

**Decreto IMT Rep. N. 02646(254) VII.16.21.07.14**

## **IL DIRETTORE**

**VISTO** lo Statuto di IMT Alti Studi Lucca, emanato con Decreto Direttoriale n. 02715(206).I.2.20.09.11, pubblicato sulla Gazzetta Ufficiale - Serie Generale- n. 233 del 6 ottobre 2011;

**VISTO** il "Regolamento sugli incarichi e sui rapporti di lavoro in ambito didattico e scientifico" emanato con Decreto Direttoriale n. 02179(93).I.3 del 5.08.2010 e successivamente modificato Decreto Direttoriale n. 04357(346).I.3.05.12.13;

**VISTO** il Decreto Legislativo 30 marzo 2001, n. 165;

**VISTA** la richiesta di utilizzo dei fondi della Research Unit ICES - Institutional Change, Economics, Society presentata dal Dott. Massimiliano Gaetano Onorato che, per il buon fine dell'attività di ricerca nell'ambito dello studio empirico delle conseguenze, sotto il profilo politico ed elettorale, della "guerra" di propaganda combattuta via radio durante la Seconda Guerra Mondiale, si necessita della collaborazione del Dott. Fabio Principe avente ad oggetto "sviluppo di un simulatore software per modellare la propagazione delle onde EM (elettromagnetiche) corte" il cui compenso da corrispondere è un forfait equiparabile ad un rimborso spese e che ai fini della ricerca è rilevante il carattere "intuitu personae" del rapporto collaborativo con il suddetto dottore;

**VISTA** la circolare 2 del 2008 del Dipartimento della Funzione Pubblica che consente di affidare direttamente, senza ricorrere a procedure di valutazione comparativa, incarichi "per le prestazioni occasionali che si esauriscono in una sola azione o prestazione, caratterizzata da un rapporto "intuitu personae" che consente il raggiungimento del fine e che comportano per loro stessa natura un compenso equiparabile ad un rimborso spese";

**CONSIDERATA** l'approvazione della spesa da parte del Prof. Davide Ticchi, titolare del fondo della Research Unit ICES - Institutional Change, Economics, Society;

**VALUTATO** che l'attività di "sviluppo di un simulatore software per modellare la propagazione delle onde EM (elettromagnetiche) corte" richiesta dal Dott. Massimiliano Gaetano Onorato è stata ritenuta compatibile con l'utilizzo del suddetto fondo;

**VALUTATI** dal Curriculum Vitae del Dott. Fabio Principe il percorso formativo in Ingegneria delle Telecomunicazioni e Ingegneria Informatica, la significativa esperienza professionale maturata nel campo *communication systems* e *signal processing algorithms* e le specifiche competenze acquisite nell'ambito della programmazione;

**VISTO** lo stanziamento sulla voce COAN - Research Money CA 04.43.18.01;

**VISTO** l'accertamento dei fondi della Research Unit ICES - Institutional Change, Economics, Society

## **DECRETA**

- l'affidamento al Dott. Fabio Principe di un incarico di collaborazione occasionale, avente ad oggetto "sviluppo di un simulatore software per modellare la propagazione delle onde EM (elettromagnetiche) corte";



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- che il compenso previsto per l'attività, per il periodo dal 07/08/2014 al 06/09/2014, è di Euro 400,00 lordi, corrispondente a un costo ente di Euro 434,00 circa che graverà sui fondi della Research Unit ICES - Institutional Change, Economics, Society di cui è titolare il Prof. Davide Ticchi.

(Allegato n. 1 Curriculum Vitae del Dott. Fabio Principe)

Lucca, 21/07/2014

Il Direttore  
IMT Alti Studi Lucca  
(Prof. Alberto Bemporad)

THE INSTITUTE OF TECHNOLOGY

OF MASSACHUSETTS  
CAMBRIDGE, MASS.

RECEIVED

THE INSTITUTE OF TECHNOLOGY

OF MASSACHUSETTS  
CAMBRIDGE, MASS.

