

# Curriculum Vitae

Daniele Borio

September 2020

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## 1 Personal Details

**Full Name (first, last):** Daniele Borio

**E-mail:** [daniele.borio@ec.europa.eu](mailto:daniele.borio@ec.europa.eu)

**Date of birth:** October 31, 1980

**Citizenship:** Italian

**Language Skills:** Italian (Native), English (level C1), French (level C1)

## 2 Professional Experience

### **January 2019 to present:**

Member of the **JRC Scientific Committee**.

### **March 2020 to present:**

**Scientific and Technical Officer** at the Joint Research Centre (JRC) of the European Commission, Ispra, Italy. Directorate for Sustainable Resources.

### **November 2013 to March 2020:**

**Scientific and Technical Officer** at the Joint Research Centre (JRC) of the European Commission, Ispra, Italy. Directorate for Space, Security and Migration.

### **October 2010 to October 2013:**

**Post-Doctoral Fellow** at the Joint Research Centre (JRC) of the European Commission, Ispra, Italy. Grant-holder cat. 30 at the Institute for the Protection and Security of the Citizen (IPSC)

### **January 2008 to September 2010:**

**Senior Research Associate/Post-Doctoral Fellow** at the PLAN group of the University of Calgary

### **July to December 2007:**

**Internship** at the PLAN group of the University of Calgary, under the supervision of Professor Gérard Lachapelle ([lachapel@ucalgary.ca](mailto:lachapel@ucalgary.ca))

### **July to December 2006:**

**Internship** at the Aerospace department of the Colorado University in Boulder, Colorado, under the supervision of Professor Dennis Akos ([dma@colorado.edu](mailto:dma@colorado.edu))

### **2005-2007:**

**Research Associate** at the Research Institute "Istituto Superiore Mario Boella", Torino, Italy.

Research activities within the projects:

1. GILT, "Galileo Initiative for Local Technologies" coordinated by Thales (<http://www.thalesgroup.com/>) and funded by GJU (Galileo Joint Undertaking)
2. GIRASOLE, "Galileo Integrated Receiver Architecture for Safety of Life Equipment", funded by GJU (Galileo Joint Undertaking)
3. ARTUS, "Advanced Receiver Terminal of User Services", funded by GJU (Galileo Joint Undertaking)

### **September 2004 to January 2005:**

**R&D Junior Engineer** in the Signal Analysis and Simulation (SAS) Group at the Politecnico di Torino, Italy. Conducted R&D on the development of Software-Radio Transceiver based on the IEEE 802.11b, 802.11g and 802.16a standards.

### **March to September 2004:**

**Internship** in the Company "Euroconcepts S.r.l" ([www.euroconcepts.it](http://www.euroconcepts.it)). Development of a prototype transceiver operating according to the IEEE 802.16a standard and equipped with beamforming algorithms.



### 3 Education

#### **Ph.D. in Electrical Engineering**

Politecnico di Torino<sup>1</sup>, ITALY, April 2008

Thesis: "A Statistical Theory for GNSS Signal Acquisition" (available on-line at

[https://www.ucalgary.ca/engo\\_webdocs/other/DBorio\\_Torino\\_Apr08.pdf](https://www.ucalgary.ca/engo_webdocs/other/DBorio_Torino_Apr08.pdf))

Advisors: Prof. Letizia Lo Presti ([letizia.lopresti@polito.it](mailto:letizia.lopresti@polito.it)) and Prof. Gérard Lachapelle ([lachapel@ucalgary.ca](mailto:lachapel@ucalgary.ca))

Major area: satellite navigation, wireless communications, software radio, digital signal processing

#### **Professional Exam in Electrical Engineering, 2005**

#### **M.Sc. (Double Diplôme) in Electrical Engineering**

Politecnico di Torino, ITALY, September 2004

Ecole Nationale Supérieure d'Electronique et Radioélectricité de Grenoble (ENSERG), FRANCE, September 2004

Thesis: "DSP implementation of an OFDM Tx-Rx chain with receiver beamforming algorithms"

Advisor: Prof. Letizia Lo Presti ([letizia.lopresti@polito.it](mailto:letizia.lopresti@polito.it))

#### **Gradué en Ingénierie (Electronic Engineering)**

Ecole Nationale Supérieure d'Electronique et Radioélectricité de Grenoble (ENSERG), FRANCE, June 2003

### 4 Scientific Activity

The applicant's research interests have been developed mainly along the fields of Signal Processing and Wireless Communications with specific focus on Satellite Navigation and Software Defined Radio.

They include digital and satellite communications, signal detection and tracking, Radio Frequency (RF) interference mitigation and digital receiver design. The main research activity of the applicant has been in the field of Global Navigation Satellite Systems (GNSS) with specific focus in the design of navigation receivers. This has led to the development of innovative algorithms for the processing of new GNSS modulations and for specific applications such as indoor navigation and weak signal processing.

