CS PhD Seminar Series

Nov 11th | 14:30-15:30 | Room 214

Satellite Positioning for Motion Capture: Inspiration and Limitation

Currently research teams all over the world are struggling with the problem of taking human motion capture outside of the lab. Laboratory setups with reflective markers have become the classic approach and gold standard, but extensive evidence suggests that human movements in laboratory settings can differ significantly from those in real-world environments. This observation is critical in the fields of rehabilitation, health, and sports science. Therefore, extensive work is being done on motion capture in real-world environments using approaches based primarily on inertial sensors or markerless computer vision systems based on machine learning. We are exploring a different approach based on advanced satellite positioning technologies. Such techniques allow centimeter-level positioning and have absolute temporal and spatial referencing. However, the underlying technology is complex and has a number of serious limitations that must be overcome before it can be used in real-world applications.

Speaker: **George Kurshakov**

Georgii Kurshakov is a third-year PhD student in Computer Science at University of Genoa. He holds a Bachelor's degree in Mechatronics and Robotics from St. Petersburg Polytechnic University, Russia, and a double Master's degree in Robotics from University of Genoa and Keio University, Japan. He currently works in collaboration with a company Gter under supervision of Vittorio Sanguineti and Giorgio Delzanno. His research focus is application of satellite positioning and inertial measurement units to human movement analysis. He also works as a teaching assistant in robotics courses.

Olfactory Navigation - A Case Study for Model-Based Reinforcement Learning

Olfactory navigation is a fundamental challenge faced by many organisms in nature. For example, dogs use it to locate food, and moths use it to find mates. This search problem can be formulated as a reinforcement learning task. In this work, we focus on model-based approaches, assuming that agents possess an internal representation of how odor cues propagate within their environment. We formalize the task as a Partially Observable Markov Decision Process (POMDP) to derive effective navigation policies under uncertainty. Our ongoing research investigates animal behavior (e.g., dogs, sea robins) and explores reinforcement learning methods applied to bio-inspired navigation strategies. We also investigate a novel POMDP formulation for olfactory navigation based on spatial tiling, which has yielded promising preliminary results.

Speaker: **Arnaud Ruymaekers**

Arnaud Ruymaekers is a second-year PhD student in Computer Science at the University of Genova. He holds a Bachelor's degree in Data Science and Knowledge Engineering from Maastricht University and a Master's degree in Data Science and Artificial Intelligence from the University of Genova. For his Master's thesis, he explored olfactory navigation within the PiMLB unit of the MaLGa Center under the supervision of Prof. Agnese Seminara and Prof. Alessandro Verri. He now continues this research with a focus on model-based reinforcement learning techniques.