# Europass Curriculum Vitae

## Personal information

Surname(s) / First name(s)

Email(s)

Nationality(-ies)

Date of birth

Home page

Current Position

**Principe, Fabio**

fabio.principe@gmail.com

Italian

January 28, 1979

<http://fabioprincede.altervista.org/>

Senior staff at the E.M. System Design & Framework Laboratory of Ingegneria Dei Sistemi (IDS) S.p.A. — IDS webpage: <http://www.idscorporation.com/en/>.



## Education

May 2007

**Ph.D. in Information Engineering** at the Dipartimento di Ingegneria dell'Informazione, University of Pisa, Pisa – Italy.

- *Research sector:* Communication Systems.
- *Thesis title:* "Iterative Message-Passing-Based Algorithms to Detect Spreading Codes".
- *Supervisor:* Prof. Marco Luise.

May 2003

**Master Degree in Telecommunications Engineering** University of Pisa, Pisa – Italy.

- *Final grade:* 110/110 cum Laude.
- *Thesis title:* "Analisi e Costruzione di Codici LDPC per Comunicazioni via Satellite" (the English translation is: "Analysis and Design of LDPC Codes for Satellite Communications") — Supervisors: Prof. Marco Luise, Ph.D. Vincenzo Lottici, and Ph.D. Luca Giugno.
- *Award:* Master Degree Award of University of Pisa, because he achieved the Master Degree in 5 Academic Years with the highest grade.

July 1997

**Scientific Secondary School Certificate** (maturità scientifica) Liceo Scientifico "F. Severi", Castellammare di Stabia (NA) – Italy.

- *Final grade:* 54/60.
- *Subjects covered:* scientific and humanistic.

## Research Activities

### Fields of Interest

From Sept. 2005 to Jan. 2007  
(2nd & 3rd year of PhD course)

From June 2003 to July 2005  
(1st & 2nd year of PhD course)

### General Research Interest

His research interests are in the general areas of *communication systems* and *signal processing algorithms*, with specific attention to detection and signal synchronization techniques, spread-spectrum systems, modern coding theory (e.g., LDPC and turbo-codes), digital beam-forming, directional modulation and *software-defined radio* (SDR) techniques. Furthermore, since 2003 he was involved in many projects on GNSS systems, with a particular attention for air-navigation applications where the respect of *safety-of-life* requirements is the primary task.

### Research Activities

He investigated the possibility to develop iterative detection algorithms to acquire spread-spectrum sequences (LFSR sequences) by exploiting the iterative decoding algorithms of modern codes (such as, LDPC codes). The final goal was to obtain fast, low-complexity and good-performance algorithms to acquire spread-spectrum codes. Because of this, he focused his attention on LDPC and turbo-codes theory, their decoding algorithms (iterative Message Passing, and BCJR), spread spectrum detection algorithms, and CDMA techniques and receivers. Part of these studies were done at the *University of Southern California* (USC) Los Angeles (California, USA), where he spent about 7 months (from the end of Sept. 2005 to the end of April 2006) as visiting scholar. During this period, He collaborated with *Prof. Keith M. Chugg*.

### Research Activities

During this period, he started his studies on satellite positioning systems (GPS, SBAS, Galileo, and GLONASS), their characteristics and signal structures. Furthermore, he designed and implemented the acquisition and tracking stages of a *SDR-based* GPS/SBAS receiver (SOFT-REC project, done in cooperation with INTECS S.p.A.) able to operate in real-time mode. This result was achieved by developing low-complexity, efficient signal processing and synchronization algorithms optimized to guarantee the real-time processing of the acquired positioning signals. Furthermore, he studied the structure of Galileo signals in order to design a preliminary architecture of a Galileo receiver (GARDA project, done in cooperation with LABEN S.p.A.).

## Work Experiences

From 26 Feb. 2007 till now  
(current position)

Senior staff at the E.M. Framework Design Laboratory, IDS S.p.A. He actively worked on the following projects.

