UNIVERSITÀ DEGLI STUDI DI NAPOLI
FEDERICO II

itee PhD
information technology
electrical engineering

DIETI. UNINA

Franca Rocco di Torrepadula

Intelligent Systems for Smart Cities

Tutor: Prof. Mazzocca

co-Tutor: Prof. Di Martino

Cycle: XXXVII

Year: First

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information technology
electrical engineering

My background

- MSc degree in Computer Engineering (October 2021)
- Research group: SECLAB
- PhD start date: 01/11/2021
- Scholarship type: UNINA

Research field of interest

- My research field concerns the definition and the application of **intelligent systems** to **smart cities**, with the aim of mitigating the challenges posed by the current tendency towards urbanization.

Summary of study activities

- **Ad hoc PhD courses / schools:**
  - Virtualization technologies and their applications
  - Statistical data analysis for science and engineering research
  - Imprenditorialità Accademica
- **Courses borrowed from MSc curricula:**
  - Neural Networks and Deep Learning (SSSA)
  - Risk Assessment
  - Software Products Management and Evolution
- **Conferences / events attended:**
  - International Symposium on Web and Wireless Geographical Information Systems (W2GIS2022)
  - Workshop Nazionale per il Trasferimento Tecnologico e l'Alta Formazione
  - 15th International Conference on the Quality of Information and Communications Technology (QUATIC)

Research activity: Overview (1/2)

- **Problem**:
  - Public transportation systems often struggle to satisfy the needs of urban mobility, as the demand of citizens is typically higher than transport supply.
  - It concerns transportation companies, passengers and the environment.
- **Objective**:
  - Definition of a data-driven, distributed and scalable platform for **Intelligent Public Transportation Systems (IPTS)**, meant to exploit the available public transport resources (mostly buses) in a smarter way.

Research activity: Overview (2/2)

- **Methodology:**
  - Towards the definition of a **reference architecture** for IPTS
    - Identification of IPTS-related requirements
    - Definition of the reference architecture
    - Description of a catalogue of technologies for the implementation of the proposal
  - Definition and validation of **data-driven solutions** to predict mobility demand
    - Comparison with state-of-the-art ML-based and simulation-based techniques
  - Resource optimization by exploiting **edge-based** solutions
  - Validation of the whole solution
    - **Real-world case study** from the *Hitachi Rail* company

Products

[P1]	Amato, F., Di Martino, S., Mazzocca, N., Nardone, D., Rocco di Torrepadula, F., & Sannino, P. *Bus Passenger Load Prediction: Challenges from an Industrial Experience*. International Symposium on Web and Wireless Geographical Information Systems. W2GIS. 2022.
[P2]	Cilardo, A., Maisto, V., Mazzocca, N., & Rocco di Torrepadula, F. *A Proposal for FPGA-Accelerated Deep Learning Ensembles in MPSoC Platforms Applied to Malware Detection*. International Conference on the Quality of Information and Communications Technology. QUATIC. 2022
[P3]	Starace L. L. L., Rocco Di Torrepadula, F., Di Martino, S., & Mazzocca, N. *How many taxis do we need to crowd-sense historical cities?* Journal of Advanced Transportation. JAT. Submitted (Under the second round of review).
[P4]	Di Martino, S., Mazzocca, Rocco di Torrepadula, F., & Sannino, P. *A Reference Architecture for Data-Driven Intelligent Public Transportation Systems.* IEEE Transactions on Intelligent Transportation Systems. IEEE T-ITS. Submitted.

Tutorship

- "**Computer System Design**" course, support and tutorship on:
  - Motorola 6800 programming and simulation on ASIM/ASIM Tool 22/03/2022 (3 hours);
  - MIPS programming and simulation 29/03/2022 (3 hours);
  - Intel 6821 peripheral driving programming 07/04/2022 (2 hours);
  - Mutual exclusion in assembly 26/04/2022 (2 hours).

Thank you for your attention

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