From May 2008 to September 2010, the applicant has been involved in the design and development of the GSNRx<sup>TM</sup> software, a software-based GNSS receiver able to process several modulation schemes including legacy and modernized GPS signals. This has led to a fully operational navigation receiver with a flexible and modular architecture simplifying the design and testing of new receiver and navigation algorithms.

The software can be directly interfaced with several front-ends and produce location and navigation information combining measurements from several live signal sources. Specific focus has also been devoted to real-time applications.

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<sup>1</sup> Politecnico di Torino was established in 1859, and is a leader technical university in Italy in the fields of Engineering; it is ranked 51-75th in the 2008 world university ranking in engineering, and 7th in Europe (<http://www.arwu.org/ARWU-FIELD2008/ENG2008.htm>).

From October 2010 to March 2020, the applicant worked in the field of RF compatibility with specific focus on the coexistence between GNSS and other communications services. In this respect, he has conducted several studies where potential threats to satellite-based navigation have been identified and analysed. The topics considered include GNSS interference, jamming and spoofing.

Within such fields various topics have been developed. The more original contributions produced are listed in the following along with references<sup>2</sup> to the publications listed in Section 9.

1. Signal detection and design of acquisition algorithms for GNSS modulations (P2, P7, P8, P10, P17, P18, C2, C4, C8, C13 and C14)
2. Digital tracking loop design for new GNSS modulations and weak signal applications (P5, P9, P11, P13, P15, C3, C15, C21, C23 and C24)
3. Design and development of Radio Frequency (RF) interference detection and mitigation algorithms in GNSS receivers (P3, P18, C5, C6, C9, C10, C11 and C12 and C47)
4. Coexistence between GNSS services and other technologies such as Digital Video Broadcastig-Terrestrial (DVB-T) and pseudolites (T1, T2, C39, C42, C42, C43)
5. Analysis, design and implementation of GNSS navigation receiver based on Software Defined Radio (SDR) technology (P12, C19 and O1)
6. Multi-rate techniques for signal recovery, analysis and modelling of front-end implementation losses in Direct Sequence Spread Spectrum (DSSS) receivers (P16, C20 and C22)
7. Time-frequency analysis for signal detection and filtering (P4, P6, C5 and C12)

Further contributions have been given to the following fields:

1. Analysis and design of OFDM transceivers (P1, C1 and C7)
2. Beamforming and multi-antenna algorithms (P1, C1, C7, C38 and O5)

The resulting publications are listed in Section 9.

Since April 2020, he has been working in the context of the European Common Agricultural Policy (CAP) where satellite images, GNSS and other technologies are used to monitor and analyse agriculture, food production and environment.

## 5 Teaching and Student Supervision/Advising Activities

The applicant's teaching activity has focused in the fields of Analog and Digital Signal Analysis, Wireless Communications, and Digital Receiver design. Moreover, the candidate has produced teaching material for the classes he taught. Visual material, such as Power Point presentations, has been integrated with software code developed in Matlab in order provide a more complete perspective of the provided notions. When possible, theoretical concepts have been complemented with laboratory experience.

The details of his teaching activities are summarized in Section 5.1.

The applicant has been involved in student supervision both at the Politecnico di Torino and at the University Of Calgary where he advised several MS.c and Ph.D students. As a result, several works have been published in both International Journals and Conferences.

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<sup>2</sup>Acronyms are as follows. P# is short for published Journal Paper, C# stands for published Conference paper, T# is short for Technical and scientific reports and O# indicates "other publications"..

From January 2008 to October 2010, the applicant has officially supervised/co-supervised several MSc students at the University Of Calgary, AB, Canada. Theses produced under the supervision of Daniele Borio are the following:

