

Conference Program

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TUESDAY, 2ND JUNE

10:00 Conference Opening

Prof. Jari Nurmi (Tampere University)

10:20 Technical Session *Hybrid Positioning*

10:20

Tight Integration of GNSS and WSN Ranging based on Spatial Map Data Enhancing Localization in Urban Environments

Paul Schwarzbach, Albrecht Michler, Oliver Michler, TU Dresden, Germany

10:40

A study on robust navigation by means of GNSS, network LTE and INS integration

Davide Imparato¹, Jean-Jacques Floch¹, Elena Simona Lohan², Martin Ruzicka³, Petr Casek⁴, Marketa Palenska⁴

¹Airbus Defense and Space, Germany; ²Tampere University, Finland; ³Evektor, Czech Republic; ⁴Honeywell, Czech Republic

11:00 Keynote *GNSS-based 3D modelling of cities*

Dr. Anahid Basiri
University of Glasgow

12:00 Break

12:20 Technical Session *GNSS Receivers*

12:20 – **Best Paper Award Winner**

Solving Multi-GNSS Signal Biases from Undifferenced Observations

Niilo Sirola, Jussi Parviainen, Olli Särkkä, Juha Roström
Exafore Oy, Finland

12:40

Architecture, design and implementation of carrier phase vector tracking in GNSS RTK receiver

Nikolay Mikhaylov¹, Valery Chistyakov², David Oertel¹

¹Robert Bosch GmbH, Germany

²BORA Ltd., Russia

13:00

Performance and Complexity Comparison of Adaptive Loop-Bandwidth Tracking Techniques

Iñigo Cortés, Jon Ander Iñiguez de Gordo, Johannes Rossouw van der Merwe, Alexander Rügamer, Wolfgang Felber
Fraunhofer IIS, Germany

13:20

Position Solution Sensitivity for Snapshot Receivers

Johannes Rossouw van der Merwe, Xabier Zubizarreta, Daniel Rubino, Alexander Rügamer, Wolfgang Felber
Fraunhofer IIS, Germany

13:40 Lunch break

14:20 Technical Session *5G Positioning*

14:20 – **Best Paper Award Candidate**

Positioning Based on Noise-Limited Censored Path Loss Data

Aki Karttunen, Mikko Valkama, Jukka Talvitie
Tampere University, Finland

14:40

Radio-based Sensing and Indoor Mapping with Millimeter-Wave 5G NR Signals

Carlos Baquero Barneto, Taneli Riihonen, Matias Turunen, Mike Koivisto, Jukka Talvitie, Mikko Valkama
Tampere University, Finland

15:00

Deep Learning Based Localization and Handover Optimization in 5G NR Networks [◆IEEE](#)

Roman Klus, Lucie Klus, Dmitrii Solomitckii, Mikko Valkama, Jukka Talvitie
Tampere University, Finland

15:20

A Primer on Real-world RSS-based Outdoor NB-IoT Localization [◆IEEE](#)

Thomas Janssen, Maarten Weyn, Rafael Berkvens
Universiteit Antwerpen – IMEC, Belgium

15:40 Break

16:00 Technical Session *Spoofing and Interference*

16:00 – **Best Paper Award Candidate**

Sub-Messages Scheduling In GNSS Packet Broadcasting By Message Splitting [◆IEEE](#)

Francesco Ardizzon, Nicola Laurenti, Stefano Tomasin
University of Padova, Italy

16:20

Simultaneous Jamming and Navigation Pseudolite System [◆IEEE](#)

Johannes Rossouw van der Merwe, Alexander Rügamer, Wolfgang Felber
Fraunhofer IIS, Germany

16:40

Hardware Implementation and Evaluation of the HDDM [◆IEEE](#)

Fabio Garzia, J. Rossouw Van der Merwe, Alexander Rügamer, Wolfgang Felber
Fraunhofer IIS, Germany

17:00

Analog Mitigation of Frequency-Modulated Interference for Improved GNSS Reception [◆IEEE](#)

Karel Pärlin¹, Taneli Riihonen²
¹Rantelon, Estonia
²Tampere University, Finland

17:20

Optimal compromise among security, availability and resources in the design of sequences for GNSS spreading code authentication [◆IEEE](#)

Nicola Laurenti, Anna Poltronieri
University of Padova, Italy

17:40 End of Technical Session

WEDNESDAY, 3RD JUNE

10:00 Special session *GNSS in Smartphones*

10:00

Analyzing Android GNSS Raw Measurements Flags Detection Mechanisms for Collaborative Positioning in Urban Environment

Thomas Verheyde^{1,2}, Antoine Blais², Christophe Macabiau², François-Xavier Marmet³

¹Telecommunication for Space & Aeronautics (TéSA)

²École Nationale de l'Aviation Civile (ENAC); ³Centre National d'Études Spatiales (CNES)

