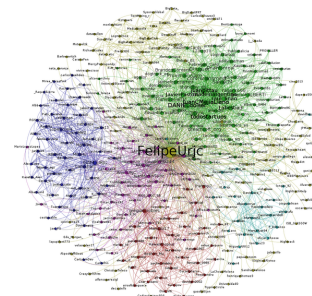# Felipe Alonso Atienza

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Phone: +34625945465, **Email**: felipe.alonso@urjc.es,
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GENERAL INFORMATION

Profile

Senior researcher and senior lecturer in the field of machine learning and statistical signal processing, with applications to social media and biomedical and health systems. I have broad experience in R&D public and private funded projects. I am a highly motivated and fast learner person. Moving from academia to real world problems. Always looking for new challenges.

Employment

– Associate Professor[1]   Jan 2009 – Present
  Rey Juan Carlos University, Madrid, Spain

– Assistant Professor   Oct 2007 – Jan 2009
  Rey Juan Carlos University, Madrid, Spain

– Visiting Researcher, Institute for Cardiovascular Research   Mar 2005 – Oct 2005
  SUNY Upstate Medical University, Syracuse, NY, USA

– Research Scientist   Feb 2004 – Sep 2007
  Carlos III University of Madrid, Spain

– Project Researcher, Carlos III University of Madrid, Spain   Jan 2003 – Jan 2004
  Carlos III University of Madrid, Spain

Education

– Doctor of Philosophy, Carlos III University of Madrid, Spain   2003-2008
  Thesis: *Analysis of cardiac arrhythmia using computer modelling and robust digital signal processing.*
  Advisors: Ph. D. José Luis Rojo-Álvarez, Ph. D., MD Arcadi García-Alberola

– M.Sc. in Telecommunications Engineering, Carlos III University of Madrid, Spain   1997-2003
  Thesis*: Estudio del campo eléctrico registrado en catéteres durante trastornos de la conducción cardiaca*
  Advisors: Ph. D. José Luis Rojo-Álvarez, Ph. D., MD Arcadi García-Alberola

Academic Responsibilities

– Director, Master Course in ICT for Biomedical Engineering   Dec 2010 – Dec 2012
  Rey Juan Carlos University

– Departmental Erasmus+/Mundus EU Program Coordinator   Dec 2007 – present
  Rey Juan Carlos University

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[1] Acreditado como Profesor Titular de Universidad (ANECA, diciembre 2014).

DATA SCIENCE SKILLS

- Data storing: MongoDB (Data wrangling with MongoDB, Udacity)
- Data wrangling and manipulation: Matlab (ninja), Python, R and Gephi (Social Network Analysis, Coursera).
- Data visualization: Python Networkx, Igraph, d3.js, ShinyR.
- Big data technologies: Hadoop, MapReduce (Mining Massive Datasets, Coursera), Spark learner (Introduction to Big Data with Apache Spark, edX).

RESEARCH

General numbers

- Co-author of 17 scientific journal papers in the field of machine learning and signal processing (see appendix for the full list of publications)
- Co-author of more than 20 conference proceedings and abstracts.
- Co-author of 2 book chapters.
- H-index = 9 (source: Google Scholar).
- Supervisor of 2 PhD students.
- Principal investigator (Non-invasive estimation of the cardiac electrical activity by convex optimization. Funded by the Ministry of Economy and Competitiveness, 116.600€).

Honors and Awards

- Best Paper Award, Rev. Esp. Cardiol. *A Probabilistic Model of Cardiac Electrical Activity Based on a Cellular Automata System.*

Journal Reviewer

- IEEE Transactions on Biomedical Engineering, IEEE Transactions on Information Technology and Biomedicine, Computers in Biology and Medicine, Medical & Biological Engineering & Computing, Artificial Intelligence in Medicine, Computer Methods in Biomechanics and Biomedical Engineering, Biomedical Signal Processing and Control, International Journal of Telemedicine and Applications.

PROJECT FUNDING and TECHNOLOGY TRANSFER

Research Evaluator

- Member of the evaluation committee of the R+D Societal Challenges program call, signal processing area. Ministry of Economy and Competitiveness, January 2015.
- Evaluator. "Estrategia Regional de Investigación e Innovación para una Especialización Inteligente (RIS3)". Viceconsejería de Innovación, Industria, Comercio y Consumo. Comunidad de Madrid. May 2015.

Patents

- System and method for the reconstruction and visualization of the cardiac electrical activity (P200801074). Spain. Extended to EU and USA.