1. N. Linty, "Codeless Tracking Algorithms for GNSS Software Receivers", Master Thesis (visiting student from Politecnico di Torino , Facoltà di Ingegneria dell'informazione), September 2010.  
Available on-line at [https://schulich.ucalgary.ca/files/plan/linty2010\\_phd.pdf](https://schulich.ucalgary.ca/files/plan/linty2010_phd.pdf)
2. L. Montloin, "Impact of Interference Mitigation Techniques on a GNSS Receiver", Memoire de fin d'Etudes (visiting student from Ecole Nationale de l'Aviation Civile, Toulouse), September 2010.  
Available on-line at [https://schulich.ucalgary.ca/files/plan/montloin2010\\_phd.pdf](https://schulich.ucalgary.ca/files/plan/montloin2010_phd.pdf)
3. N. Sokolova, "Doppler Measurements and Velocity Estimation: Comparison of Standard and High Sensitivity Receivers", MSc Thesis, published as Report No. 20299, Department of Geomatics Engineering, The University of Calgary, Canada, December 2009.  
Available on-line at [https://schulich.ucalgary.ca/files/plan/sokolova2009\\_msc.pdf](https://schulich.ucalgary.ca/files/plan/sokolova2009_msc.pdf)
4. S. Fazio, "Multi-rate Signal Processing for Wide-band GNSS Signals", Master Thesis (visiting student from Politecnico di Torino, Facoltà di Ingegneria dell'informazione), July 2009.  
Available on-line at [https://schulich.ucalgary.ca/files/plan/fazio2009\\_phd.pdf](https://schulich.ucalgary.ca/files/plan/fazio2009_phd.pdf)
5. G. Giordanengo, "Impact of Notch Filtering on Tracking Loops for GNSS Applications", Master Thesis (visiting student from Politecnico di Torino, Facoltà di Ingegneria dell'informazione), January 2009.  
Available on-line at [https://schulich.ucalgary.ca/files/plan/giordanengo2009\\_phd.pdf](https://schulich.ucalgary.ca/files/plan/giordanengo2009_phd.pdf)
6. A. Martinetti, "Comparison of Standard and Generalized Post-Correlation Differential Coherent Detection Strategies for Weak GNSS Signal Acquisition", Master Thesis (visiting student from Politecnico di Torino, Facoltà di Ingegneria dell'informazione), January 2009.  
Available on-line at [https://schulich.ucalgary.ca/files/plan/martinetti2009\\_phd.pdf](https://schulich.ucalgary.ca/files/plan/martinetti2009_phd.pdf)
7. J. Courtois, "Enhancement of Acquisition and Detection performance through the combination of GIOVE-A L1 channels", Memoire de fin d'Etudes (visiting student from Ecole Nationale de l'Aviation Civile (ENAC), Toulouse, France), July 2008.  
Available on-line at [https://schulich.ucalgary.ca/files/plan/courtois2008\\_phd.pdf](https://schulich.ucalgary.ca/files/plan/courtois2008_phd.pdf)

He also advised/co-supervised the following PhD students in the PLAN Group (University of Calgary) and at the Joint Research Centre (JRC) of the European Commission:

- Ciro Gioia, from January 2013 to April 2014, in the area of satellite navigation in difficult environments
- Pratibha B. Anantharamu, from January 2009 to September 2011 , in the area of new GNSS signal processing
- Shashank Satyanarayana, from January 2009 to September 2011, in the field of indoor fading characterization



- Kannan Muthuraman, from January 2009 to January 2010, in the area of combined signal processing for new GNSS signals

The theses produced by the students advised/co-supervised by the applicant are listed in the following:

8. C. Gioia, "GNSS Navigation in difficult environments: Hybridization and Reliability". PhD Thesis, Parthenope University, Naples, Italy, April 2014.  
Available on-line at [http://pang.uniparthenope.it/sites/default/files/PhD\\_thesis\\_CG.pdf](http://pang.uniparthenope.it/sites/default/files/PhD_thesis_CG.pdf)
9. P. Anantharamu, "Space-Time Equalization Techniques for New GNSS Signals". PhD Thesis, Report No. 20335, Department of Geomatics Engineering, The University of Calgary, Canada, September 2011.  
Available on-line at [https://schulich.ucalgary.ca/files/plan/ananatharamu2011\\_phd.pdf](https://schulich.ucalgary.ca/files/plan/ananatharamu2011_phd.pdf)
10. S. Satyanarayana, "GNSS Channel Characterization and Enhanced Weak Signal Processing". PhD Thesis, Report No. 20336, Department of Geomatics Engineering, The University of Calgary, Canada, September 2011.  
Available on-line at [https://schulich.ucalgary.ca/files/plan/satyanarayana2011\\_phd.pdf](https://schulich.ucalgary.ca/files/plan/satyanarayana2011_phd.pdf)
11. K. Muthuraman, "Tracking Techniques for GNSS Data/Pilot Signals". PhD Thesis, published as Report No. 20303, Department of Geomatics Engineering, The University of Calgary, Canada, January 2010.  
Available on-line at [https://schulich.ucalgary.ca/files/plan/muthuraman2010\\_phd.pdf](https://schulich.ucalgary.ca/files/plan/muthuraman2010_phd.pdf)

## 5.1 Detailed List of the Courses Taught

### **List of courses taught as instructor**

#### **2019:**

1. ESA/JRC International Summerschool on GNSS 2019 – He provided a lecture on "GNSS Threats and Countermeasures" and organized the "Lab on GNSS Signal Processing". A new lab session on GNSS measurement generation has been added to the lab.

#### **2018:**

2. ESA/JRC International Summerschool on GNSS 2018 – He provided a lecture on "GNSS Threats and Countermeasures" and organized the "Lab on GNSS Signal Processing".

#### **2017:**

3. ESA/JRC International Summerschool on GNSS 2017 – He provided a lecture on "GNSS Threats and Countermeasures" and organized the "Lab on GNSS Signal Processing".

#### **2016:**

4. ESA/JRC International Summerschool on GNSS 2016 – He was responsible for the local organization of the event. He also provided a lecture on "GNSS Threats and Countermeasures" and organized the "Lab on GNSS Signal Processing" and the "Workshop: Practical Work with GNSS Receivers".

