

# CS PhD Seminar Series

Apr 7th

| 14:30-15:30

| Room 214

## Gait Analysis for Medical Assessment: Visualization Functionalities for Medical Doctors

Human gait analysis is widely used in clinical assessment, rehabilitation, and the diagnosis of neurological and musculoskeletal disorders. However, traditional marker-based systems are expensive, require specialized environments, and are difficult to scale in routine clinical practice. Recent advances in computer vision enable marker-less motion analysis from simple RGB video. In this seminar, I present a vision-based approach to gait analysis with a focus on visualization functionalities designed for medical doctors. The proposed tools highlight key gait characteristics, such as joint motion, temporal dynamics, and asymmetries, providing intuitive and clinically relevant representations of patient movement. This work is also motivated by ongoing collaboration with Ospedale Policlinico San Martino, aiming to support clinical interpretation without requiring technical expertise, while remaining easy to use.



Speaker: [Xiaolin Xing](#)

Xiaolin Xing is a Ph.D. student in Computer Science at the University of Genoa. She obtained her M.S. degree in Data Science from the University of Aberdeen, UK, in 2023. Her research focuses on monocular 3D human pose estimation for human motion analysis, as well as 3D generation and 3D reconstruction, with a particular interest in clinically relevant applications. Her work lies at the intersection of computer vision and machine learning. She is currently a member of the MaLGA Lab, where she is supervised by Prof. Francesca Odone and Prof. Matteo Moro.

## Toward Architectural Foundations for Runtime Verification in Real-Time Programmable Logic Controllers

Runtime verification (RV) enables checking formal properties during system execution. While the approach is well established in many software domains, its application to safety-critical industrial control systems raises distinctive challenges. Programmable Logic Controllers (PLCs), which form the backbone of industrial automation, operate under strict real-time constraints and deterministic, scan-based execution, making careful consideration necessary when introducing runtime monitoring. This seminar examines the use of runtime verification in PLC-based systems and discusses the architectural and semantic issues that arise in this context. In particular, it considers how real-time execution constraints influence both the integration of monitors and the formulation of execution-level properties. The talk also surveys representative classes of properties that emerge in industrial control contexts, such as bounded response guarantees, restart constraints, liveness conditions, and integrity checks over sensor-actuator behaviour. These examples illustrate how runtime verification must be adapted to the realities of cyclic real-time control systems and motivate ongoing research in this direction.

Speaker: [Hisham Unniyankal](#)

Hisham Unniyankal is a PhD student in Computer Science at the University of Genoa, supervised by Prof. Davide Ancona, Prof. Angelo Ferrando, and Fabio Parodi. His research focuses on runtime verification for safety-critical Programmable Logic Controller (PLC) systems as part of an industrial PhD program in collaboration with Technoleader Srl and COBO S.p.a. He holds a master's degree in computer science from the University of Genoa. He also has professional experience as a software engineer in big data systems. His academic interests span runtime verification, artificial intelligence, and their integration into reliable industrial automation systems

