

# Carlo Augusto Grazia

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## contact

home page

## languages

italian mother tongue

english fluency

## programming

♥ C, Java

Python, C++

## editing

LaTeX, HTML

## education

- 2013–2015 **Ph.D.** in Information and Communication Technology The University of Modena and Reggio Emilia  
Winner of the best Ph.D. thesis.
- 2010–2012 **Master** degree in Computer Science The University of Bologna  
110/110 cum laude  
Implementation of a tool for static deadlock analysis over an ABS core  
ABS is a formal concurrent Object Oriented language born with a European Project HATS. The tool is based on an Inference Algorithm and an Analyzer.
- 2007–2010 **Bachelor** degree in Computer Science The University of Modena and Reggio Emilia  
110/110 cum laude  
Analysis of transcription factor binding site tool inside co-regulated genes  
Bioinformatic tool is based on statistical representation for DNA mutation.
- 2002–2007 **Technical Expert** in Electr. & Telecomm. I.T. Enrico Fermi, Modena  
100/100

## experience

### Full Time

- 2023–now **UNIVERSITY OF MODENA AND REGGIO EMILIA** Modena, Italy  
Tenure Track Assistant Professor (RTDb) ING-INF/03
- 2022–2023 **UNIVERSITY OF MODENA AND REGGIO EMILIA** Modena, Italy  
Research Fellow
- 2017–2022 **UNIVERSITY OF MODENA AND REGGIO EMILIA** Modena, Italy  
Assistant Professor (RTDa) ING-INF/03
- 2016–2017 **UNIVERSITY OF MODENA AND REGGIO EMILIA** Modena, Italy  
Research Fellow
- 2013–2016 **UNIVERSITY OF MODENA AND REGGIO EMILIA** Modena, Italy  
PhD Student in ICT  
Developed networking solutions for QoS provisioning in wireless/satellite environments.  
Detailed achievements:
  - Investigated networking area:
    - Packet Scheduling
    - Active Queue Management
    - Middleware and Cross-Layering Solutions
    - Transmission Control Protocol
  - Learned how to merge research and industry through EU projects
- 2014–2015 **UNIVERSITY OF MODENA AND REGGIO EMILIA** Modena, Italy  
Co.Co.Co  
Developed middleware solutions for PPDR Systems

## research topics

**automotive:** domains specific applications towards autonomous driving. Creation of living labs and field experiment testbed with wireless vehicular technologies like DSRC/11p/11bd, C-V2X, and NR-V2X. Ethernet-based in-vehicle connectivity evolution with 100BASE-T1 and 10BASE-T1S.

**wireless:** TCP-IP stack with emphasis on:

- layer 2: WiFi drivers, with contributions on the Linux mainline kernel about the TCP Small Queues topic
- layer 3: several packet schedulers and AQM networking algorithms deployed and published
- layer 4: novel algorithms and variations to Google's BBR algorithm for wireless domains

Theoretical contributions to the network bottleneck modeling and analysis.

## editorial experience

2020–now	<b>Sensors</b> Topic Board	MDPI
2017–now	<b>Computer Communication</b> Technical Committee	Elsevier
2019–2020	<b>Telecom - Special Issue "Vehicular Communications"</b> Guest Editor	MDPI

## projects & collaborations

2023–now	<b>Research Project with ESA</b> SURPRISE: Standardised ground software components for orchestrating high throughput Satellite services	Roma, Italy
2023–now	<b>POR-FESR</b> IGNITE 5.0: Intelligent and secure Networking in Industrial Environments: towards Industry 5.0	Modena, Italy
2022–now	<b>Collaborator in the PNRR Spoke 7</b> Centro Nazionale per la Mobilità Sostenibile (MOST)	Modena, Italy
2020–now	<b>Scientific partner at Tesla, Lamborghini, Maserati, Ducati, EDAG/Ferrari, Quest-Global and CNH</b> Internship and research collaboration: Vehicular networking	Modena & Bologna, Italy
2018–2019	<b>Research Project with Alstom Group</b> V2X communications and distributed architectures for road safety-related applications	Modena, Italy
2017–now	<b>Research Project with EarthCloud NPO</b> IoT-based Seismic Alert Systems Association Web Page for more information	Modena, Italy
2013–2015	<b>The European FP7 Projects PPDR-TC &amp; E-SPONDER</b> Public Protection and Disaster Relief Transformation Center	Modena, Italy
2012–2013	<b>European Project EU-FET HATS</b> Highly Adaptable and Trustworthy Software using Formal Method	Bologna, Italy