#### **2015:**

5. ESA/JRC International Summerschool on GNSS 2015 – He provided a lecture on "GNSS Threats and Countermeasures" and organized the "Lab on GNSS Signal Processing".

**2014:**

6. ESA/JRC International Summerschool on GNSS 2015 – He provided a lecture on “GNSS Threats and Countermeasures” and organized the “Lab on GNSS Signal Processing”.

**2013:**

7. ESA International Summerschool on GNSS 2013 – He provided a lecture on “Interference Mitigation and Detection” and organized the “Lab on GNSS Signal Processing”.

**2012:**

1. ENGO638 – GNSS Receiver Design (Master Degree in Geomatics Engineering, University of Calgary). The course has been re-designed and updated with respect to the previous editions. The lecture notes consists of 242 pages
2. JRC Summer School on GNSS Core Technologies – The applicant was one of the organizers/coordinators of the event. His responsibilities included the definition of the program, the coordination of the speakers and the editing of the lecture notes. The applicant provided three lectures on different GNSS related topics.

**2010:**

1. ENGO638 – GNSS Receiver Design (Master Degree in Geomatics Engineering, University of Calgary)

**2009:**

1. ENGO638 – GNSS Receiver Design (Master Degree in Geomatics Engineering, University of Calgary) (co-taught with Dr. C. O’Driscoll) . Development of lecture notes consisting of 221 detailed slides

**List of courses taught as teaching assistant**

**2007:**

1. Signal Analysis (Bachelor in Biomedical Engineering, Politecnico di Torino).

**2005:**

1. Analog and Digital Signal Processing (Bachelor in Telecommunications Engineering, Politecnico di Torino).

**2004-05:**

1. Electrical Communications (Joint Bachelor Degree Program, Politecnico di Torino / Institut National Polytechnique de Grenoble).

**2004:**

1. Analog and Digital Signal Processing (Bachelor in Telecommunications Engineering, Politecnico di Torino).

## **6 Research Projects**

**April 2020 till present**

Conducted research in the framework of the European Common Agricultural Policy (CAP) .

**June 2015 till March 2020:**

Conducted research in the framework of the GALINNOVA project with the goal of developing robust techniques for the processing of GNSS signals. This includes monitoring activities on new Galileo and GNSS signals and the development of innovative techniques for interference detection and mitigation.

**June 2012 till May 2014:**

Conducted research in the framework of the European Programme for Critical Infrastructure Protection (EPCIP) with specific emphasis on the protection of communication and navigation infrastructures.

**October 2010 to June 2012:**

Conducted research on the compatibility analysis between GNSS and other communications services including pseudolites. These research activities are part of the support provided by the JRC/IPSC to the European Commission (DG ENTR) and the European Conference of Postal and Telecommunications Administrations (CEPT), working group SE40.

Reference: Dr. Joaquim Fortuny Guasch([joaquim.fortuny@jrc.ec.europa.eu](mailto:joaquim.fortuny@jrc.ec.europa.eu))

**January 2008 to September 2010:**

Conducted research for several projects within the activities of the PLAN group at the University of Calgary. These projects involve public and industrial partners including:

1. Research In Motion (RIM), (<http://www.rim.com>)
2. Defence Research and Development Canada (DRDC), (<http://www.drdc-rddc.gc.ca>)
3. General Motors (GM), (<http://www.gm.com>)

These research activities have led to the following conference and journal publications

1. C25, C26 and R1
2. C21, P11 and P13
3. C16, C17, C23, P9 and P10

listed in Section 9, plus several others in preparation

Reference: Prof. Gérard Lachapelle ([lachapel@ucalgary.ca](mailto:lachapel@ucalgary.ca))

**2005-2006**

Conducted research within the ARTUS project, “Advanced Receiver Terminal For User Services” (<http://www.artus-gju.org/index.html>), funded by Galileo Joint Undertaking (GJU) within the second call . The applicant was work package (WP) responsible for the task “Core Technology Investigation – Interference Mitigation”, Area 1B.

The research activities within this project led to several publications (P3, P4, C5, C6, C10, C11, C12) listed in Section 9.

Reference: Prof. Letizia Lo Presti ([letizia.lopresti@polito.it](mailto:letizia.lopresti@polito.it))

**2005-2006**

Conducted research within the GIRASOLE project, “Galileo Integrated Receiver for Advanced Safety Of Life Equipment” coordinated by Alcatel Alenia Space Italia and funded by Galileo Joint Undertaking (GJU) within the second call. The main research activity was the development and design of detection and mitigation algorithms for Radio Frequency (RF) interference in GNSS receivers for Safety of Life (SoL) applications.

Reference: Prof. Letizia Lo Presti ([letizia.lopresti@polito.it](mailto:letizia.lopresti@polito.it))

**2005-2006**

Conducted research within the GILT project, “Galileo Initiative for Local Technologies” funded by Galileo Joint Undertaking (GJU) and coordinated by Thales (<http://www.thalesgroup.com/>).

