

CS PhD Seminar Series

October 27th

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14:30-15:30

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Room 322

A Wearable System for Posture Monitoring and Positional Sleep Apnea

Body position can influence the severity of obstructive sleep apnea, making posture monitoring an important component of positional therapy. My PhD research focuses on developing a wearable system that combines inertial sensing, acoustic monitoring, and Bluetooth Low Energy communication to support the detection and management of positional obstructive sleep apnea. This presentation will introduce the system architecture, hardware selection, and firmware development, alongside preliminary work on posture classification using orientation data. It will also discuss ongoing challenges and the next steps toward integrating snoring detection, reducing power consumption, and validating the system.



Speaker: **Salah Ismail**

Salah Ismail is a PhD student at the University of Genoa, Italy. His research focuses on wearable technologies for monitoring positional obstructive sleep apnea, combining inertial and acoustic sensing with embedded systems and wireless communication. His interests include sensor data processing, posture classification, and low-power wearable design.

Deep Learning for GNSS Satellite Visibility Classification via CNN and Multi-Head Attention

In dense urban environments, satellite-based positioning is severely degraded by signal reflections and blockages caused by surrounding infrastructure. This work addresses the issue by formulating signal quality identification as a supervised time-series classification problem, introducing a CNN-MHA (Convolutional Neural Network with Multi-Head Attention). The architecture integrates 1D convolutional layers to extract local, high-frequency temporal features alongside a Multi-Head Attention Transformer module designed to capture long-range dependencies and global signal dynamics across the time window. To prevent temporal data leakage and overfitting across non-independent and identically distributed (non-I.I.D.) samples, training and validation splits were isolated into distinct time blocks and sessions, enabling the network to demonstrate high generalization under domain shift. Developed in TensorFlow and converted to the ONNX format, the model is integrated into a C/C++ software using ONNX Runtime for real-time execution.

Speaker: **Andrea Maffia**

Andrea Maffia is a GNSS Engineer at Gter and a PhD candidate at the University of Genoa, researching machine learning applications for robust GNSS positioning.