- Activity of EM analysis and simulation (by mean *EMACS software*) to verify the installation or replacement of radio-aids (DME, VOR and ILS systems) in Italian airports.
- Activity of development/maintenance of *EMACS*.
- *SIAM* (stands for Innovative System for the Approach and Monitoring on the Airports) sponsored by ENAV S.p.A. This experimental project aimed at verifying the GNSS application for flight procedures on Italian regional airports (in compliance with the ICAO SARPs). In this context, he designed and implemented a GPS/SBAS monitoring station, which was intensively used for GBAS siting applications and characterization of the GNSS scenario in many Italian airports (Palermo, Parma, Perugia, Grottaglie, etc.).
- GNSS experimental activity with AgustaWestland.
- *PEGASUS* (stands for Platform of Enhanced GNSS receiver for Application in Sol User Segment) project sponsored by ASI (Agenzia Spaziale Italiana). In the framework of this project, he studied the possibility of integrating digital beam-forming technologies in GNSS receivers in order to improve their performance for safety-of-life applications.
- *LICOLA* (stands for Low-Interceptable Communication Link Antennas) project sponsored by the Italian MoD. Analysis of the directional modulation techniques to design and implement a low-interceptable transmitter. At the end of the 1st phase of the project a SDR-based prototype was developed.
- Design and development of the *GNOME* (GNSS Operative Monitoring Equipment) system. He has been the project manager of this activity and also provided an active contribution to its development.

4-8 September 2006

He collaborated with the *organization staff* (made up of Prof. M. Luise, the general chairman, other professors/researchers of Dip. di Ingegneria dell'Informazione, Univ. of Pisa, and Incor DGMP s.r.l.) of *EUSIPCO 2006* Conference, in Florence (Italy).

2004-2005

### Consultant Activity (1st – 2nd years as PhD student)

During this period, he was involved in the following activities.

- Design and implementation of a real-time GPS/SBAS software-receiver (*SOFT-REC* project, sponsored by ESTEC), made in cooperation with INTECS S.p.A. Specifically, he designed the frequency-plan and developed all signal processing and synchronization stages (in C/C++ language) of the software receiver.
- Architectural design of a receiver for Galileo signals (referred to as *GARDA*, *Galileo Receiver Development Activities*) made in collaboration with LABEN S.p.A. (now ThalesAlenia Space Italy).

From June 2003 to October  
2003

**Consultant Activity – Contract with CPR (Consorzio Pisa Ricerche)**  
During this period, he worked as consultant for LABEN S.p.A. (now ThalesAlenia Space). He studied and analyzed Galileo signals and performed Galileo/GPS frequency plan during *GSR Galileo* and *ACE+* projects.

## Review Activities

2012

He served as reviewer of:

- **IEEE Communications Letters;**
- **2012 IEEE Symposium on Industrial Electronics and Applications**, Sept. 23-26, 2012, Bandung (Indonesia).

2011

He served as reviewer of:

- **EURASIP Signal Processing;**
- **IEEE Communications Letters;**
- **International Journal of Navigation and Observation**, Hindawi Publishing Corporation.

2010

He served as reviewer of:

- **EURASIP Signal Processing;**
- **IEEE Communications Letters;**
- **IEEE Transactions on Signal Processing;**
- **ISIT 2010 Conference**, June 13-18, 2010, Austin, Texas (USA).

2009

He served as reviewer of:

- **EURASIP Signal Processing;**
- **IEEE Communications Letters;**
- **IEEE Transactions on Signal Processing.**

2008

He served as reviewer of:

- **IEEE Transactions on Signal Processing.**

2007

He served as reviewer of:

- **IEEE Transactions on Signal Processing;**
- **WPMC 2007 Conference**, December 3-6 2007, Jaipur (India);
- **PIRMC 2007 Conference**, September 3-7 2007, Athens (Greece).

2006

He served as reviewer of:

- **ICASSP 2007 Conference**, April 15-20 2007, Honolulu, Hawaii (USA);
- **EUSIPCO 2006 Conference**, September 4-8 2006, Florence (Italy).