Reference: Prof. Letizia Lo Presti ([letizia.lopresti@polito.it](mailto:letizia.lopresti@polito.it))

**2004-2006**

Conducted research within the CAPANINA project, “Communications from Aerial Platform Networks delivering broadband communications for All” (contract number FP6-IST-2003-506745), which received a total funding of \$4.2 million distributed over 13 European partners from both Universities and private companies.

The research in this project led to a number of scientific results presented in the papers P1, C1 and C9 listed in Section 9.

Reference: Prof. Marina Mondin ([marina.mondin@polito.it](mailto:marina.mondin@polito.it))

**2004-2005**

Conducted research with in the PRIMO project (Piattaforme Riconfigurabili per Interoperabilità in Mobilità – Reconfigurable platforms for mobile interoperability). The project led to the development of a prototype OFDM transceiver equipped with beamforming algorithms at the receiver side.

Reference: Prof. Marina Mondin ([marina.mondin@polito.it](mailto:marina.mondin@polito.it))

## 7 Professional Activities

**Since January 2020**

**Associate Editor of NAVIGATION**, the Journal of the Institute of Navigation (ION).

**Since April 2010 to present:**

**Member of the Editorial Advisory Board** of GPS Solutions, the Journal of Global Navigation Satellite Systems, Springer (<http://www.springer.com/earth+sciences+and+geography/geophysics/journal/10291>)

**Since 2005 to present:**

**Regular reviewer** for many International Journals and Conferences.

Among them:

Springer GPS Solutions

ION NAVIGATION

IEEE Transactions on Aerospace and Electronic Systems

IET Radar Sonar and Navigation

IET Signal Processing

## 8 Honours, Awards, Patents, Software, and Professional Society Membership

- ✓ **Member of IEEE (since 2005).**
- ✓ **Member of the American Institute of Navigation (ION) (since 2008).**

**September 2019**

**Best presentation award** at the ION GNSS+ conference. He obtained the award for the presentation relative to the paper titled “Galileo E6-B Tracking with Non-Coherent Integration and Kalman Filtering”

**September 2018**

**Best presentation award** at the ION GNSS+ conference. He obtained the award for the presentation relative to the paper titled “Huber's Non-linearity for Robust Transformed Domain GNSS Signal Processing”

**September 2017**

**Best presentation award** at the ION GNSS+ conference. He obtained the award for the presentation relative to the paper titled “Multi-Constellation T-RAIM: An Experimental Evaluation”

**May 2016**

**Best paper award** at the European Navigation Conference (ENC), Helsinki, Finland. He obtained the award for the paper titled “Swept GNSS Jamming Mitigation through Pulse Blanking”

**September 2015**

**Best presentation awards** at the ION GNSS+ conference. He obtained two awards for the presentations relative to the papers titled “GGTO: Stability and Impact on Multi-constellation Positioning” and “A Dual-antenna Spoofing Detection System Using GNSS Commercial Receivers”

**January 2013**

**Dr. Samuel M. Burka Award 2012** from the Institute of Navigation, for the paper “A Composite Model for Indoor GNSS Signals: Characterization, Experimental Validation and Simulation” published in the Summer issue of NAVIGATION, Journal of The Institute of Navigation, Vol. 59, No. 2, pp. 77-92.

The purpose of the award is to recognize outstanding achievement in the preparation of papers contributing to the advancement of navigation and space guidance. Shared with Dr. S. Satyanarayana and Prof. G. Lachapelle

**September 2008**

**Student sponsorship award** from the Institute of Navigation, GNSS'08 conference for the paper “Ultra-stable Oscillators: Limits of GNSS Coherent Integration”. Shared with P. Gaggero

**January 2007**

Co-author of a patent with Dr Letizia Lo Presti, Laura Camoriano, Elisabetta Grignani and Emanuele Del Pero, entitled “Method and apparatus for frequency estimation”, Patent No. EP1847838 of the European Patent Office.

The main functionalities of the proposed algorithm have been published in the papers P5 and C3.

**October 2006**

Co-author of a patent with Laura Camoriano and Dr Paolo Mulassano entitled “A method and an apparatus for reducing interference frequencies by using a notch filter”, Patent No. EP1916767 of the European Patent Office.

The main functionalities of the proposed algorithm have been published in the papers P3, C9 and C11.

**May 2006**

**Best student paper award** at the European Navigation Conference (ENC) for the paper “Acquisition analysis for Galileo BOC modulated Signals: theory and simulation”.

**April 2006**

Co-author of a patent with Laura Camoriano and Dr Paolo Mulassano entitled, “Time-frequency interfering detector”, Patent No. EP1862816of the European Patent Office.

The main functionalities of the proposed algorithm have been published in the papers P6, C5 and C12.

**2005**

The applicant was awarded the *Premio Optime* by Unione Industriale of Turin, ITALY, for his university career in Electrical and Electronics Engineering.

