

# GIUSEPPE PEDONE

## Software Engineer

@ giuseppe.pedone.developer@gmail.com

linkedin.com/in/giuseppe-pedone-a170921a6

+39 3711963527

github.com/Unix69

Turin, Italy

0000-0001-8920-9406



## SUMMARY

Hello, my name is Giuseppe Pedone, I was born in May 1994. I grew up in Germany until I was 11 years old, then I moved to Sicily due to unforeseen circumstances. Finally I moved to Turin where I studied and actually work in. I have obtained a BSc in Computer Engineering and a MSc in Software and Digital Systems at Polytechnic of Turin. I have performed an experimental master thesis at CNRIEIT by participating to a IEEE project on high deterministic and high available Wifi transmissions in Industry 4.0 context.

Currently I am a Research Fellow in Predictive Maintenance at Polytechnic of Turin since two years and we are collaborating with Spea SPA. Thanks to it, I developed my hard and soft skills, I collaborated with company employees, learned about economics, and entered into companies dynamics. Besides, I discovered academic world and its environment, I learned to make research, develop prototypes, make experiments, evaluate results and write scientific papers together a team of people. The experimental master thesis and the research grant made me curious about scientific research. I like to discover and learn but also to transform ideas into reality to obtain concrete results. I am more for quality than for quantity (I would describe myself as pragmatic). Furthermore, I think that making research, specially for society, is a noble way to practice knowledge.

I try also to carry out personal or shared projects about different topics when I am free (please provide example) In this way I can train myself to carry out entire projects, I can reinforce my prior knowledge other than extend and deepen it, and I can learn something new about technology that is evolving continuously.

For these reasons I am now focused on research and I am planning to follow a PhD or work on research topics at some universities, foundations or research centers in Europe. I have been particularly passionate about Data Engineering, ML and AI, Distributed AI, microprocessors, embedded systems and operative systems, bare metal programming. I have life experience with Linux, C/C++, Armv-v7/Arm-v8, Python. Additionally my work experience is related to Linux/Windows, C++/C#, Python, Bash/Batch.