## teaching

- 2018–now **Automotive Connectivity** Alma Mater Studiorum UniBo & UniMoRe  
Master Course available for: Electronic Engineering for Intelligent Vehicles (UniBo), Electronic Engineering and Computer Engineering (UniMoRe)
- 2020–2023 **Communication Systems: Theory & Measurement** UniBo  
Master Course available for Electrical Vehicle Engineering (UniBo)
- 2021–now **In-vehicle connectivity** Motorvehicle University of Emilia-Romagna - MUNER  
School for higher education on Future of automotive for intelligent mobility

## awards

- 2023 **ASN** Ministero dell'Università e della Ricerca  
National Scientific qualification as associate in the Italian higher education system for the disciplinary field of 09/F2 - Telecommunications and the field of 01/B1 - Informatics
- 2017 **Best Ph.D. Student** The ICT Doctorate School, UNIMORE  
Awarded to the best research activity by the ICT school
- 2014 **Certificate of Merit** The University of Modena and Reggio Emilia  
Awarded to the best researcher handed by the Chancellor
- 2013 **Best Presentation** The University of Padova  
Awarded to the best presentation at the SSIE Summer School in Brixen
- 2012 **Letter of Merit** The University of Bologna  
Awarded to the top student posted by the Chancellor
- 2010 **Scholarship** The University of Modena and Reggio Emilia  
Awarded to the top bachelor thesis

## interests

**professional:** TCP-IP Linux systems, networking algorithms, wireless communications, intra&inter vehicular network protocols, formal analysis, software design  
**personal:** video editing, ukulele, running, football, snooker, Rubik's cube

## publications

### Article in peer-reviewed Journal/Magazine

- [22] L. Lusvarghi, Carlo A. Grazia, M. Klapez, M. Casoni and M.L. Merani  
Awareness Messages by Vulnerable Road Users and Vehicles: Field Tests Via LTE-V2X  
IEEE Transactions on Intelligent Vehicles; 10.1109/TIV.2023.3280744, 2023
- [21] Carlo A. Grazia, N. Patriciello, T. Høiland-Jørgensen, M. Klapez and M. Casoni  
Aggregating Without Bloating: Hard Times for TCP on Wi-Fi  
IEEE/ACM Transactions on Networking; 10.1109/TNET.2022.3171594, 2022 - 10 May 2022
- [20] M. Klapez, Carlo A. Grazia, M. Casoni  
Experimental Evaluation of IEEE 802.11p in High-Speed Trials for Safety-Related Applications  
IEEE Transactions on Vehicular Technology; 10.1109/TVT.2021.3111289, 2021 - 9 Sep 2021
- [19] M. Klapez, Carlo A. Grazia, M. Casoni  
Application-level Performance of IEEE 802.11p in Safety-related V2X Field Trials  
IEEE Internet of Things Journal, 7(5), pp. 3850-3860, <https://doi.org/10.1109/JIOT.2020.2967649>  
- Jan 2020
- [18] M. Klapez, Carlo A. Grazia, M. Casoni  
Minimization of IEEE 802.11p Packet Collision Interference through Transmission Time Shifting  
J. Sens. Actuator Netw. 2020, 9(2), 17; <https://doi.org/10.3390/jsan9020017> - 26 Mar 2020
- [17] M. Klapez, Carlo A. Grazia, M. Casoni  
The Energy Footprint of 5G Multi-RAT Cellular Architectures  
IEEE Access, early access, 10.1109/ACCESS.2021.3122797 - 26 Oct 2021
- [16] Carlo A. Grazia, M. Klapez, M. Casoni  
The New TCP Modules on the Block: A Performance Evaluation of TCP Pacing and TCP Small Queues  
IEEE Access, Volume 9; 10.1109/ACCESS.2021.3113891 - 20 Sep 2021
- [15] Carlo A. Grazia  
Future of TCP on Wi-Fi 6  
IEEE Access 2021, Volume 9; <https://doi.org/10.1109/ACCESS.2021.3102022> - 3 Aug 2021
- [14] Carlo A. Grazia  
A Performance Model for Wi-Fi Frame Aggregation Considering Throughput and Latency  
IEEE Communication Letters 2020; <https://doi.org/10.1109/LCOMM.2020.2995590> - 19 May 2020
- [13] Carlo A. Grazia, M. Klapez, M. Casoni  
BBRp: Improving TCP BBR Performance Over WLAN  
IEEE Access 2020, Volume 8; <https://doi.org/10.1109/ACCESS.2020.2977834> - 2 Mar 2020
- [12] M. Klapez, Carlo A. Grazia, M. Casoni, S. Zennaro, M. Cozzani  
Processing and Communication Delays in EWS: On the Performance of the Earthcloud Prototype  
Wireless Communications and Mobile Computing, March 2019, DOI: 10.1155/2019/6206854
- [11] Carlo A. Grazia, N. Patriciello, M. Klapez, M. Casoni  
Transmission Control Protocol and Active Queue Management together against congestion: cross-comparison through simulations  
Simulation: Transactions of the Society for Modeling and Simulation International, November 30, 2018, DOI: 10.1177/0037549718814626