**Software development**

**October 2010 to Present**

Development of several software tools for the analysis and characterization of radio frequency threats to GNSS signals. These tools include JIM (JRC Interference Monitor) and PLight, a real-time pseudolite able to operate in the GPS L1 bands. The software is developed in C++ and is designed to operate along with an USRP (Universal Software Radio Platform).

**May 2008 to September 2010**

Co-authorship of GSNRx™ (GNSS Software Navigation Receiver), a C++ class-based GNSS software receiver (Petovello, O’Driscoll, Lachapelle, Borio).

## 9 List of Publications in International Journals and Conferences

### 9.1 International Journals

- P.59 C. Gioia and **D. Borio** "Android positioning: from stand-alone to cooperative approaches" **Applied Geomatics**, accepted for publication, Aug. 2020
- P.58 **D. Borio** and C. Gioia "GNSS Interference Mitigation: a Measurement and Position Domain Assessment" **NAVIGATION, the Journal of the Institute of Navigation**, accepted for publication, Aug 2020
- P.57 M. Susi and **D. Borio** "Kalman Filtering with Non-coherent Integrations for Galileo E6-B Tracking" **NAVIGATION, the Journal of the Institute of Navigation**, on-line first, March 2020  
<https://onlinelibrary.wiley.com/doi/full/10.1002/navi.380>
- P.56 **D. Borio** "An Experimental Evaluation of GNSS/INS Verification Strategies for Vehicular Applications", **IEEE Intelligent Transportation Systems Magazine**, Vol. 12, Issue 3, Fall 2020, pp. 25-35
- P.55 I. Fernández-Hernández, T. Senni, **D. Borio** and G. Vecchione "High-parity vertical Reed-Solomon codes for long GNSS high-accuracy messages" **NAVIGATION, the Journal of the Institute of Navigation**, Vol. 67, Issue 2, Summer 2020, pp. 365-378 <https://onlinelibrary.wiley.com/doi/abs/10.1002/navi.357>
- P.54 **D. Borio** "Cross-correlation codeless processing of BOC modulated signals", **IET Radar Sonar and Navigation**, Vol. 13, Issue 11, November 2019, pp. 1998-2007
- P.53 **D. Borio** and P. Closas "Robust transform domain signal processing for GNSS" **NAVIGATION, the Journal of the Institute of Navigation**, Vol. 66, Issue 2, Summer 2019, pp. 305-323
- P.52. **D. Borio** and P. Closas "Complex signum non-linearity for robust GNSS interference mitigation", **IET Radar Sonar and Navigation**, Vol. 12, Issue 8, August 2018, p. 900 – 909
- P.51.**D. Borio**, H. Li and P. Closas "Huber's Non-Linearity for GNSS Interference Mitigation", **Sensors** MDPI, Vol. 2018, July 2018, pp. 1-26
- P. 50.**D. Borio**, E. Cano and G. Baldini "Speed Consistency in the Smart Tachograph", **Sensors** MDPI, Vol. 2015, May 2018, pp. 1-21
- P.49. M. G. Amin, **D. Borio**, Y. D. Zhang and L. Galleani, "Time-Frequency Analysis for GNSSs: From interference mitigation to system monitoring," **IEEE Signal Processing Magazine**, vol. 34, no. 5, September 2017, pp. 85-95
- P.48. **D. Borio** "Myriad non-linearity for GNSS robust signal processing" **IET Radar Sonar and Navigation**, Vol. 11, Issue 10, pp. 1467 - 1476, September 2017.

- P.47. **D. Borio** "Coherent Side-Band BOC Processing" *IET Radar Sonar and Navigation*, Vol. 11, Issue 10, September 2017, pp. 1455-1466
- P.46 **D. Borio**, C. Gioia, E. Cano Pons and G. Baldini "GNSS Receiver Identification Using Clock-Derived Metrics" *Sensors*, Vol. 17, Issue 9, September 2017, pp. 1-18
- P.45. F. Dimc , M. Bazec, **D. Borio**, C. Gioia, G. Baldini and M. Basso, "An Experimental Evaluation of Low-cost GNSS Jamming Sensors" *NAVIGATION, the Journal of the Institute of Navigation*, Vol. 64, Issue 1, Spring 2016, pp. 93-109
- P.44. C. Gioia and **D. Borio** "A Statistical Characterization of the Galileo-to-GPS Inter-system Bias", *Journal of Geodesy*, , Vol. 90, Issue 11, November 2016, pp. 1279–1291
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## 9.2 International Conferences

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C.82 **D. Borio** and C. Gioia "Mitigation of Frequency-Hopped Tick Jamming Signals" IEEE/ION Position, Location and Navigation Symposium (PLANS), Portland, Oregon, 20-23 April 2020

C81. **D. Borio**, T. Senni and I. Fernandez-Hernandez "Experimental Analysis of a Candidate Galileo E6-B Data Dissemination Scheme" 2020 International Technical Meeting of The Institute of Navigation, San Diego, California, 21-24 January 2020