## EDUCATION

Master's Degree in Computer Engineering - Software and Digital Systems

Polytechnic of Turin

March 2017 - June 2020

Turin, TO Italy

Bachelor's Degree in Computer Engineering

Polytechnic of Turin

October 2013 - March 2017

Turin, TO Italy

High School License

Liceo Scientifico M. Cipolla

September 2008 - June 2013

Castelvetrano, TP Italy

## PROGRAMMING SKILLS

Armv7/Armv8/Assembly8086

Assembly Inline/Embedded C/C/C++

Bash/Batch/AWK

C#/Visual C++/XAML

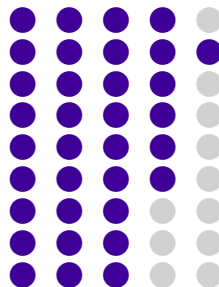
Python

SQL/XSQL/NoSQL

Android/Java/Kotlin/XML

SQL4/MQL5

PHP/HTML5/Javascript/JQuery/NodeJS/CSS



## PERSONAL ATTITUDES

Curios

Reflective

Rational

Functional

Objective

Propositive

Perseverance

Resilient

Creative

Stress resistant

## TEAM ATTITUDES

Flexibility

Helpful

Reviewer

Adaptive

Autonomous

Resourcefulness

Constructive

Coordination

Organization

Planning

## STRENGTHS

Typing

Problem Solving

Multitasking

Teamwork

## LANGUAGES

Italian

English

German



## SOFTWARE TOOLS AND TECHNOLOGY

Intel 8086

8253

8259

8255

Arm Cortex A53

BCM2837

RaspberryPi

MicroKeil

STM32CubeIDE

Emu8086

Qemu

C/ASM ABI

Linux

Linux SVC

Linux CMDs

Shell

Bash

Makefile

GCC

GDB

VS Code

Windows

Win32 SDK

Win API

DLL

Dependency Walker

Win32 Services

MSVC

Visual Studio

Ini

.Net Framework 4.7.2

WPF

XAML

RabbitMQ

WinMerge

Wireshark

Putty

PyCharm

Jupyter

Pip

NumPy

SciPy

Scikit-Learn

Joblib

PyMongo

Matplotlib

Pandas

Statsmodels

Colab

Git

CMake

Valgrind

Vcpkg

Oracle

MySQL

MongoDB

Firebase

SQL Lite

Android Studio

XML

Eclipse

SSH

RDP

CAN

TCP/IP

UART

MQTT

PUBSUB

JSON

Joomla

Xamp

LateX

# WORK EXPERIENCE

## Research Fellow as Predictive Maintenance Software Engineer

### Polytechnic of Turin and Spea SPA Volpiano TO

📅 December 2020 - Until Now

📍 Turin-Volpiano

During this experience as a software engineer, I participated in various research and development projects concerning predictive maintenance applied to Industry 4.0 contexts. In particular I collaborated with Spea SPA of Volpiano TO, in order to develop Predictive Maintenance techniques for their Automated Test Equipment (ATE). The team was composed by three research fellow, and three professors. I frequented the company assiduously for the first 8 months, in order to know the state of art of its machines, develop data collection systems and design a new database. Spea's systems test automatically electrical and electronic devices, by performing various kinds of tests (Analogical, Functional, Programming) on various kinds of devices (Semiconductors and Boards, within Power and Digital domain). The software systems that I developed during this period concern:

- Data Loading interface that performs data transmission via TCP/IP of machine data. This interface is used by system software in order to transmit data, with low latency, outside the machine.
- Data Loading systems that wait for any kind of data coming from a machine by listening to some interfaces (CAN, PCI-X, TCP port, filesystem), performs data collecting and data fusion algorithms and transmit them to a storage unit (typically a database) by using communication protocols (MongoDB protocol, TCP/IP, MQTT).
- Data injection systems that simulates data coming from machines, by reading raw data stored into a CSV, compose the final data to transmit by completing raw data with their header, and transmit them to a storage unit (typically a database). Thus allowing to generate certain machine behaviors and thus test all the systems developed that make use of that data without the use of a physical machine.
- Data Analysis systems for the detection of the exceeding of some critical thresholds (Warning H/L, Alert H/L, Alarm H/L) as well as for the detection of DRIFT, GLITCH, DROP and SHIFT of measurements obtained from the Device Under Test (DUT) during the board test phase.
- Sensor management systems of custom sensors designed by Spea, including a library able to communicate with and control a sensor network. Furthermore a standalone software for data loading and data view has been developed. This software loads the data coming from the sensors on a database and at the same time allows to read the real-time data coming from that one.
- Feature extraction systems able to extract features of machine axial movements. This system allows to extract representative features of the movement performed by the axes of a Spea machine. It makes use of DSP, statistics and Machine Learning techniques to extract features from the data collected during the movements of the axes. This project has been developed in order to characterize the axes of the 4080 FP Spea systems.
- Novelty Recognition system for predictive maintenance, which makes use of Artificial Intelligence and Machine Learning techniques applied to data from a (generic) machine, or part of it, to identify changes with respect to learned normal behavior. This AI system is composed by different heterogeneous parts developed in various languages (Python, C++). Those parts are: AI unit that constitutes the brain of the system, Maintenance Control unit that performs analytic to detect model changes and predictions to notify future changes. Further the system is able to configure itself remotely, perform recovery actions, online training, model evaluation with different metrics, predicting time of certain predefined changes.

Besides R&D activities related to software systems, I participated to the design of a new database capable of containing Spea machine produced data. All the software developed rely on the aforementioned database, using the appropriate driver. During the database selection phase, several stress tests were conducted, simulating the transmission of data from several Spea machines. The conducted tests made it possible to establish the limits and potential of the chosen database. Software porting were performed to adapt old software to the new database. The design of the data structures and the definition of their attributes required a study of Spea machines processes and of the data generated by them. Additionally the above mentioned Novelty Detection system, permits me to produce a scientific paper on predictive maintenance, titled 'A Real-Time Novelty Recognition Framework based on Machine Learning for Fault Detection', with the collaboration of U. Albertin, G. Squillero, M. Chiaberge, M. Brossa. During the prototype design and development phase, and the paper writing phase, I was hosted by Pic4Ser center, thanks to its director M. Chiaberge. This paper has been submitted to Journal MDPI Algorithms on call for paper 'Machine Learning and Deep Learning Applications for Anomaly and Fault Detection'.