Public Funding (only most relevant)[2].

– PI: Non-invasive estimation of the cardiac electrical activity by convex optimization. 2014-2016 (116.600€)
– PI: Feature Selection in medical signal and images with support vector machines. 2011-2012 (25.000€)
– Co-PI: Non-invasive home vital signs monitoring system. 2012-2015 (46.645€)
– Co-PI: Feature extraction and variable selection in long-term multivariate records, 2011-2013 (120.200€)
– Co-PI: Source localization of cardiac arrhythmia using computer modelling and signal processing, 2010-2012, (35.448,84€)
– Co-PI: Multivariate distributed signal processing of cardiac electrical records, 2010-2011 (30.000€)
– Co-PI: Sudden cardiac death prediction and electrocardiographic signals monitoring using support vector machines, 2009-2010 (21.000€)
– Co-PI: Specialized SVM algorithms for its application in communications, 2007-2010 (72.600€)
– Co-PI: Analysis of the scope of intracavitary probes in implantable cardiac defibrillators, 2007-2008 (9.000€)
– RS: Mathematical modelling of depolarization cardiac currents recorded by intracavitary electrograms, 2005-2006 (37.405€)

Private Funding (summarized).

– Co-PI of more than 20 R&D projects with Electromedicine and ICT companies (aggregate funding more than 500,000€).

TEACHING

Bsc/Msc Thesis Supervisor

– Supervisor of more than 15 students in the field of cardiac signal processing, machine learning and social network analysis.

Lecturer: undergraduate courses[3]

– Circuit Analysis (F07, F08)
– Data Transmission (S07, S08, S09)
– Electromagnetic Fields (S07, S08, S09)
– Advanced Electromagnetic Fields (F10, F11, F12, F13)
– Fields and Waves (F10, F11, F12, F13, F14)
– Speech and audio signal processing (F11, F12, F13, F14).
– Microwave Engineering (S13, S14, S15)
– Electromagnetic Fields for Aerospace Engineering (S13, S14, S15)

Lecturer: graduate courses

– Signal Processing for Wireless Communications (S06, S07, S08)
– Advanced Medical Signal Processing (S10, S11)
– Multimedia Signal Processing (S14, S15)

Lecturer: novel methodologies in teaching

– Co-author of 1 journal paper and 3 conference papers related to novel strategies for teaching in engineering (see apendix).

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[2] PI: Principal Investigator; Co-PI: participant Investigator, RS: Researcher
[3] S: Spring semester; F: Fall semester.

COMPLETE LIST OF PUBLICATIONS

Refereed Journal Papers

1. F. Beltrán-Molina, J. Requena-Carrión, **F. Alonso-Atienza**, *Effects of the Spatial Resolution of Electrode Systems on the Spectrum of Cardiac Signals*. In preparation.

2. C.E. Chávez, **F. Alonso-Atienza**, D. Álvarez, *The Use of a Simple Mathematical Model in the Characterization of Cardiac Ischemic Regions*. Submitted to Int. J. Appl. Math. Comput. Sci. 2015.

3. E. Morgado, **F. Alonso-Atienza**, R. Santiago-Mozos, O. Barquero-Pérez, I. Silva, J. Ramos, and R. Mark, *Quality Estimation of the Electrocardiogram Using Cross-Correlation Among Leads*. Accepted for publication, Biomedical Engineering Online.

4. U. Ayala, U. Irusta, J. Ruiz, T. Eftestol, J. Kramer-Johansen, **F. Alonso-Atienza**, E. Alonso, D. González-Otero. *A Reliable Method for Rhythm Analysis During Cardiopulmonary Resuscitation*. BioMed Research International, May 2014.

5. **F. Alonso-Atienza**, E Morgado, L. Fernández-Martínez, A. García-Alberola, JL Rojo-Álvarez. *Detection of Life-threatening Arrhythmias Using Feature Selection and Support Vector Machines*. IEEE Transactions on Biomedical Engineering 61(3): 832:840, Mar 2014.

6. J Requena-Carrión, **F Alonso-Atienza**, E Everss, JJ Sánchez-Muñoz, M Ortiz, A García-Alberola, JL Rojo-Álvarez. *Analysis of the robustness of spectral indices during ventricular fibrillation*. Biomedical Signal Processing and Control, 8(6):733-739, Nov 2013.