- [10] M. Casoni, Carlo A. Grazia, M. Klapez  
SDN-Based Resource Pooling to Provide Transparent Multi-Path Communications  
IEEE Communication Magazine, DOI: 10.1109/MCOM.2017.1601214
- [9] M. Klapez, Carlo A. Grazia, M. Casoni  
A Hybrid Algorithm to combine Redundancy and Concurrency in Virtual Network Resource Pooling  
Internet Technology Letters, John Wiley & Sons, DOI: 10.1002/itl2.18
- [8] M. Casoni, Carlo A. Grazia, M. Klapez, N. Patriciello  
How to avoid TCP Congestion without dropping Packets: an Effective AQM called PINK  
accepted for publication in the Computer Communications Journal, Elsevier, ISSN: 0140-3664 , available online DOI: 10.1016/j.comcom.2017.02.010
- [7] M. Casoni, Carlo A. Grazia, P. Valente  
Achieving a High Throughput and a Low Latency through a Modular Packet Scheduler  
accepted for publication in the International Journal of Communication Networks and Distributed Systems, Inderscience Publishers, ISSN: 1754-3916.
- [6] M. Casoni, Carlo A. Grazia, M. Klapez  
A software defined 5G cellular network with links virtually pooled for public safety operators  
Transactions on Emerging Telecommunications Technologies, John Wiley & Sons, 2016, DOI: 10.1002/ett.3092
- [5] M. Casoni, Carlo A. Grazia, M. Klapez, N. Patriciello  
QRM: a Queue Rate Management for fairness and TCP flooding protection in mission-critical networks  
Computer Networks, Elsevier, pp. 54-65, Vol.93, December 2015, ISSN: 1389-1286, DOI: 10.1016/j.comnet.2015.10.010
- [4] M. Casoni, Carlo A. Grazia, M. Klapez, N. Patriciello  
A congestion control middleware layer with dynamic bandwidth management for satellite communications  
International Journal of Satellite Communications and Networking, John Wiley & Sons, 2015, ISSN: 1542-0981, DOI: 10.1002/sat.1129
- [3] M. Casoni, Carlo A. Grazia, M. Klapez, N. Patriciello  
Integration of Satellite and LTE for Disaster Recovery  
Communications Magazine, IEEE, March 2015, Pages 47-53, DOI: 10.1109/MCOM.2015.7060481
- [2] M. Casoni, Carlo A. Grazia, P. Valente  
TEMPEST: a new Test Environment for Performance Evaluation of the Scheduling of packets  
Simulation Modelling Practice and Theory (SIMPAT), Elsevier, Volume 49, December 2014, Pages 258–276, ISSN: 1569-190X, DOI: 10.1016/j.simpat.2014.10.005
- [1] M. Casoni, Carlo A. Grazia, P. Valente  
A Green, Modular and Fair Packet Scheduler for boosting Throughput over Wireless Links  
Journal of Networking Technology (JNT), Vol. 4, Issue 4, pp. 192-202, December 2013, ISSN: 0976-898X

