# Bernardo Camajori Tedeschini

Telecommunication Engineer | PhD student | Italian

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Residence : 20133, Milan, Italy Date of Birth : 14.01.1997, Carrara, Italy


## Academics

**November 2024 – November 2021** — PhD in Information Technology (Honors - Cum Laude), Telecommunications, Politecnico di Milano
- Thesis : Cooperative Machine Learning Methods in Distributed Systems.
- Multi-agent Learning.
- Online Learning and Monitoring.
- TinyML and Efficient Deep Learning Computing.

**October 2021 – October 2019** — Master Degree in Telecommunication Engineering (Honors - 110L, GPA 29.85/30), Communication Networks and Internet, Politecnico di Milano
- Thesis in collaboration with CERN, CNR, and medical school of Athens.
  Title : "Federated learning architectures and algorithms for diagnostic imaging in healthcare networks."

**July 2019 – October 2016** — Bachelor Degree in Computer Science Engineering (Honors - 110L, GPA 29.23/30), Telecommunications, Politecnico di Milano
- Thesis : Final Examination in Communication Systems.

## Honors and Awards

2022 Roberto Rocca Doctoral Fellowship : funding for 12 months of research at MIT.
2021 PhD grant from Ministero dell'Istruzione, dell'Università e della Ricerca (MIUR), Italy.
2021 Master's degree with Honors.
2019 Bachelor's degree with Honors.
2017 Best freshmen of the academic year 2016/2017.

## Work experience, stages, studies abroad

**August 2024 – August 2023** — Visiting Researcher at MIT Laboratory for Information & Decision Systems (LIDS), Massachusetts Institute of Technology, Cambridge
- Contribution : Development of classical and deep machine learning algorithms for localization and sensing networks. Research carried out under Prof. Win's supervision.

Bayesian Neural Networks | Ray-tracing | 5G | Autonomous Vehicles

**July 2021 – June 2021** — Visiting Research Scientist, CERN, Geneva
- Contribution : Implementing and testing the network architecture for the Federated Learning in real and physically separated machines located at CERN, Milan, and Athens.

Federated Learning | MQTT | NVIDIA | Docker

**July 2013 – June 2013** — Summer english school, University of Limerick, Ireland
- Contribution : Attending daily lessons of english and culture of Ireland.

## PhD Projects

### TRUSTroke 2022 - 2025

trustroke.eu

- Partners : Fundacio Hospital Universitari Vall D'Hebron, Fondazione Policlinico Universitario Agostino Gemelli-IRCSS, KU Leuven, CERN, Eurecat Technology Centre, Nora Health, Politecnico di Milano, CNR, Stroke Alliance for Europe and others.
- Objective : Trustworthy prediction of stroke outcome on a Federated Learning infrastructure.
- Budget : 6M €. Call : HORIZON-HLTH-2022-STAYHLTH-01-two-stage.
- Contribution : Analysis of the federated algorithms and their optimization.

Tensorflow | Fully-distributed Federated Learning | Asynchronous Federated Learning

### HYPER-5G 2022 - 2024

hyper5g-project.eu

- Partners : Geomatics Research & Development srl, algoWatt SpA and Politecnico di Milano.
- Budget : 500k € funded by ESA's Navigation Innovation and Support Program (NAVISP).
- Objective : Studying, designing and developing the algorithms and software needed to implement a precise positioning engine to jointly use multi-constellation GNSS and 5G observations.
- Contribution : Design and implement the 5G positioning system.

Matlab | Rohde & Schwarz scanner

### CAFEIN-FL 2019 - 2021

kt.cern/kt-fund/projects/cafein-federated-network-platform-development-and-deployment-ai-based-analysis-and

- Partners : CERN, CNR, Politecnico di Milano, National and Kapodistrian University of Athens.
- Budget : 135k CHF funded by CERN Knowledge Transfer fund.
- Objective : Federated network platform for the development and deployment of AI based analysis and prediction models.
- Contribution : Creation of the whole network architecture and proof-of-work implementation of Federated Learning algorithms.

Tensorflow | Personalized Federated Learning

## Master's degree Projects

### Wireless Communication group project Oct 2020 - Dec 2020

github.com/BernardoCama/WirelessCommunicationProject Grade : 30L

Tracking, with adaptive Beamforming, two mobile terminals in presence of one or more interferers.

Matlab | Beamforming

### Localization, Navigation and Smart Mobility group project Jun 2020

github.com/BernardoCama/Localization-Navigation-and-Smart-Mobility-Project Grade : 30L

Handling a localization problem, by formulating the model, implementing a positioning method and assessing the related performance in Matlab environment.

Matlab | Kalman filter | Localization problem

### IOT group project Mar 2020 - Jul 2020

github.com/LucaFerraro/IoT-HomeChallenge Grade : 30L

Designing and implementing a software prototype for a social distancing application using TinyOS and Node-Red and test it with Cooja. The application is meant to understand and to alert you when two people (motes) are close to each other.