7. **F. Alonso-Atienza**, JL Rojo-Álvarez, A. Rosado-Muñoz, JJ Vinagre-Díaz, A- García-Alberola, G. Camps-Valls, *Feature selection using support vector machines and bootstrap methods for ventricular fibrillation detection*. Expert Systems with Applications, 39:1956-1967, 2012.

8. D. Álvarez, **F. Alonso-Atienza**, JL Rojo-Álvarez, A. García-Alberola, M. Moscoso, *Shape Reconstruction of Cardiac Ischemia from Non-contact Intracardiac Recordings*. Mathematical and Computer Modelling, 55:1770-1781, 2012.

9. O. Barquero-Pérez, JL Rojo-Álvarez, A.J. Caamaño, R. Goya-Esteban, E. Everss, **F. Alonso-Atienza**, J.J. Sánchez-Muñoz, A. García-Alberola, *Fundamental Frequency and Regularity Of Cardiac Electrograms with Fourier Organization Analysis*. IEEE Transactions on Biomedical Engineering, 57(9):2168-2177, september 2010.

10. J. Requena-Carrión, J. Väisänen, **F. Alonso-Atienza**, A. García-Alberola, J. Ramos, JL Rojo-Álvarez, *Sensitivity and Spatial Resolution of Transvenous Leads in Implantable Cardioverter Defibrillator* IEEE Transactions on Biomedical Engineering, 56(12): 2773-2781, December 2009.

11. R Goya, O Barquero, **F Alonso-Atienza**, E Everss, J Requena, A García-Alberola, JL Rojo. *A Review on Recent Patents in Digital Signal Processing for Cardiac Electric Signals (I): From Basic Systems to Arrhythmia Analysis*. Recent Patents on Biomedical Engineering 2:22-31, 2009.

12. O Barquero, R Goya, **F Alonso-Atienza**, E Everss, J Requena, A García-Alberola, JL Rojo. *A Review on Recent Patents in Digital Signal Processing for Cardiac Electric Signals (II): Advanced Systems and Applications*. Recent Patents on Biomedical Engineering 2:32-47, 2009.

13. JJ Sánchez-Muñoz, JL Rojo-Álvarez, E. Everss, **F Alonso-Atienza**, M Ortiz, J Martínez, A García-Alberola, J Ramos, M Valdés. *Spectral Analysis of Intracardiac Electrograms During Induced and Spontaneous Ventricular Fibrillation in Humans*. Europace 11(3): 328-331, 2009.

14. JJ Sánchez-Muñoz, JL Rojo-Álvarez, A García-Alberola, E Everss, J Requena-Carrión, M Ortiz, **F Alonso-Atienza**, M Valdés. *Effects of the Location of Myocardial Infarction on the Spectral Characteristics of Ventricular Fibrillation*. Journal of Pacing and Cardiac Electrophysiology, 31:660-665, 2008.

15. JL Rojo-Álvarez, C Figuera, C Martínez, G Camps-Valls, **F Alonso-Atienza**, M Martínez. *Non-uniform Interpolation of Noisy Signals Using Support Vector Machines*. IEEE Transactions on Signal Processing; 55(8): 4116-4126, 2007.

16. J Fernández-Getino, JL Rojo-Álvarez, **F Alonso-Atienza**, M Martínez-Ramón. *Support Vector Machines for Robust Channel Estimation in OFDM*. IEEE Signal Processing Letters; 13(7): 397-400, 2006.

17. **F Alonso-Atienza**, J Requena, A García, JL Rojo, JJ Sánchez, J Martínez, M Valdés. *A Probabilistic Model of Cardiac Electrical Activity Based on a Cellular Automata System*. Revista Española de Cardiología; 58: 41-47, 2005. **BEST PAPER AWARD**

Refereed conference papers and proceedings

1. V. Suárez-Gutiérrez, C. Figuera-Pozuelo, D. Álvarez, C.E. Chávez, J. Requena-Carrión. M.S. Guillem, A.M. Climent, **F. Alonso-Atienza**, Noninvasive estimation of the cardiac electrical activity by convex optimization, ECGi Workshop, Bad Herrenalb, Germany, 26-03-2015.

2. U. Ayala, U. Irusta, J. Ruiz, **F. Alonso-Atienza**, E. Alonso, D. González-Otero, J. Kramer-Johansen and T. Eftestøl. Filtering Chest Compression Artifacts Improves the Performance of VF-detection Parameters", Computing in Cardiology, Boston, USA. 10-09-2014.

