lecture **"The psychology of the virtual body"**, **Prof. Alberto Gallace**

11.30 am
break

11.45 am
lecture **"Virtual Reality in Neurorehabilitation"**, **Prof. Andrea Turolla**

12.15 am
lecture **"Virtual reality: From mechanisms to therapeutic applications"**, **Prof. Luana Colloca**

12.45 am
participant presentations

1.15 pm
lunch

2.30 pm
free time

5 pm
hands on workshops on immersive virtual reality

7 pm
closing

JULY 29TH, 2022

Round table: the importance of Research Data Management in Neuromechanics

Research data, as well as research methods, are necessary for the reproducibility of biomedical studies. This field is attracting an increasingly high attention in the last years, with some fields (like biochemistry) where the community has converged towards interoperable mark-up languages that promote the effective exchange of raw data, models and results. However, no consensus has been found on how to represent neuromechanical data nor a standard is present that allows different groups to exchange data, metadata and algorithms. This round table aims at collecting the impressions of world-leading experts in the field of human neuromechanics, to move the first steps towards a common data (and metadata) format. Emphasis will be placed in creating a sustainable model for the collection of health, exercise and recovery data, and in generating a taxonomy of performance indicators for the effects of the interventions.

9.30 am
opening **Dr. Leonardo Gizzi**

10 am
"The EnzymeML toolbox: F.A.I.R. management and modelling of enzymatic data", **Prof. Jürgen Pleiss**

10.30 am
short communications from the participants

11.10 am
"The importance of Research Data Management in Neuromechanics: current status, caveats and future steps", **Dr. Leonardo Gizzi**

11.30 am
round table with open discussion

12.45 am
closing

NeuRehab Summer School is a project realized by University of Stuttgart (USTUTT) in collaboration with University of Genova (UniGe)

Universität Stuttgart
Institute for Modelling and Simulation of Biomechanical Systems

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