MULTI POS Multitechnology Positioning Professionals

MARIE CURIE ACTIONS

# MULTIPOS

## D6.6 Version 1.0

## *Special Session in ICL-GNS 2014 Conference*

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**Abstract: A special session on MULTI-POS was organized in ICL-GNSS 2014, Helsinki, Finland.**

**Disclaimer:**

# Document Control

| Version | Details of Change | Review Owner | Approved | Date |
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**Executive Summary**
A special session on MULTI-POS was organized in the International Conference on Localization and GNSS (ICL-GNSS) 2014. The proposers were Henk Wymeersch (CUT) and Niels van Manen (VU-VUMC). Also Jari Nurmi, Francescantonio Della Rosa and Elena-Simona Lohan from TUT participated in setting up the session. Olivier Julien (ENAC) chaired the session. The paper by MULTI-POS fellow Enik Shytermeja in this session won the Best Paper Award of the conference.

Authors


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# List of Acronyms and Abbreviations

| Term | Description |
|---|---|
| ICL-GNSS | International Conference on Localization and GNSS |
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# 1. Introduction

This document describes the implementation of a special session on MULTI-POS at ICL-GNSS 2014 in Helsinki, Finland on June 24-26, 2014 [1].

# 2. Special Session Implementation

This section describes the details of the special session. The session was proposed to and accepted by the conference steering committee, and the submitted papers were undergoing a regular review process as all the papers submitted to the conference. The proposers were Henk Wymeersch (CUT) and Niels van Manen (VU-VUMC). Also Jari Nurmi, Francescantonio Della Rosa and Elena-Simona Lohan from TUT participated in setting up the session. Olivier Julien (ENAC) chaired the session. The paper by MULTI-POS fellow Enik Shytermeja in this session won the Best Paper Award of the conference.

## 2.1 Location and dates

Helsinki, Finland
June 24-26, 2014

## 2.2 Agenda

The agenda as extracted from the conference program at the conference web site.

**Session4: MULTI-POS**
*Time:*
**Wednesday, 25/Jun/2014:**
**2:00pm - 3:30pm**

*Session Chair:* **Olivier Julien**

**Presentations**

MULTI-POS – Multi-technology Positioning Professionals Training Network

Jari Nurmi, Francescantonio Della Rosa, Elena-Simona Lohan

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The global navigation market (products and services) is expected to grow to more than 160 billion EUR revenue by 2015 with significant growth being driven by mobile terminals. A link is still missing between the user needs/environment awareness (or application layer) and the physical layer where the wireless device is actually designed. The missing link can be created by cognitive approaches, borrowed on one hand from cognitive human behavior, and on the other hand from cognitive computing. MULTI-POS training network is bridging the gap between the lower technology layer and upper application layer involved in wireless mobile location. In addition, MULTI-POS will offer comprehensive training to young fellows in the broad field of wireless location, will create novel technologies and business models for the future location-enabled wireless devices, will promote the exchange of fellows in mixed academic-industrial R&D trajectories and in multiple European cultures, and will initiate an educational and research framework that unifies the currently fragmented research activities on technological and applications aspects of wireless navigation. There is strong involvement of industrial partners in the network to accomplish this.

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Overview of Positioning Technologies from Fitness-to-Purpose Point of View

Ana Basiri[1], Pedro Figueiredo Silva[2], Elena Simona Lohan[2], Pekka Peltola[1], Chris Hill[1], Terry Moore[1]

[1]The University of Nottingham, United Kingdom; [2]Tampere University of Technology;
anahid.basiri@nottingham.ac.uk

Even though Location Based Services (LBSs) are being more and more widely-used and this shows a promising future, there are still many challenges to deal with, such as privacy, reliability, accuracy, cost of service, power consumption and availability. There is still no single low-cost positioning technology

which provides position of its users seamlessly indoors and outdoors with an acceptable level of accuracy and low power consumption. For this reason, fitness of positioning service to the purpose of LBS application is an important parameter to be considered when choosing the most suitable positioning technology for an LBS. This should be done for any LBS application, since each application may need different requirements. Some location-based applications, such as location-based advertisements or Location-Based Social Networking, do not need very accurate positioning input data, while for some others, e.g. navigation and tracking services, highly-accurate positioning is essential. This paper evaluates different positioning technologies from fitness-to-purpose point of view for two different applications, public transport information and family/friend tracking.

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Proposed Architecture for Integrity Monitoring of a GNSS/MEMS System with a Fisheye Camera in Urban Environment

Enik Shytermeja, Axel Garcia-Pena, Olivier Julien

École Nationale de l'Aviation Civile (ENAC), France; shytermeja@recherche.enac.fr

Recently, an increasing trend of GNSS-based Safety Critical (SC) or Liability Critical (LC) urban applications has been observed. These applications, associated to dense urban canyons, can have very stringent requirements in terms of accuracy, reliability and availability of the provided position solution. In this paper, the implementation of a step-by-step algorithm able to ensure the robustness and integrity monitoring of an integrated GPS/Galileo receiver with low-cost MEMS sensors and aided by the video Fisheye camera is proposed.