## Personal Skills and Competences

Mother tongue(s)

Italian.

Other languages

**Good knowledge of the oral and written English language**, improved on-field thanks to a long period (about 7 months, 10/2005 – 04/2006) spent in Los Angeles CA (USA) at the University of Southern California, and thanks to several travels abroad (France, Holland, England, Spain and Germany) for business and conferences. He also achieved the following certificates.

- **Certificate of English language knowledge** (admission high level) received from Centro Linguistico Interdipartimentale University of Pisa in June 2004.
- **Certificate of English language knowledge** (admission 4th level) received from Trinity College London in June 1993.

Technical skills

Operating systems:

- MS Windows – good knowledge;
- Linux – good knowledge.

Programming languages:

- C/C++, Pascal, Basic, and Fortran – good knowledge;
- LaTeX – good knowledge;
- Matlab, Scilab, Mathematica, MathCad, and Octave – good knowledge;
- Simulink – basic knowledge.

Graphical tools:

- MS Visio, Draw (of OpenOffice), Paint.Net, Igor Pro, Gimp – good knowledge;
- GNU Plot – basic knowledge.

Other SW applications:

- MS Office package, OpenOffice package, MathType – good level;
- Dev C++, Code Warrior, Visual Studio – good level.

Personal predisposition

Optimum attitude towards learning technical/scientific topics and to work in team.

## Other Certificates

2011

**Certificate of participation at the GPU programming course**, released by CILEA (April 8, 2011).

2009

**Certificate of operator and maintenance of Thales GBAS system**, released by Thales ATM.

2003

**Qualification to the profession of engineer**, released by University of Pisa (Nov. 11, 2003).

1998/1999	<p><b>Certificate of "RGB TV" ("Televisione a Colori")</b>, released by Scuola Radio Elettra di Torino (Sep. 16, 1999).</p> <p><b>Admission to the 5th year of computer science course</b> at ITIS "R. Elia", Castellammare di Stabia (NA), Italy.</p>
1997/1998	<p><b>Secondary school certificate of Geometer</b> (maturità tecnica per Geometra), released by Istituto Tecnico per Geometra "Vitruvio", Castellammare di Stabia (NA), Italy. Final grade: 42/60.</p> <p><b>Certificate of "Course of Safety Coordinator in Building Yard"</b> ("Corso di Coordinatore della Sicurezza per la Progettazione ed Esecuzione dei Lavori") laws 494/96 and 626/94.</p>
1996	<p><b>Certificate of "Operatore di Terminale"</b> (basic course on computer science), released by Regione Campania (May 13, 1996).</p> <p><b>Certificate of "Manager Game 1996" of Confindustria</b>, released by "Gruppo Giovani Imprenditori" of Unione Industriali di Napoli (March 18, 1996).</p> <p><b>Certificate of "Master on Computer Graphic"</b>, released by Peruzzi University of Milano.</p>
1994	<p><b>Certificate of "Experimental Electronic"</b> ("Tecnica Elettronica Sperimentale"), released by Scuola Radio Elettra di Torino.</p>
<b>Other Information</b>	
Other Information	<p>Free from military service.</p> <p>Availability to be away on business.</p>
<b>Annexes</b>	
Annex 1	List of my publications.

## DATA PROTECTION ACT

I agree that the mentioned personal data can be processed in compliance with the law of 196/2003 and its next modifications and integrations on safeguarding the right to privacy in connection with the processing of personal data.