10:20

Assessment of the Vulnerability to Spoofing Attacks of GNSS Receivers Integrated in Consumer Devices

Akmal Rustamov^{1,2}, Alex Minetto¹, Neil Gogoi¹, Fabio Dovis¹

¹Politecnico di Torino

²Turin Polytechnic University in Tashkent

10:40

Precise Point Positioning with single and dual-frequency multi-GNSS Android smartphones

Umberto Robustelli¹, Valerio Baiocchi², Laura Marconi³, Fabio Radicioni³, Giovanni Pugliano¹

¹Department of Engineering, Parthenope University of Naples, Naples Italy

²Department of Civil Constructional and Environmental Engineering DICEA Sapienza University of Rome, Rome, Italy

³Department of Engineering, University of Perugia, Perugia Italy

11:00 Keynote

Concurrent Transmissions: A New Paradigm for Ultra-wideband Ranging and Localization

Prof. Gian Pietro Picco

University of Trento

12:00 Break

12:20 Technical Session *Indoor Positioning*

12:20

NLOS Detection using UWB Channel Impulse Responses and Convolutional Neural Networks

Maximilian Stahlke¹, Sebastian Kram², Christopher Mutschler², Thomas Mahr¹

¹Nuremberg Institute of Technology Georg Simon Ohm

²Precise Localization and Analytics Department Fraunhofer Institute for Integrated Circuits IIS

12:40

Floor Plan-free Particle Filter for Indoor Positioning of Industrial Vehicles

Ivo Silva, Adriano Moreira, Maria João Nicolau, Cristiano Pendão

Algoritmi Research Center, University of Minho, Portugal

13:00

Versatile, low-cost indoor positioning combining Bluetooth and Ultra Wideband technologies

María D. Miñambres¹, Victor Rojo², Antonio Román², Pablo Renero³, Diego R. Llanos³

¹Servicio Prevención de Riesgos Laborales, University of Valladolid, Spain

²RDNest SL, Spain; ³Departamento de Informática, University of Valladolid, Spain

13:20

Sensor Fusion and Well Condition Triangle Approach for BLE-based Indoor Positioning

Amrit Karmacharya¹, German M. Mendoza Silva¹, Joaquín Torres-Sospedra²

¹Universitat Jaume I, Spain

²UBIK Geospatial Solutions, S.L, Spain

13:40 Lunch Break

14:20 Technical Session *Modelling and Estimation*

14:20

Modeling and Mitigating 5G Wireless Downlink Interferences for Low-altitude Aerial vehicles

Wenbo Wang¹, Thilo Fath², Mikko Valkama¹, Elena-Simona Lohan¹

¹Tampere University, Finland

²Airbus, Germany

14:40

Multipath Delay Estimation Using Signal Power Measurements from Multiple Carrier Frequencies

Simon Ollander^{1,2}, Friedrich-Wilhelm Bode², Marcus Baum¹

¹University of Goettingen, Germany; ²Robert Bosch Car Multimedia GmbH, Germany

15:00

On the performance of selected ionospheric modelling schemes in Precise Point Positioning

Jacek Paziewski, Rafal Sieradzki

University of Warmia and Mazury in Olsztyn, Poland

15:20

Support Vector Regression Machine Learning Tool to Predict GNSS Clock Corrections in Real-Time PPP Technique

Mutaz Wajeh Abdlamajud Qafisheh^{1,2}, Angel Martín Furones¹, Joaquín Torres-Sospedra²

¹Departamento de Ingeniería Cartográfica, Geodesia y Fotogrametría, Universitat Politècnica de València. València, Spain

²Institute of New Imaging Technologies, Universitat Jaume I, Castellón, Spain

15:40 Break

16:00 Technical Session *Vehicle Applications*

16:00

GNSS-based Techniques for Accurate Height Component Estimation of Vessels in Finnish Waterways – A review

Afroza Khatun, Sarang Thombre, M. Zahidul H. Bhuiyan, Mirjam Bilker-Koivula, Hannu Koivula

Finnish Geospatial Research Institute (FGI), NLS, Finland

16:20

GNSS Positioning Aspects for the Intelligent Shipping Test Laboratory at Rauma Harbor

Simo Marila, Octavian Andrei, Hannu Koivula, Pasi Häkli, Mirjam Bilker-Koivula

National Land Survey of Finland, Finland

16:40

Comparative Study on GNSS Positioning Systems for Autonomous Vessels in the Arctic Region

Anastasia Yastrebova¹, Marko Höyhty², Sandrine Boumard¹, Aleksandr Ometov³

¹Autonomous Connectivity Systems Research Group, VTT Technical Research Centre of Finland Ltd, Oulu, Finland

²Space Technology Research, VTT Technical Research Centre of Finland Ltd, Oulu, Finland

³Faculty of Information Technology and Communication Sciences, Tampere University, Tampere, Finland

17:00

Challenges in Characterization of GNSS Precise Positioning Systems for Automotive