## **Article in International Conference/Workshop**

- [38] Carlo A. Grazia, M. Klapez, M. Casoni  
Comparing different GPS solutions for the Cooperative Awareness Messages Distribution  
IEEE WiMob 2023, VN4RRSR Workshop, Montreal, Canada
- [37] Bjørn I. Teigen, N. Davies, K.O. Ellefsen, T. Skeie, Carlo A. Grazia and J. Torresen  
A Lower Bound on Latency Spikes for Capacity-Seeking Network Traffic  
IEEE ICC'23, 2023, Rome, Italy

- [36] M. Klapez, Carlo A. Grazia, M. Casoni  
The Impact of Transmission Power on the Safety-Related Performance of IEEE 802.11p  
IEEE WiMob 2021, STWiMob Workshop, Virtual Conference
- [35] Carlo A. Grazia, M. Klapez, M. Casoni  
IRONMAN: Infrastructured RSSI-based Opportunistic routing in Mobile Adhoc Networks  
IEEE WiMob 2020, ICT4PPRR Workshop, Virtual Conference
- [34] Carlo A. Grazia, N. Patriciello, M. Klapez, M. Casoni  
BBR+: improving TCP BBR Performance over WLAN  
IEEE ICC, 2020, International Conference on Communications, Virtual Conference
- [33] Carlo A. Grazia  
IEEE 802.11n/ac Wireless Network Efficiency under different TCP Congestion Controls  
EN4PPDR'19, 2019, WiMob Sixth International Workshop on ICT Systems for Public Protection and Risk Reduction
- [32] M. Klapez, Carlo A. Grazia, M. Casoni  
IEEE 802.11p field trials on interference minimization for safety-related V2X applications  
EN4PPDR'19, 2019, WiMob Sixth International Workshop on ICT Systems for Public Protection and Risk Reduction
- [31] M. Klapez, Carlo A. Grazia, L. Rold, M. Casoni  
IEEE 802.11p under congestion in an Infrastructure-to-Vehicle communication approach  
2019 AEIT International Conference of Electrical and Electronic Technologies for Automotive (AEIT AUTOMOTIVE).
- [30] Carlo A. Grazia  
Towards 1 ms WLAN Latency  
Accepted in IEEE 2018 WiMob workshop on Emergency Networks for Public Protection and Disaster Relief, EN4PPDR'18, October 15-17, 2018, Limassol, Cyprus.
- [29] M. Klapez, Carlo A. Grazia, S. Zennaro, M. Cozzani, M. Casoni  
First Experiences with Earthcloud, a Low-Cost, Cloud-Based IoT Seismic Alert System  
Accepted in IEEE 2018 WiMob workshop on Emergency Networks for Public Protection and Disaster Relief, EN4PPDR'18, October 15-17, 2018, Limassol, Cyprus.
- [28] Carlo A. Grazia  
On the Performance of IEEE 802.11P Outside the Context of a BSS Networks  
Proc. of IEEE 2018 International Symposium on Personal, Indoor and Mobile Radio Communications (IEEE PIMRC), June 9-12, 2018, Bologna, Italy.
- [27] Carlo A. Grazia, N. Patriciello, Toke Hoiland-Jorgensen, M. Klapez, M. Casoni, J. Mangues-Bafalluy  
Adapting TCP Small Queues for IEEE 802.11 Networks  
Proc. of IEEE 2018 International Symposium on Personal, Indoor and Mobile Radio Communications (IEEE PIMRC), June 9-12, 2018, Bologna, Italy.
- [26] M. Klapez, Carlo A. Grazia, M. Casoni  
Energy Savings of Sleep Modes enabled by 5G Software-Defined Heterogeneous Networks  
Proc. of IEEE 2018 International Forum on Research and Technologies for Society and Industry, RTSI 2018, September 10-13, 2018, Palermo, Italy.
- [25] M. Klapez, Carlo A. Grazia, M. Casoni  
Quantifying Sleep-Related Energy Savings in Indoor LTE HetNets Radio Access  
Proc. of IEEE 2018 International conference on selected topics in Mobile and Wireless Networking, MoWNet 2018, June 20-22, 2018, Tangier, Morocco.
- [24] Carlo A. Grazia, M. Klapez, M. Casoni  
The Bufferboost Effect: when Drops and Redundancy boost the Throughput