**List of Publications**  
**- Annexes I attached to Fabio Principe CV -**

**BOOKS**

- [1] **F. Principe**, *Rapid Acquisition in Direct-Sequence/Spread-Spectrum Systems: Iterative Message-Passing-Based Algorithms to Fast Acquire Spreading Sequences*, VDM Verlag, Germany, Aug. 26, 2009, ISBN 978-3639191936. **Year 2009**

**JOURNALS**

- [1] **F. Principe**, G. Bacci, F. Giannetti, and M. Luise "Software-Defined Radio Technologies for GNSS Receivers: a Tutorial Approach to a Simple Design and Implementation," *International Journal of Navigation and Observation*, vol. 2011, article ID 979815, 27 pages, 2011, doi: 10.1155/2011/979815. **Year 2011**

**INTERNATIONAL CONFERENCES**

- [1] V. Pellegrini, **F. Principe**, A. Tomei, M. Mori, M. Natali, and R. Cioni, "The GNSS Operative Monitoring Equipment (GNOME): an SDR-Based Solution for Integrity Assurance," in *Proc. NAVITEC 2012*, ESTEC Noordwijk (The Netherlands), Dec. 5-7, 2012. **Year 2012**
- [2] A. Italiano, **F. Principe**, R. Cioni, and R. Perago, "Multipath and Interference Modelling in Complex GNSS Scenarios," in *Proc. EuCAP 2010 Conference*, Barcellona (Spain), April 12-16, 2010. **Year 2010**
- [3] G. Del Duca, R. Perago, V. Paciucci, G. Di Bitonto, and **F. Principe**, "Verification of GNSS Applications at Italian Regional Airports," in *Proc. ENC-GNSS 2009 Conference*, Napoli (Italy), May 3-6, 2009. **Year 2009**
- [4] M. Rovini, **F. Principe**, L. Fanucci, and M. Luise, "Implementation of Message-Passing Algorithms for the Acquisition of Spreading Codes," in *Proc. ICASSP 2008 Conference*, Las Vegas (USA), March 30 - April 4, 2008. **Year 2008**
- [5] **F. Principe**, M. Luise, and K. M. Chugg, "Performance Evaluation of Message-Passing-Based Algorithms for Fast Acquisition of Spreading Codes with Application to Satellite Positioning," in *Proc. NAVITEC 2006*, ESTEC Noordwijk (The Netherlands), Dec. 11-13, 2006. **Year 2006**
- [6] **F. Principe**, K. M. Chugg, and M. Luise, "Rapid Acquisition of Gold Codes and Related Sequences Using Iterative Message Passing on Redundant Graphical Models," in *Proc. MILCOM 2006*, Washington DC (USA), Oct. 23-25, 2006.
- [7] G. Bacci, **F. Principe**, M. Luise, C. Terzi, and M. Casucci, "SOFT-REC: a GPS Real Time Software Receiver with EGNOS Augmentation," in *Proc. Workshop on EGNOS Performance and Applications 2005*, Gdynia (Poland), October 27-28, 2005. (Best Paper Award of Plenary Session "Applications and Tools – part 2") **Year 2005**
- [8] **F. Principe**, C. Terzi, M. Luise, and M. Casucci, "SOFT-REC: a GPS/EGNOS Software Receiver," in *Proc. 14<sup>th</sup> IST Mobile & Wireless Communication Summit*, Dresden (Germany), June 19-23, 2005.

**Year 2004**

- [9] **F. Principe**, C. Terzi, M. Luise, and M. Casucci, "SOFT-REC: a Low-Cost GPS Receiver Following the Software Radio Paradigm," in *Proc. NAVITEC 2004*, ESTEC Noordwijk (The Netherlands), Dec. 8-10, 2006.

**DOCTORATE PUBLICATIONS**

**Year 2007**

- [1] **F. Principe** (year 2004; tutor: Prof. Marco Luise), *Iterative Message-Passing-Based Algorithms to Detect Spreading Codes*. Dipartimento di Ingegneria dell'Informazione - University of Pisa, Pisa (Italy), Feb. 26, 2007.

**Year 2006**

- [2] **F. Principe** (year 2004; tutor: Prof. Marco Luise), "Performance Evaluation of Iterative Message Passing Algorithms for Fast Acquisition of Spreading Codes with Application to Satellite Positioning," in *Proceedings Doctoral Workshop 2006 - Telecom. Systems*, Dip. di Ingegneria dell'Informazione - University of Pisa, Pisa (Italy), Nov. 15, 2006.