Cristiano Pendão¹, André Ferreira¹, Adriano Moreira¹, César Martins³, Hélder Silva²

¹Algoritmi Research Center, University of Minho – Portugal

²Center for MicroElectromechanical Systems, University of Minho – Portugal

³Bosch Car Multimedia Portugal, S.A., Braga – Portugal

17:20

Hybridized GNSS and IMU Positioning for Train Infrastructure Asset Health Status Monitoring within the SIA-Project

Ramin Moradi, Michael Hutchinson

Nottingham Scientific Limited, United Kingdom

17:40 End of Technical Session

THURSDAY, 4TH JUNE

10:00 Special Session *Collaborative Positioning*

10:00

RFI Localization in a Collaborative Navigation Environment

Naveed Ahmed, Nadezda Sokolova

Norwegian University of Science and Technology, Trondheim, Norway

10:20

Autocalibration of a UWB Localization System for Dynamic and Ad-Hoc Deployments in GNSS-Denied Environments

Carmen Martinez Almansa, Wang Shule, Jorge Peña Queralta, Tomi Westerlund

University of Turku, Finland

10:40

Performance analysis of collaborative positioning method in automated car driving

Shuo Li, Nikolay Mikhaylov, Florian Schiegg, Yichen Liu

Robert Bosch GmbH, Germany

11:00 Keynote *Sensory technology for medical wearables and rehabilitation robotics*

Prof. Nirvana Popescu

Polytechnic University of Bucharest

12:00 Break

12:20 Special Session *Wearables (A-WEAR)*

12:20

Privacy versus Location Accuracy in Opportunistic Wearable Networks

Viktoriiia Shubina¹, Aleksandr Ometov¹, Sergey Andreev¹, Dragos Niculescu², Elena Simona Lohan¹

¹Tampere University, Finland

²University "Politehnica" of Bucharest, Romania

12:40

Lossy Compression Methods for Performance-Restricted Wearable Devices

Lucie Klus¹, Elena Simona Lohan¹, Carlos Granell², Jari Nurmi¹

¹Tampere University, Finland

²Universitat Jaume I, Spain

13:00

Privacy in Indoor Positioning Systems: a systematic review

Sylvia Holcer¹, Joaquín Torres-Sospedra^{1,2}, Michael Gould¹, Inmaculada Remolar¹

¹Institute of New Imaging Technologies, UJI, Spain

²UBIK Geospatial Solutions S.L., Castellón, Spain

13:20

New Cluster Selection and Fine-grained Search for k-Means Clustering and Wi-Fi Fingerprinting

Joaquín Torres-Sospedra^{1,2}, Darwin Quezada², Germán Martín Mendoza-Silva², Jari Nurmi³, Yevgeni Koucheryavy³, Joaquín Huerta²

¹UBIK Geospatial Solutions S.L., Spain, ²Universitat Jaume I, Spain, ³Tampere University, Finland

13:40 Lunch Break

14:20 Technical Session *GALILEO*

14:20

Signal performance analysis of the latest quartet of Galileo satellites

Octavian Andrei¹, Jan Johansson², Hannu Koivula¹, Markku Poutanen¹

¹National Land Survey of Finland, Finland

²Chalmers University of Technology, Sweden

14:40

Opportunities and challenges of Galileo E5 wideband real signals processing

Nicola Linty, Mohammad Zahidul H. Bhuiyan, Martti Kirkko-Jaakkola

Finnish Geospatial research Institute (FGI-NLS), Finland

15:00

On the Time-Delay Estimation Performance Limit of New GNSS Acquisition Codes

Lorenzo Ortega¹, Jordi Vilà-Valls², Eric Chaumette², François Vincent²

¹TeSA, France

²ISAE-SUPAERO/University of Toulouse

15:20

Galileo OSNMA: an implementation for ARM-based embedded platforms

Micaela Troglia Gamba, Mario Nicola, Beatrice Motella

LINKS Foundation, Italy

15:40 Break

16:00 Special Session *Localization Techniques*

16:00

GNSS Aided Non-Line-of-Sight Radio Localization via Dual Polarized Arrays

Marco Antonio Marques Marinho¹, Alexey Vinei¹, Felix Antreich², Per Gustafson³

¹Halmstad University, Sweden

²Aeronautics Institute of Technology (ITA), Brazil

³Gutec AB, Sweden

16:20

Audio Source Positioning Based on Angle of Arrival Measurements Using Particle Filter

Mikko Lager, Simo Ali-Löytty, Robert Piché

Tampere University, Finland

16:40

MAMPI – Multipath-assisted Device-free Localization with Magnitude and Phase Information

Marco Cimdins, Sven Ole Schmidt, Horst Hellbrück

Technische Hochschule Lübeck, Germany

17:00 Awards, ICL-GNSS 2021 and closing

Prof. Jari Nurmi

17:20 End of ICL-GNSS 2020