Technologies used: Git Visual Studio Windows C# .Net System SerialPort Newtonsoft Ini files NetFramework Windows SDK WPF Datagrid Windows Form XAML Dependency Walker Dynamic Linked Library Batch Prompt MongoDB .Net driver MQTT RabbitMQ TCP/IP Client-Server CAN PCI-X RDP SSH Python Pymongo Scikit-Learn Pandas DataFrame NumPy SciPy Statsmodel Matplotlib KFOLD Random Forest Regressor Decision Tree Kernel Density Estimation PCA GridSearch itertools KMeans Joblib SpectralClustering AgglomerativeClustering OPTICS MeanShift MiniBatchKMeans DBSCAN Birch AffinityPropagation CMake Linux Bash Shell C++ 2020 C++ multithread C++ network C++ stl C++ std C++ template Boost Library Components MongoCXX Driver Bsoncxx

Learned about: ATE Mechatronics Automation Sensors MEMs MCU MPU Testing Remote Debugging Software maintenance Win32 Services Win32 Events Linux Services Linux System Distributed programming Communication protocols Machine Learning Artificial Intelligence AI based systems Supervised Learning Unsupervised Learning Model selection Cross Validation Data processing Data smoothing Data reduction Feature Extraction Multi Agent Systems Agent Programming Simple Reflex Agents Model Based Agents Multi Agent framework Scientific Papers State of Art Experiments Simulation Real Ex. Validation Metrics Digital Modeling Software Design Notes Software Licenses

## Private Teacher

### Freelance

📅 January 2020 - August 2020

📍 Turin

I've worked temporally as private teacher and I've helped university and high school students with teorical and practical lessons on the following topics: Procedural and OOP Languages (C, C++, Java, Python, C#), Web Protocols and Web Programming Languages (PHP, HTML, Javascript, CSS), Cyber Security Fundamentals (Hardware & Software) and Security Protocols, Operative Systems (Linux, Windows) and Bash/Batch scripting, Computer System Architectures and Assembly Programming, Machine Learning and Artificial Intelligence in Python, relational Database Management Systems and SQL.

## Autonomous Trading System Developer

### Freelance

📅 August 2017 - September 2017

📍 Turin

For this job I've developed a typical trading online expert advisor for Meta Trader 4 (MT) Platform, that acted as bot and followed the designed strategy. The strategy has been given by the customer. The platform permitted to define Meta Quotes Language (MQL) routines triggered by events such as timer, init, deinit events. The bot exploited this routines in order to be executed. The timer feature was used to perform a control loop. The bot architecture was based on a 4-state machine. For each state a set of actions were performed. In decision state, the bot followed a condition-action based rules in which conditions were verified on inputs, internal state, environment state and self-collected data. The bot basic capabilities was to send, delete, modify, query orders. Additionally it was able to read environment state such as bid price. Bot exploit a set of MQL APIs related to orders, positions, user account, signaling, alerts, time, file IO, email.

- Making autonomous decision and taking actions on orders (send, delete, modify) and their parameter (stoploss, volume, slippage, takeprofit) based on static rules applied on input parameters, on current state and on historical data collected.
- Registering init state of bot, into register files (Register directory).
- Reporting to the customer a summary including followed operations, currency gain and current balance.
- Log each bot action (send order, modify order, delete order) and software operations (inputs, errors) into log files (Log directory).

During this experience I'd have approach to economics world and trading online concepts (trading platforms, trading strategies and risk evaluations, expert advisor and indicators, brokers, binary trading, quantitative trading, high frequency trading). I'd have approach myself to the customer (understand needs, requirements and desired output) deploying and maintaining software. I learn about MQL language and Meta Trader APIs, expert advisor programming, trading indicators. Additionally, this experience permits me to explore relationships between economics and computer engineering, possible applications of computer in economics field, their potential further developments.

Technologies used: Meta Trader 4 Meta Trader 5 Meta trader IDE MQL 4 MQL 5

Learned about: Economics Purchase Power Parity Forex Indexes Basic trading concepts Automated Trading Trading strategies Expert Advisor Trading Indicators

## Graduate Student Sperimental Master Thesis IEEE 802.11 Wifi Industrial Networks in Smart Industries Automation Contexts

### Implementation and optimization of Wifi redundancy based techniques at application level

📅 April 2019 - June 2020

📍 Turin, Italy TO

Into this project my purpose was to implement, optimize and validate Wifi redundancy transmission techniques respect to classical Wifi transmissions. I developed a user-space software architecture that was able to duplicate transmissions of a given queue of application messages and to handle re-transmissions of packets and multiple received ACKs for each channel.