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Design of OFDM Sequences for Joint Communications and Positioning Based on the Asymptotic Expected CRB

Arash Shahmansoori, Rafael Montalban, José A. López-Salcedo, Gonzalo Seco-Granados

Universitat Autonoma de Barcelona (UAB), Spain; arash.shahmansoori@uab.cat

A key aspect to design an OFDM system for combined positioning and high-data-rate communications is to find optimal data and pilot power allocations. Previously, A capacity maximizing design by taking into account the effects of channel and time-delay estimation for finite number of subcarriers and channel taps has been investigated. Increasing the number of subcarriers and channel taps make the matrix inversions in the non-asymptotic bounds close to singular or badly conditioned. Furthermore, computational complexity of such a system designed by non-asymptotic bounds grows significantly. In this paper, a method based on the asymptotic expected Cramer-Rao bound of joint time-delay and channel coefficients by increasing the number of subcarriers and channel taps has been proposed. The method reduces the complexity of the design considerably. Specifically, by increasing the number of channel taps the number of operations to compute matrix inversions is significantly reduced by asymptotic bounds. Numerical results show that as the number of subcarriers increases, the asymptotic bounds converge to the non-asymptotic bounds. Moreover, even for a finite number of subcarriers or channel taps the difference between joint data and pilot power allocations is negligible compared to the non-asymptotic expected Cramer-Rao bounds.

# 3. Participants

The conference participants were actively attending the session. There is no separate participant list available for the sessions. The general participant list of the conference is attached.

# 4. Conclusions

The first special session by the project was organized successfully jointly by the project partners at ICL-GNSS 2014 in Helsinki, Finland.

# 5. References

[1] ICL-GNSS conference website http://www.icl-gnss.org/2014/

**ICL-GNSS 2014** **List of participants**

| | name | firstname | organisation | country |
|---|---|---|---|---|
| 1 | Andrei | Octavian | Chulalongkorn University | Thailand |
| 2 | Angrisano | Antonio | Parthenope University of Naples | Italy |
| 3 | Ashkenazi | Vidal | Nottingham Scientific Ltd | United Kingdom |
| 4 | Bhuiyan | Mohammad Zahidul Hasan | Finnish Geodetic Institute | Finland |
| 5 | Borio | Daniele | EC Joint Research Centre | Italy |
| 6 | Bürgi | Clemens | u-blox AG | Switzerland |
| 7 | Chen | Liang | Finnish Geodetic Institute | Finland |
| 8 | Chen | Wu | Hong Kong Polytechnic University | Hong Kong |
| 9 | Cosstick | Benjamin | Spectracom / Orolia | United Kingdom |
| 10 | Daniel | Ondřej | Tampere University of Technology (TUT) | Finland |
| 11 | Dovis | Fabio | Politecnico di Torino | Italy |
| 12 | Eerola | Ville | u-blox Espoo Oy | Finland |
| 13 | Ferrara | Nunzia Giorgia | Tampere University of Technology | Finland |
| 14 | Figueiredo e Silva | Pedro Manuel | Tampere University of Technology | Finland |
| 15 | Gaglione | Salvatore | Parthenope University of Naples | Italy |
| 16 | Guinness | Robert Edward | Finnish Geodetic Institute | Finland |
| 17 | Honkala | Salomon Jaakko Juhani | FGI | Finland |
| 18 | Isojärvi | Pia Isojärvi | FGI | Finland |
| 19 | Ivanov | Pavel | HERE | Finland |
| 20 | Julien | Olivier | Ecole Nationale de l'Aviation Civile (ENAC) | France |
| 21 | Kasebzadeh | Parinaz | Tampere University of Technology | Finland |
| 22 | Khan | Muhammad Irshan | Here | Finland |
| 23 | Kirkko-Jaakkola | Martti | Finnish Geodetic Institute | Finland |
| 24 | Lardjane | Salim | Universite de Bretagne Sud | France |
| 25 | Linty | Nicola | Politecnico di Torino | Italy |
| 26 | Lisi | Marco | European Space Agency | Netherlands |
| 27 | Lohan | Elena Simona | Tampere University of Technology | Finland |
| 28 | Lopez-Salcedo | Jose A. | Universitat Autonoma de Barcelona (UAB) | Spain |
| 29 | Maung Maung | Nyein Aye | Ritsumeikan University | Japan |
| 30 | Miettinen-Bellevergue | Seija | Ministry of Transport and Communications | Finland |
| 31 | Mondal | Riaz Uddin | University of Jyväskylä | Finland |
| 32 | Nurmi | Jari | Tampere University of Technology | Finland |
| 33 | Paakki | Tommi | Tampere University of Technology | Finland |
| 34 | Renaudin | Valerie | IFSTTAR | France |
| 35 | Robert | Piche | Tampere University of Technology | Finland |
| 36 | Ruotsalainen | Laura Maria | Finnish Geodetic Institute | Finland |
| 37 | Saarimäki | Jarno | FGI | Finland |
| 38 | Saastamoinen | Ilkka | Qualcomm Inc. | Finland |
| 39 | Shytermeja | Enik | École Nationale de l'Aviation Civile (ENAC) | France |
| 40 | Söderholm | Stefan | Finnish Geodetic Institute | Finland |
| 41 | Talvitie | Jukka Olavi | Tampere University of Technology | Finland |
| 42 | Thombre | Sarang | Finnish Geodetic Institute | Finland |
| 43 | Wirola | Lauri | Here | Finland |
| 44 | Wright | D. Bruce | Trusted Positioning Inc. | Canada |
| 45 | Zhang | Xiaolong | Tampere University of Technology | Finland |

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| Finland | 27 | 60,00 % |
| Other countries | 18 | 40,00 % |