Proc. of IEEE 2018 International Symposium on Networks, Computers and Communications (ISNCC): Wireless and Mobile Communications & Networking, June 19-21, 2018, Rome, Italy.

[23] Toke Hoiland-Jorgensen, Carlo Augusto Grazia, Per Hurtig, Anna Brunstrom  
Flent: The FLExible Network Tester  
ValueTools Conference, December 5-7, 2017, Venice, Italy, DOI: 10.1145/3150928.3150957

[22] Carlo A. Grazia, M. Casoni  
Technology independent Scheduling Architecture for V2X Communications  
IEEE WiMob Conference, Workshop EN4PPDR, October 9-11, 2017, Rome, Italy, DOI:  
10.1109/WiMOB.2017.8115826

[21] Carlo A. Grazia, N. Patriciello, M. Klapez, M. Casoni  
Which AQM fits IoT better?  
accepted at the next IEEE RTSI workshop, Modena, Italy, September 11-13 2017.

[20] M. Klapez, Carlo A. Grazia, M. Casoni  
Reducing Cellular Networks Power Consumption: the Role of Resource Pooling and Cooperation  
Proc. of the IEEE ConTEL Conference, Zagreb, Croatia, 28-30 June 2017, pp.107-114,  
ISBN:9789531842242.

[19] Carlo A. Grazia, N. Patriciello, M. Klapez, M. Casoni  
A Cross-Comparison between TCP and AQM Algorithms: which is the Best Couple for Congestion Control?  
Proc. of the IEEE ConTEL Conference, Zagreb, Croatia, 28-30 June 2017, pp.75-82,  
ISBN:9789531842242.

[18] Carlo A. Grazia, N. Patriciello, M. Klapez, M. Casoni  
Mitigating Congestion and Bufferbloat on Satellite Networks through a Rate-Based AQM  
Proc. of the IEEE ICC International Conference on Communications, May 21-25, 2017,  
Paris, France, pp.4477-4482.

[17] Carlo A. Grazia, N. Patriciello, M. Klapez, M. Casoni  
Enabling Smart Environments by avoiding TCP Congestion through PINK: a no-drop AQM  
Proc. of the IEEE WiMob Conference, Workshop SEUNET, October 17-19, 2016, New York, USA.

[16] M. Klapez, Carlo A. Grazia, M. Casoni  
Towards Massively Multipath Transmissions for Public Safety Communications  
Proc. of the IEEE WiMob Conference, Workshop EN4PPDR, October 17-19, 2016, New York, USA.

[15] N. Patriciello, Carlo A. Grazia, J. Nunez-Martinez, J. Baranda, J. Mangués-Bafalluy, M. Casoni  
Performance Evaluation of Backpressure Routing in Integrated Satellite-terrestrial Backhaul for PPDR Networks  
Proc. of the IEEE WiMob Conference, Workshop EN4PPDR, October 17-19, 2016, New York, USA.

[15] M. Casoni, Carlo A. Grazia, M. Klapez  
Enabling Resource Pooling in Wireless Networks through Software-Defined Orchestration  
Proc. of the IEEE ICC International Conference on Communications, May 22-27, 2016, Kuala Lumpur, Malaysia.

[14] M. Casoni, Carlo A. Grazia, M. Klapez  
An SDN and CPS based opportunistic Upload Splitting for mobile users  
Proc. of the EAI International Conference on CYber physiCaL systems, IoT and sensors Networks (CYCLONE), October 26, 2015, Rome, Italy.