A set of Reactive Duplication Avoidance (RDA) mechanisms were developed in order to optimize mean queueing time of packets. Into this software architecture, ACK reactive triggers were able to cancel the acknowledged packet from queues of all channels.

For this purpose a C user space program with multi threading and network communication features has been developed. The program was composed by a transmitter that acted as message duplicator, multiple FIFO queues contained application messages, device managers which dispatched messages to different network interfaces and managed acknowledgments in order to control queues. This software collected statistical timing data to perform post analysis activities. Data collected regards insertion, transmission and reception of messages.

Different simulated and real experiments have been performed.

Simulated experiments in which data were sent through loopback interface and acknowledgements were generated by an internal random acknowledge generator (simulating access points answers). Real experiments were performed into a dual LAN environment with two Access Points associated with two different NICs of a dual NIC Station equipped with modded Linux RTOS.

Through an awk script and a python script I calculated transmission time, queuing time of packets of experiments collected data, compute CDFs, percentiles, mean, variance and some soft real-time quality indexes. Thanks to that post analysis I have been able to validate Wifi Redundancy and Wifi Redundancy with RDA optimization transmission techniques respect to classical Wifi transmissions.

Technologies used: C C Posix Library Linux Ubuntu 16.04 LTS Linux system calls Linux shell Bash Python Numpy SciPy Statsmodels Matplotlib UDP SSH Makefile AWK GCC GDB Wireshark Valgrind LaTeX

Learned about: Industry 4.0 applications Industrial networking context Hard real-time soft real-time hard mac and soft mac devices Signal reliability Signal determinism Noise Interference Wired networking Wireless networking Device network stack Linux network architecture Athereos drivers IEEE 802.11 a/b/n/g/ac/ax/be Industrial network protocols

## Restaurant Waiter

### Ristorante Pizzeria La Giummara

📅 June 2009 - September 2012

📍 Salemi, Italy TP

I've began to work in catering world because it was well paid and less prior knowledge was needed in order to being considered suitable. In this restaurant I worked as waiter. In summer seasons I worked every day, while in Winter sessions only on weekdays and holidays because I still studied.

My mansions was to Filling the shopping list based on next days events, taking inventory of current resources, Serving clients, supporting and take care about them during their stay, taking bookings at phone either at tables, Preparing the hall, organize banquets and set up tables, helping cooks with preparing activities, Prepare sorbets, fruit salads and doughs, load food and beverage resources.

During this experience I also acquired some food and beverage certificates. Moreover I learn to cooperate with a team.

## PUBLICATIONS

- 'A Real-Time Novelty Recognition Framework based on Machine Learning for Fault Detection', U. Albertin, G. Pedone, G. Squillero, M. Chiaberge, M. Brossa, MDPI Algorithms on call for paper 'Machine Learning and Deep Learning Applications for Anomaly and Fault Detection', November 2022.

# LIFE EXPERIENCES

---

## Lived in Germany

📅 June 1994 - April 2005

📍 Esslingen, Stuttgart

I'm born in Italy but I moved to Germany 2 weeks after birth. I stayed in Germany until I was eleven years old. I've lived into Baden-Württemberg region in Nellingen, Mettingen and Essling am Neckar.

I've received a primary and high school education oriented to functionality and method, horizontal and vertical knowledge, and based on self improvement, personal independence, empowerment and learning by practice.

I've learned german at school by hearing and interact with others. I've spoken italian at home and german outside since childhood. Furthermore I've frequented an italian school one time a week for three hours.

In Germany school is a way to learn life. School programs were so dense of interesting activities and educational trips that leaved you something useful. Classes were multicultural and balanced, there was not a majority group. During my school experience in Germany I've learned about sports (swimming, boxing, basket, light athletic, self defense techniques) about nature (garbage collection, growing vegetables, bread little animals, visiting zoos, farms, hoods and animal museums) and practical activities (sew, repair bikes wheels, cooking clay)