3. C.E. Chávez, **F. Alonso-Atienza**, D. Álvarez. Avoiding the Inverse Crime in the Inverse Problem of Electrocardiography: Estimating the Shape and Location of Cardiac Ischemia, Computing in Cardiology, Zaragoza, Spain. 23-09-2013.

4. D. Álvarez**, F. Alonso-Atienza**, JL Rojo-Álvarez, M. Moscoso, "Recovering the Location, Size, and Grade of Cardiac Ischemia Using Level Set Methods", Comunicación oral, SIAM Conference on Image Science, Chicago, EEUU, 13-04-2010.

5. JL Rojo-Álvarez, FJ Sáiz-Rodríguez, **F Alonso-Atienza,** CA Ruiz, A García-Alberola. A Method for Assessing the Sampling Bandwidth for Activation Time and Voltage Maps in Cardiac Navigators. Comunicación oral. 36th Computers in Cardiology, Park City-Utah, USA, 15-09-2009.

6. O. Barquero Pérez, J. L. Rojo Álvarez, J. Requena Carrión**, F. Alonso Atienza**, E. Everss Villalba, Goya-Esteban R., Sánchez Muñoz JJ, A. García Alberola. Cardiac Arrhythmia Spectral Analysis of Electrogram Signals using Fourier Organization Analysis . Comunicación oral. 36th Computers in Cardiology, Park City-Utah, USA, 15-09-2009.

7. O. Barquero Pérez, J. L. Rojo Álvarez, Goya-Esteban R., **F. Alonso Atienza**, J. Requena Carrión, Sánchez Muñoz JJ, A. García Alberola, Fundamental Frequency and Regularity of Cardiac Electrograms with Fourier Organization Analysis. Póster, 34th Annual ISCE Conference, Vol. 42, n. 6, 618, Florida, EE.UU, 01-04-2009.

8. **Alonso-Atienza F**, Rojo Álvarez JL, Alvarez D, Moscoso M, García Alberola A. Reconstruction of Transmembrane Currents Using Support Vector Machines and Its Application to Endocardial Mapping: A Model Study, comunicación oral, 34th Computers in Cardiology, Durham (North Carolina), EEUU, 30 Septiembre a 3 Octubre 2007.

9. Gimeno Blanes FJ, Rojo Álvarez JL, Requena Carrión J, Everss E, Hernández Ortega J, **Alonso-Atienza F**, García Alberola A. Denoising of Heart Rate Variability Signals during Tilt Test Using Independent Component Analysis and Multidimensional Recordings. comunicación oral, 34th Computers in Cardiology, Durham (North Carolina), EEUU, 30 Septiembre a 3 Octubre 2007.

10. Requena Carrión J, Väisänen J, **Alonso-Atienza F**, Rojo Álvarez JL, Hyttinen J, García Alberola A. Comparison of the Scope of True and Integrated Bipolar Lead Systems in Implantable Cardioverter Defibrillators. Comunicación oral, 34th Computers in Cardiology, Durham (North Carolina), EEUU, 30 Septiembre a 3 Octubre 2007.

11. Väisänen J, Requena Carrión J **, Alonso-Atienza F**, Rojo Álvarez JL, Hyttinen J. Analysing the Effects of Implant Dimensions on Eleectrocardiopragh: A Modeling Approach. Comunicación oral, 34th Computers in Cardiology, Durham (North Carolina), EEUU, 30 Septiembre a 3 Octubre 2007

12. **Alonso-Atienza F**, Requena-Carrión J, Rojo-Álvarez JL, Berenfeld O, Jalife J. Action Potential alternans in LQT3 syndrome: a simulation study. Póster, 29th IEEE EMBS Annual International Conference. Lyon, Francia, 23-26 de Agosto 2007.

13. Requena Carrión J, Väisänen J, **Alonso-Atienza F**, Rojo Álvarez JL, Hyttinen J, García Alberola A. Estimation of the Scope of Transvenous Lead Systems in Implantable Cardioverter Defibrillators. Presentación oral, 29th IEEE EMBS Annual International Conference. Lyon, Francia, 23-26 de Agosto 2007.

14. Väisänen J, Reqúena-Carrión J, **Alonso-Atienza F**, Rojo-Álvarez JL, Malmivuo J Hyttinen J. Contribution of the Left Anterior Myocardium to the Body Surface Potentials in Case of Apical Ectopic Beat. Presentación oral, 29th IEEE EMBS Annual International Conference. Lyon, Francia, 23-26 de Agosto 2007.