C80. **D. Borio** and C. Gioia "Robust Interference Mitigation: a Measurement and Position Domain Assessment" 2020 International Technical Meeting of The Institute of Navigation, San Diego, California, 21-24 January 2020

C79. **D. Borio**, M. Susi, I. Fernandez-Hernandez and T. Senni "The Galileo E6-B Propagation Channel: An Experimental Characterization", 25th Ka and Broadband Conference, Sorrento, Italy, 30 September-2 October 2019

C78. M. Susi and **D. Borio** "Galileo E6-B Tracking with Non-coherent Integration and Kalman Filtering" 32nd International Technical Meeting of The Satellite Division of the Institute of Navigation (ION GNSS+), Miami, Florida, 16-20 September 2019

C77. H. Li, **D. Borio** and P. Closas "Dual-Domain Robust GNSS Interference Mitigation" 32nd International Technical Meeting of The Satellite Division of the Institute of Navigation (ION GNSS+), Miami, Florida, 16-20 September 2019

- C76. C. Gioia and **D. Borio** "GNSS-based Cooperative Positioning: Approaches and Demonstration" 32nd International Technical Meeting of The Satellite Division of the Institute of Navigation (ION GNSS+), Miami, Florida, 16-20 September 2019
- C75. C. Gioia, S. Damy and **D. Borio** "GNSS stability monitoring using the three-cornered hat method" 50th Annual Precise Time and Time Interval Systems and Applications (PTTI) Meeting, Reston, Virginia, 28-31 January 2019
- C74. C. Gioia, **D. Borio** and S. Damy "Precise time in your pocket: Timing performance of android phones" 50th Annual Precise Time and Time Interval Systems and Applications (PTTI) Meeting, Reston, Virginia, 28-31 January 2019
- C73. **D. Borio** and M. Susi "Non-Coherent Processing of Galileo E6b Signals" 31st International Technical Meeting of The Satellite Division of the Institute of Navigation (ION GNSS+), Miami, Florida, 24-28 September 2018
- C72. **D. Borio**, H. Li and P. Closas "Huber's Non-linearity for Robust Transformed Domain GNSS Signal Processing" 31st International Technical Meeting of The Satellite Division of the Institute of Navigation (ION GNSS+), Miami, Florida, 24-28 September 2018
- C71. M. Makridis, K. Mattas, **D. Borio**, R. Giuliani and B. Ciuffo "Estimating reaction time in Adaptive Cruise Control systems" 29th IEEE Intelligent Vehicles Symposium, June 2018
- C70. **D. Borio** "GNSS Receiver Identification Using Clock-Derived Metrics" European Navigation Conference (ENC), Gothenburg, Sweden, 14-17 May 2018
- C69. **D. Borio**, C. Gioia and G. Baldini "Clock-Unrelated Features for GNSS Receiver Fingerprinting" 30th International Technical Meeting of The Satellite Division of the Institute of Navigation (ION GNSS+), Portland, Oregon, 26-29 September 2017
- C68. C. Gioia and **D. Borio** "Multi-Constellation T-RAIM: An Experimental Evaluation" 30th International Technical Meeting of The Satellite Division of the Institute of Navigation (ION GNSS+), Portland, Oregon, 26-29 September 2017
- C67. E. Dierikx, A. Wallin, M. Merimaa, R. Bauernfeind, M. Kirkko-Jaakkola, V. Catalano, K. A. Aarmo and **D. Borio** "EGNSS Based Robust Synchronization Service", 2017 European Frequency and Time Forum & International Frequency Control Symposium (EFTF-IFCS 2017), Besançon, France, 10-13 July 2017
- C66. **D. Borio**, "Robust Signal Processing for GNSS" European Navigation Conference (ENC), Lausanne, Switzerland, 9-12 May 2017
- C65. **D. Borio**, C. Gioia, A. Stern, F. Dimc and G. Baldini "Jammer Localization: from Crowdsourcing to Synthetic Detection" 29th International Technical Meeting of The Satellite Division of the Institute of Navigation (ION GNSS+), Portland, Oregon, 14-16 September 2016

