

Andrea Garbugli



I am a PhD student in the Computer Science and Engineering PhD Program enthusiastic about software engineering and systems architecture, with particular attention to Industrial Internet of Things and Fog/Edge Computing. I like to stay updated and try new technologies every day. During my spare time, I like to listen music and play video games. I am also passionate about sports and cooking.

Education

- Alma Mater Studiorum – University of Bologna** **Bologna, Italy**
 - Master of Computer Engineering 110/110 with honors* *Sept 2016 – Oct 2019*
 - Official duration (years):** 3
 - Thesis title:** Run-time Monitoring of Timing Constraints in Industrial Ethernet-based Systems
 - Thesis subject:** Distributed Systems | Effort 8 months
 - The advent of the Internet of Things (IoT) concept and particularly its application in industrial domains, called Industrial Internet of Things (IIoT), have led to an improvement in the aspects production related in the industrial automation sector. Given their increasing use, even in safety-critical systems, verify the correct behaviour those systems is becoming more important especially at run-time. Although some formal methods exist, such as: theorem proving, model checking, and testing; the complexity of IIoT systems requires the use of other verification mechanisms. For this reason, Runtime Verification plays a very important role as a complement to those methods. There are several works focusing on the development of Runtime Monitors, some of these are based on hardware implementation and the ones that are software monitor are not meant on monitoring distributed systems based on Industrial Ethernet connection. In this thesis we will propose a non-invasive software monitor able to connect to the network and to extract information regarding the sending and receiving times of exchanged messages. The system considered will use two communication protocols, namely OPC UA PubSub and TSN, which are excellent candidates to become the next standards in the field of IIoT. Finally, an example system will be set up to which the monitor will be connected in order to verify the performance of these protocols and the monitor's ability to extract information and useful metrics; the latter will be used to verify that the system complies with the timing constraints specification.
 - In-depth analysis of technologies:** OPC UA, Time-Sensitive Networking (TSN), UPPAAL
 - In-depth analysis of languages:** C, C++, CMake, Python
- Alma Mater Studiorum – University of Bologna** **Bologna, Italy**
 - Bachelor of Computer Engineering 98/110* *Sept 2012 – Mar 2016*

Official duration (years): 3

Thesis title: Experimentation with algorithms for the analysis of point clouds for autonomous driving applications

The thesis followed the study and testing of two different Computer Vision systems. The first case study was a system for SLAM, called Stereo SLAM, of which I tried to improve the quality of the results by adding tools for visual debugging. The second case study focused on different algorithms for Plane Detection, in order to study their performance in different scenarios. In this case, to improve the testing experience, I proceeded to create a GUI program written via the Qt framework, in order to set the parameters of the different algorithms and to see the results in real-time.

Thesis subject: Computer Architectures | Effort 3 months

In-depth analysis of frameworks: OpenCV, Qt

In-depth analysis of languages: C++, CMake

Experience

ADLINK Technology Inc.

Paris, France

◦ *Ph.D Visiting Period*

Oct 2021 – Jan 2022

During my time at ADLINK, I had the opportunity to learn about and experiment with different acceleration technologies for network communication, and in particular the TSN protocol, with the benefit of having worked closely with the research and development team of the Zenoh protocol. This experience allowed me to improve my skills on the development of communication protocols capable of supporting applications with different Quality of Service (QoS) requirements.

In-depth analysis of technologies: Zenoh, Time-Sensitive Networking (TSN), XDP

In-depth analysis of languages: C, Rust

Fraunhofer FOKUS

Berlin, Germany

◦ *Master Thesis Preparation*

Oct 2018 – Jun 2019

During the time spent at the Fraunhofer FOKUS research institute I had the opportunity to prepare my thesis project, with the advantage of being in close contact with research and development teams in the field of Industrial Internet of Things. This experience has allowed me to improve my skills, for instance research and resolution of complex problems in safety-critical industrial systems and the presentation of the results to the research team.

In-depth analysis of technologies: OPC UA, Time-Sensitive Networking (TSN), UPPAAL

In-depth analysis of languages: C, C++, CMake, Python

Cesop Communication Srl

Bologna, Italy

◦ *Software Developer and Analyst*

May 2016 – Nov 2016

During the job experience, I had the opportunity of being involved in everyday activities of the company such as customers relation and activities schedule. As a developer and analyst I found myself working on various services and web applications. The scope of these applications varied between the management of events and the management of business processes for the search and selection of new candidates. Most of these systems have requested the use of tools such as Asp .Net MVC, and Microsoft SQL Server.

In-depth analysis of frameworks: ASP.NET MVC, Bootstrap

In-depth analysis of languages: SQL, C#, HTML, CSS, JavaScript

Languages

Italian: Mother language

English: Fluent in reading, writing and speaking

Computer skills

Languages & Frameworks: C, C++, C#, Rust, Python, JavaScript, LaTeX, OpenGL, Node.js

Tools: Visual Studio, Visual Studio Code, CMake

Platform: Linux, Microsoft Windows