## WORK EXPERIENCE

01/05/2024 – 01/07/2024 Rome, Italy **R&D CONSULTANT** WSENSE S.R.L.

Research activity on Underwater Wireless Sensor Networks, concerning performance evaluation and optimization in complex scenarios.

Development of dedicated simulators and extensions to ns-3 in C++ and MATLAB. Additional duties included drafting scientific manuscripts for peer-reviewed conferences and journals of interest.

Business or Sector Professional, scientific and technical activities

01/02/2023 – 01/02/2024 Rome, Italy CONTRACT PROFESSOR SAPIENZA UNIVERSITY OF ROME

Co-Lecturer for B.Sc Degree course "Reti di Calcolatori" (Computer Networks) held by Prof. Petrioli (A.Y. 2022/23). Appointed by: Department of Computer, Control and Management Engineering (DIAG); Contract: PROT. N.205 DEL 18/01/2023 REP. N.27/2023

In charge of frontal lectures to in-person students as well as remote, with topics regarding the C programming language applied to computer network use cases.

Additional duties included developing syllabus alongside with teaching material, exam tracks, and proposing optional projects.

#### Business or Sector Education

01/04/2020 – 01/12/2020 Rome, Italy RESEARCH FELLOW (STUDENTSHIP) SAPIENZA UNIVERSITY OF ROME

Studied and reproduced State of The Art routing protocols for Underwater Wireless Sensor Networks; explored the introduction of reinforcement learning frameworks to routing solutions. Supervised by Prof. Chiara Petrioli.

## EDUCATION AND TRAINING

01/11/2020 – CURRENT Rome, Italy PHD IN COMPUTER SCIENCE Sapienza University of Rome

Main topics: Underwater wireless networks, Networking protocols, Internet of Things, Reinforcement learning, Underwater drones

Supervisor: Prof. Chiara Petrioli

- Teaching Assistant for M.Sc Degree course "Internet of Things" held by Prof. Petrioli (A.Y. 2022/23 and 2021/22; Topics: C++ and ns-3).

Represented Prof. Petrioli's group within the development of multiple national research projects: PNRM FRONTCOM, PON SMARTOUR, PON ARES, PON SI-Robotics (PNRM: Piano Nazionale della Ricerca Militare; PON: Programma Operativo Nazionale).
 Co-organizer of final conference for PON SMARTOUR, held in Rome (Italy) with 40+ on-site participants and 20+ online ones.

Field of study Computing | National classification Advanced university studies (Doctorate)

01/10/2018 – 22/10/2020 Rome, Italy MASTER'S DEGREE IN COMPUTER SCIENCE Sapienza University of Rome

#### Grade: 110/110 cum laude

Some projects I've worked on:

- predictive analytics (R)

- machine learning models in the context of cybersecurity and weather classification (Python + Keras)
- neural networks for Chinese segmentation, sense embedding, and disambiguation (WSD) (Python + TensorFlow)
- study of techniques in Neural Architecture Search (NAS)

- configuration of a Google Cloud Platform cluster and benchmark of it using an Apache Spark application (Python + PySpark, GCP Dataproc)

- voice-only authentication system (Python + Microsoft Azure)

- text editor with vocal dictation and gesture-based formatting (Python + Google MediaPipe + GCP)

#### Attendace of courses about:

- fundamentals of data science, machine learning, deep learning, natural language processing (NLP)

- internet of things, distributed systems, big data computing, cloud computing
- security in software applications, biometric systems, multimodal interaction
- models of computation, advanced software engineering

# Field of study Computing $\mid$ National classification University studies (Master)

01/10/2014 – 23/10/2018 Rome, Italy BACHELOR'S DEGREE IN COMPUTER SCIENCE Sapienza University of Rome

#### Grade: 98/110

Some projects I've worked on:

- multi-thread web crawler, with GUI (Java, JavaFX)
- multi-thread Sudoku solver, based on fork-join (Java)
- multi-thread matrix multiplication (C, OpenCL)
- RESTful webapp (Java, J2EE, Tomcat)
- multi-platform, client-server, multi-thread, remote file cypher application (C, POSIX API, WIN32 API, OpenMP)

Attendance of courses about:

- multicore programming
- optimization
- security
- web programming
- system programming

Field of study Computing | National classification University studies (Bachelor)

# PARTICPATION TO RESEARCH PROJECTS

#### CURRENT

FRONTCOM: FRONTiers of Underwater COMmunications and Networking (Piano Nazionale della Ricerca Militare - PNRM; Dp M\_D GSGDNA REG2020 0036517)

Role: Research collaborator.

Tasks: Development of a simulation platform for multimodal communication (acoustic, optical, electromagnetic) in the context of underwater wireless networks.

# SMARTOUR: Piattaforma per la promozione del turismo culturale attraverso l'impiego di tecnologie innovative (Programma Operativo Nazionale - PON; PON04a3\_00117)

Role: Research collaborator.

Tasks: Organizer of closing conference, development of website for scientific dissemination, drafting project deliverables.

## ARES: Autonomous Robotics for the Extended Ship (Programma Operativo Nazionale - PON; ARS01\_00682)

Role: Research collaborator. Tasks: Drafting project deliverables.

## SI-Robotics: SocIal ROBOTICS (Programma Operativo Nazionale - PON; ARS01\_01120)

Role: Research collaborator. Tasks: Drafting project deliverables.

# LANGUAGE SKILLS

## Mother tongue(s): ITALIAN

Other language(s):

	UNDERSTA	UNDERSTANDING		SPEAKING	
	Listening	Reading	Spoken production	Spoken interaction	
ENGLISH	C2	C2	C2	C2	C2

Levels: A1 and A2: Basic user; B1 and B2: Independent user; C1 and C2: Proficient user

# DIGITAL SKILLS

#### Software development

 Deliverables and reports

 Microsoft Office | LaTeX | Google Suite

 Computer science and ICT knowledge

 Internet of Things | Wireless networking | Computer networking | Machine learning | Deep learning | Cybersecurity

 Data Analytics

 NumPy | Pandas | Matplotlib

# OTHER SKILLS

# Other skills

troubleshoot, assess students, Work in an organised manner, develop course outline, accept constructive criticism, Analyse own performance, ICT communications protocols, address problems critically, prepare lesson content, Identify opportunities, Develop strategy to solve problems, show diplomacy

## PUBLICATIONS

#### 2024

AquaID: Authentication for Underwater Nodes with Decentralised Identity

#### Abstract:

The increasing pervasiveness of digital infrastructures, also extending into marine domains, makes Underwater Wireless Sensor Networks (UWSNs) an essential tool for the development of novel marine sustainability and monitoring paradigms. Applications in sensitive scenarios may require data encryption, non-repudiation, and provenance tracking. Moreover, the broadcast nature of the underwater acoustic channel makes the task of identifying and authenticating nodes of critical importance.

To meet such requirements, we introduce AqualD, a protocol for resource-constrained hardware that leverages Distributed Ledger Technologies (DLTs) and Decentralised Identities. It guarantees confidentiality, authentication, and integrity using low bandwidth and CPU usage, while supporting high scalability and interoperability.

We validate our solution in a threefold manner: via embedded board implementation, network simulation, and sea trials using commercially-available acoustic modems and underwater nodes. We also include a cost comparison among possible DLT choices. Results show AqualD to be robust to scaling, achieving low authentication delays and overhead, thus proving suitable even for large deployments.

Nicola Altamura, Emanuele Giona, Michele Nati, Chiara Petrioli. 2024. ACM WUWNet. To appear.