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- C63. **D. Borio**, E. Cano and C. Gioia “From Agnostic to Model-Based GNSS Jamming Detection” 29th International Technical Meeting of The Satellite Division of the Institute of Navigation (ION GNSS+), Portland, Oregon, 14-16 September 2016
- C62. **D. Borio** “Swept GNSS Jamming Mitigation through Pulse Blanking” European Navigation Conference (ENC), Helsinki, Finland, 30 May - 2 June 2016
- C61. **D. Borio**, C. Gioia, G. Baldini and R. Giuliani “A Real-time SDR Sanitizer for GNSS Interference Mitigation in Road Transportation” 24th International Electrotechnical and Computer Science Conference, IEEE ERK, Portorož, Slovenia, 21-23 September 2015
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- C59. **D. Borio** and C. Gioia “A Dual-antenna Spoofing Detection System Using GNSS Commercial Receivers” 28th International Technical Meeting of The Satellite Division of the Institute of Navigation (ION GNSS+), Tampa, Florida, 14-18 September 2015
- C58. C. Gioia and **D. Borio** “GGTO: Stability and Impact on Multi-constellation Positioning”, 28th International Technical Meeting of The Satellite Division of the Institute of Navigation (ION GNSS+), Tampa, Florida, 14-18 September 2015
- C57. **D. Borio** and C. Gioia “Real-Time Jamming Detection using the Sum-of-Squares Paradigm”, 5th International Conference on Localization and GNSS (ICL-GNSS), Gothenburg, Sweden, 22-24 June 2015
- C56. C. Gioia, S. Gaglione and **D. Borio** “Inter-system Bias: Stability and Impact on Multi-constellation Positioning” IEEE Metrology for Aerospace (MetroAeroSpace), pp. 103-108, Benevento, Italy, 4-5 June 2015
- C55. **D. Borio** “Double Phase Estimator: New Results”, 7th ESA Workshop on Satellite Navigation Technologies (NAVITEC), ESTEC, Noordwijk, the Netherlands, 3-5 December 2014
- C54. **D. Borio** and C. Gioia “Improved Pseudolite Navigation using C/N0 Measurements”, 22nd European Signal Processing Conference (EUSIPCO 2014), Lisbon, Portugal, 1-5 September, 2014.
- C53. **D. Borio** “A Multi-State Notch Filter for GNSS Jamming Mitigation”, 4th International Conference on Localization and GNSS (ICL-GNSS), Helsinki, Finland, 24-26 June, 2014
- C52. C. Gioia and **D. Borio** “Asynchronous Pseudolites and GNSS Hybrid Positioning”, 4rd International Conference on Localization and GNSS (ICL-GNSS), Helsinki, Finland, 24-26 June, 2014
- C51. D. Borio and C. Gioia “Indoor Navigation Using Asynchronous Pseudolites”, 6th European Workshop on GNSS Signals and Signal Processing, Munich, Germany, 5 – 6 December, 2013

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- C47. **D. Borio**, C. O'Driscoll and J. Fortuny "GNSS Jammers: Effects and Countermeasures", 6th ESA Workshop on Satellite Navigation Technologies (NAVITEC), ESTEC, Noordwijk, the Netherlands, 5-7 December 2012
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- C45. **D. Borio**, E. Cano "Evaluation of Pulsed Interference Mitigation Techniques Accounting for Signal Conditioning" European Navigation Conference, Gdansk, Poland, 25-27 April 2012
- C44 **D. Borio**, M. Rao and C. O'Driscoll "Quality Monitoring of BOC Signals Through Codeless Techniques" European Navigation Conference, Gdansk, Poland, 25-27 April 2012
- C.43 C. O'Driscoll, M. Rao, **D. Borio**, E. Cano, J. Fortuny, F. Bastide and D. Hayes "Compatibility Analysis Between LightSquared and L1/E1 GNSS Signals", IEEE/ION Position Location and Navigation Symposium (PLANS), Myrtle Beach, SC, 24-26 April 2012
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- C35. M. Susi, **D. Borio** and G. Lachapelle "Accelerometer Signal Features and Classification Algorithms for Positioning Applications", *ION/ITM'11*, San Diego, California, 24-26 January 2011.
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- C.30. C. O'Driscoll, M. Tamazin, **D. Borio** and G. Lachapelle "Investigation of the Benefits of Combined GPS/GLONASS for High Sensitivity Receiver", *ION/GNSS'10*, Portland, Oregon, 21-24 September 2010
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- C19. M. G. Petovello, C. O'Driscoll, G. Lachapelle, **D. Borio** and H. Murtaza "Architecture and Benefits of an Advanced GNSS Software Receiver" *International Symposium on GPS/GNSS*, Tokyo, Japan, November 11-14, 2008
- C18. P. Gaggero and **D. Borio** "Ultra-stable Oscillators: Limits of GNSS Coherent Integration", *ION GNSS 2008*, Savannah, Georgia, US, September, 16-19, 2008
- C17. **D. Borio** "FFT Sign Search with Secondary Code Constraints for GNSS Signal Acquisition", *IEEE Vehicular Technology Conference (VTC)*, Calgary, Alberta, Canada, September 21-24, 2008
- C16. **D. Borio**, C. Mongrédien and G. Lachapelle "New L5/E5a Acquisition Algorithms: Analysis and Comparison", *10th International Symposium on Spread Spectrum Techniques and Applications (ISSSTA)*, Bologna, Italy, August 25-28, 2008
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- C14. **D. Borio**, C. Gernot, F. Macchi and G. Lachapelle "The Output SNR and its Role in Quantifying GNSS Signal Acquisition Performance", *European Navigation Conference (ENC-GNSS)*, Toulouse, France, April 23- 25, 2008
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