TinyOS | TOSSIM | Wireshark | MQTT | ThingSpeak | Node-Red | IFTTT

### Switching and Routing group project Feb 2020

github.com/BernardoCama/project-7 Grade : 30L

Building an application able to react to the failure of a switch (node), both in a reactive and in a proactive way, using OpenFlow switches and Ryu as network controller.

Mininet | ryu-manager | python | Failure Detection in rings

## Certifications

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|---|---|
| October 2022 | Professional engineering licence |
| July 2022 | MIT Certification of English Proficiency Assessment |
| November 2021 | TOEFL |
| October 2021 | RTF Certificate (VHF) |
| August 2021 | First Aid Certificate |
| September 2018 | ETS - TOEIC (Test of English for International Communication - Listening and Reading Test ), Grade 835 (C1) |
| May 2015 | Certificate in ESOL International (First), Grade C |

## Technical Skills

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|---|---|
| **Programming Languages** | Python (Advanced)<br>Matlab (Advanced)<br>C/C++ (Beginner) |
| **Deep Learning Frameworks** | PyTorch, TensorFlow, Keras |
| **SDK's** | Visual Studio Code, Eclipse, git |
| **Operating Systems** | Mac OS, Windows, Linux |
| **Database Tools** | MySQL |
| **Text Processing** | Word, PowerPoint |

## Interests

- Machine Learning
- Localization
- Vehicles
- Data Mining
- Wireless Communications

## Languages

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|---|---|
| **Italian** | ● ● ● ● ● |
| **English** | ● ● ● ● ● |
| **French** | ● ● ● ○ ○ |

## Soft Skills

- Problem Solving
- Team Working
- Leadership
- Curiosity and innovation
- Organization and planning

## References


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**Moe Z. Win**
*Core faculty Professor at MIT*
Cambridge, MA, USA
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## Publications

* 2024 **B. Camajori Tedeschini**, S. Savazzi, M. Nicoli, "Weighted Consensus Algorithms in Distributed and Federated Learning", submitted to IEEE Transactions on Network Science and Engineering (TNSE).

Nov 2024 M. Brambilla, M. Alghisi, **B. Camajori Tedeschini**, A. Fumagalli, F. Grec, L. Italiano, C. Pileggi, L. Biagi, S. Bianchi, A. Gatti, A. Goia, M. Nicoli, and E. Realini, "Integration of 5G and GNSS Technologies for Enhanced Positioning : an Experimental Study", IEEE Open Journal of the Communications Society (OJ-COMS), doi : 10.1109/OJCOMS.2024.3487270.

Nov 2024 J. C. Morrison, N. Schatz, S. Kim, G. Kwon, **B. Camajori Tedeschini**, V. Weerackody, A. Conti, and M. Z. Win, "Sidelink-Enabled Cooperative Localization for xG Non-Terrestrial Networks", IEEE Military Communications Conference (MILCOM), pp. 1-6, doi : 10.1109/MILCOM61039.2024.10773683.

Nov 2024 N. Schatz, S. Kim, G. Kwon, **B. Camajori Tedeschini**, M. Ricard, T. Klein, V. Weerackody, A. Conti, and M. Z. Win, "Location Verification in Next-Generation Non-Terrestrial Networks", IEEE Military Communications Conference (MILCOM), pp. 1-6, doi : 10.1109/MILCOM61039.2024.10774026.

Oct 2024 **B. Camajori Tedeschini**, M. Brambilla, M. Nicoli, and M. Z. Win, "Multi-agent Reinforcement Learning for Distributed Cooperative Positioning", IEEE Transactions on Intelligent Vehicles (TIV), doi : 10.1109/TIV.2024.3471909.

Sep 2024 L. Italiano, **B. Camajori Tedeschini**, M. Brambilla, H. Huang, M. Nicoli and H. Wymeersch, "A Tutorial on 5G Positioning", IEEE Communications Surveys & Tutorials (COMST), doi : 10.1109/COMST.2024.3449031.

Sep 2024 **B. Camajori Tedeschini**, G. Kwon, M. Nicoli, and M. Z. Win, "Real-time Bayesian Neural Networks for 6G Cooperative Positioning and Tracking", IEEE Journal on Selected Areas in Communications (JSAC), special issue "Positioning and Sensing Over Wireless Networks", doi : 10.1109/JSAC.2024.3413950.

Aug 2024 **B. Camajori Tedeschini**, M. Brambilla and M. Nicoli, "Split Consensus Federated Learning : an Approach for Distributed Training and Inference", IEEE Access, doi : 10.1109/ACCESS.2024.3446577.