[13] M. Casoni, Carlo A. Grazia, M. Klapez, N. Patriciello

DyBRA: a Dynamic Bandwidth Reservation Algorithm to enhance Satellite Communications  
Proc. of the IEEE Global Communications Conference (GLOBECOM), December 6-10, 2015, San Diego, California (USA).

[12] M. Casoni, Carlo A. Grazia, M. Klapez, N. Patriciello  
A Cooperative Middleware for Enhancing TCP Performance over High Delay Networks  
Proc. of the IEEE Global Communications Conference (GLOBECOM), December 6-10, 2015, San Diego, California (USA).

[11] Carlo A. Grazia, M. Klapez, N. Patriciello, M. Casoni  
PINK: Proactive INjection into ack, a queue manager to impose fair resource allocation among TCP flows  
Proc. of the IEEE WiMob Conference, Workshop EN4PPDR, October 19-21, 2015, Abu Dhabi, UAE.

[10] Carlo A. Grazia, M. Klapez, N. Patriciello, M. Casoni, H. Gierszal, P. Tyczka, K. Pawlina, A. Amditis, E. Sdongos  
Performance Evaluation and Economic Modelling of PPDR Communication Systems  
Proc. of the IEEE WiMob Conference, Workshop EN4PPDR, October 19-21, 2015, Abu Dhabi, UAE.

[9] M. Casoni, Carlo A. Grazia, M. Klapez, N. Patriciello  
Implementation and Validation of TCP Options and Congestion Control Algorithms for ns-3  
Proc. of the 2015 ACM Workshop on ns-3 (WNS3), 13-14 May 2015, Barcelona (Spain), pp. 112-119, DOI: 10.1145/2756509.2756518

[8] M. Casoni, Carlo A. Grazia, M. Klapez, N. Patriciello  
Towards Emergency Networks Security with Per-Flow Queue Rate Management  
International Workshop on Pervasive Networks for Emergency Management (PerNEM), March 27, 2015, St. Louis, Missouri

[7] M. Casoni, Carlo A. Grazia, M. Klapez, N. Patriciello  
Reducing Latency in Satellite Emergency Networks through a Cooperative Transmission Control  
Proc. of IEEE Global Communications Conference (GLOBECOM), December 8-12, 2014, Austin, Texas

[6] Carlo A. Grazia, M. Casoni, P. Valente  
TEMPEST: Test EnvironMent for Performance Evaluation of the Scheduling of packeTs  
Proc. of IEEE Emergency Networks for Public Protection and Disaster Relief (EN4PPDR) Workshop within IEEE WiMob 2014, 8 October 2014, Larnaca (Cyprus), pp.300-307.

[5] Carlo A. Grazia, M. Klapez, N. Patriciello, M. Casoni, A. Amditis, E. Sdongos, H. Gierszal, D. Kanakidis, C. Katsigiannis, K. Romanowski, P. Simplicio, A. Oliveira, S. Sonander, J. Jackson  
Integration between Terrestrial and Satellite Networks: the PPDR-TC vision  
Proc. of IEEE Emergency Networks for Public Protection and Disaster Relief (EN4PPDR) Workshop within IEEE WiMob 2014, 8 October 2014, Larnaca (Cyprus), pp.202-209.

[4] M. Casoni, Carlo A. Grazia, P. Valente  
A Low-Latency and High-Throughput Scheduler for Emergency and Wireless Networks  
IEEE International Conference on Communications (ICC), June 10-14, 2014, Sydney, Australia

[3] M. Casoni, Carlo A. Grazia, N. Patriciello  
On the Performance of Linux Container with Netmap/VALE for Networks Virtualization  
IEEE International Conference On Networking (ICON), December 11-13, 2013, Singapore

[2] M. Casoni, Carlo A. Grazia, P. Valente  
A Flexible and Green Scheduler for providing QoS and High Throughput over Wireless Links



IEEE ICCST, October 04-06, 2013, Hammamet, Tunisy, pp.218-225, ISBN: 978-9938-9511-6-5

[1] E. Giachino, Carlo A. Grazia, C. Laneve, M. Lienhardt, P. Wong  
DeadLock Analysis of Concurrent Objects - Theory and Practice  
iFM Conference, Springer, June 10-14, 2013, Turku, Finland