Jul 2024 **B. Camajori Tedeschini**, M. Brambilla, M. Nicoli, and M. Z. Win, "Cooperative Positioning with Multi-Agent Reinforcement Learning", 27th IEEE International Conference on Information Fusion (FUSION), doi : 10.23919/FUSION59988.2024.10706524.

Jun 2024 L. Italiano, **B. Camajori Tedeschini**, M. Brambilla and M. Nicoli, "Pedestrian Positioning in Urban Environments with 5G Technology", IEEE 22th Mediterranean Communication and Computer Networking Conference (MedComNet), doi : 10.1109/MedComNet62012.2024.10578126.

Jun 2024 U. Milasheuski, L. Barbieri, **B. Camajori Tedeschini**, M. Nicoli, and S. Savazzi, "On the Impact of Data Heterogeneity in Federated Learning Environments with Application to Healthcare Networks", IEEE Conference on Artificial Intelligence, pp. 1-6, doi : 10.1109/CAI59869.2024.00185.

Jun 2024 **B. Camajori Tedeschini**, G. Kwon, M. Nicoli, and M. Z. Win, "Empowering 6G Positioning and Tracking with Bayesian Neural Networks", IEEE International Conference on Communications (ICC), pp. 1-7, doi : 10.1109/ICC51166.2024.10622691.

Mar 2024 L. Barbieri, **B. Camajori Tedeschini**, M. Brambilla and M. Nicoli, "Deep Learning-based Cooperative LiDAR Sensing for Improved Vehicle Positioning", IEEE Transactions on Signal Processing (TSP), doi : 10.1109/TSP.2024.3377375.

Nov 2023 S. Roger, M. Brambilla, **B. Camajori Tedeschini**, C. Botella-Mascarell, M. Cobos and M. Nicoli, "Deep-Learning-Based Radio Map Reconstruction for V2X Communications", IEEE Transactions on Vehicular Technology (TVT), doi : 10.1109/TVT.2023.3326935.

Sep 2023 **B. Camajori Tedeschini**, M. Brambilla, L. Italiano, S. Reggiani, D. Vaccarono, M. Alghisi, L. Benvenuto, A. Goia, E. Realini, F. Grec and M. Nicoli, "5G positioning : a feasibility analysis with current network deployment", Scientific Reports (Nature), doi : 10.1038/s41598-023-42426-1.

Sep 2023 **B. Camajori Tedeschini** and M. Nicoli, "Cooperative Deep-Learning Positioning in mmWave 5G-Advanced Networks", IEEE Journal on Selected Areas in Communications (JSAC), special issue "5G/6G Precise Positioning on Cooperative Intelligent Transportation Systems (C-ITS) and Connected Automated Vehicles (CAV)", doi : 10.1109/JSAC.2023.3322795.

Aug 2023 **B. Camajori Tedeschini**, M. Brambilla and M. Nicoli, "Message Passing Neural Network Versus Message Passing Algorithm for Cooperative Positioning", IEEE Transactions on Cognitive Communications and Networking (TCCN), doi : 10.1109/TCCN.2023.3307953.

Aug 2023 **B. Camajori Tedeschini**, M. Brambilla, L. Barbieri, G. Balducci and M. Nicoli, "Cooperative lidar sensing for pedestrian detection : data association based on message passing neural networks", IEEE Transactions on Signal Processing (TSP), doi : 10.1109/TSP.2023.3304002.

Jun 2023 L. Barbieri, **B. Camajori Tedeschini**, M. Brambilla and M. Nicoli, "Implicit vehicle positioning with cooperative lidar sensing", 48th IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP), pp. 1-5, doi : 10.1109/ICASSP49357.2023.10094864.

## Publications

May 2023 **B. Camajori Tedeschini**, M. Nicoli and M. Z. Win, "On the Latent Space of mmWave MIMO Channels for NLOS Identification in 5G-Advanced Systems", IEEE Journal on Selected Areas in Communications (JSAC), special issue "3GPP Technologies : 5G-Advanced and Beyond", doi : 10.1109/JSAC.2023.3273769.

May 2023 **B. Camajori Tedeschini**, S. Savazzi, M. Nicoli, "A Traffic Model based Approach to Parameter Server Design in Federated Learning Processes", IEEE Communications Letters (COMML), doi : 10.1109/LCOMM.2023.3272844.

Jul 2022 **B. Camajori Tedeschini**, M. Brambilla, L. Barbieri and M. Nicoli, "Addressing data association by message passing over graph neural networks", 25th IEEE International Conference on Information Fusion (FUSION), pp. 01-07, doi : 10.23919/FUSION49751.2022.9841233.

Jan 2022 **B. Camajori Tedeschini**, S. Savazzi, R. Stoklasa, L. Barbieri, I. Stathopoulos, M. Nicoli, L. Serio, "Decentralized Federated Learning for Healthcare Networks : A Case Study on Tumor Segmentation", IEEE Access, doi : 10.1109/ACCESS.2022.3141913.