15. Requena Carrión J, Väisänen J, Rojo Álvarez JL, Hyttinen J, **Alonso Atienza F**, Malmivuo J. Numerical Analysis of the Resolution of Surface Electrocardiographic Lead Systems. Functional Imaging and Modeling of the Heart 2007, Salt Lake City (Utah), EEUU 9-7 de Junio 2007.

16. Väisänen J, Requena-Carrión J, **Alonso-Atienza F**, Hyttinen J, Rojo-Álvarez JL, Malmivuo J. Contributions of the 12 Segments of Left Ventricular Myocardium to the Body Surface Potentials. Póster, Functional Imaging and Modeling of the Heart 2007, Salt Lake City (Utah), EEUU 9-7 de Junio 2007.

17. Requena Carrión J, Väisänen J, Hyttinen J, Rojo-Álvarez JL, **Alonso-Atienza F**, Malmivuo J. Analysis of the Scope of Unipolar and Bipolar Electrograms in Implantable Cardioverter Defibrillators. Póster, 32nd Annual International Society for Computerized Electrocardiology Conference Cancún, México, 21-26 de Abril 2007.

18. J Requena-Carrión, JL Rojo-Álvarez, E Everss, **F Alonso-Atienza**, JJ. Sánchez-Muñoz, M. Ortiz, A. García-Alberola. Changes in Cardiac Indices from Implanted Defibrillator-Stored Electrograms Due to Acquisition and Preprocessing Conditions. Computers in Cardiology, Valencia, 17-20 Septiembre 2006

19. **Alonso-Atienza F**, Requena-Carrión J, Rojo-Álvarez JL, Berenfeld O, Jalife J. ΔKPQ Mutation in LQT3 results in increased frequency and stability of reentry. Heart Rhythm, Boston (USA), May 17-20, 2006.

20. **Alonso-Atienza F**, Rojo Álvarez JL, Camps Valls G, Rosado Muñoz A, García Alberola A. Bootstrap Feature Selection in Support Vector Machines for Ventricular Fibrillation Detection. Comunicación oral, European Symposium on Artificial Neural Networks, Bruxes (Belgium), April 26-28, 2006.

Refereed Book Chapters

1. **F. Alonso-Atienza**, A. Rosado-Muñoz, J.L. Rojo-Álvarez, G. Camps-Valls. Learning the relevant features of ventricular fibrillation from automatic detection algorithms, en Intelligent Systems: Techniques and Application, Shaker Verlag, The Netherlands, 2008. Eds: E. Hines, M. Leeson, M. Martinez-Ramón, M. Pardo, E. Llobet, D. Illescu, J. Yang.

2. M.J. Fernandez-Getino García, J.L. Rojo-Álvarez, V. Gil-Jiménez, **F. Alonso-Atienza**, A. García-Armada. Complex Support Vector Machine Approach to OFDM Coherent Demodulation, en Kernel Methods in Bioengineering, Signal and Image Processing, Idea Group Inc., Hershey, PA, USA, 2007. Eds: G. Camps-Valls, J.L. Rojo-Álvarez, M. Martínez-Ramón.

Teaching Publications

Journals

1. C. Figuera, E. Morgado, D. Gutiérrez-Pérez, **F. Alonso-Atienza**, E. del Arco-Fernández-Cano, A. Caamaño, J. Ramos-López, J. Ramiro, J. Requena-Carrión. A multidisciplinary problema based learning experience for telecommunications students. International Journal of Human Capital and Information Technology Professionals, 2(3):15-28, Jul-Sept. 2011.

Conferences

1. J. Requena Carrión, **F. Alonso-Atienza**, A. Guerrero Curieses, A. B. Rodríguez González, "A Student-Centered Collaborative Learning Environment for Developing Communication Skills in Engineering Education", comunicación oral, IEEE EDUCON 2010 conference, Madrid, 14-04-2010.

2. C. Figuera, E. Morgado, D. Gutiérrez-Pérez, **F. Alonso-Atienza**, E. Del Arco-Fernandez-Cano, "Wireless4×4: An Integrating Learning Experience For Telecommunications Students", comunicación oral, IEEE EDUCON 2010 conference, Madrid, 14-04-2010. **BEST PAPER AWARD**

3. A. B. Rodríguez González, J. Requena Carrión, **F. Alonso-Atienza**, A. Guerrero Curieses, "A four-tier evaluation model to improve learning assessment", comunicación oral, International Conference of Education, Research and Innovation, Madrid, Spain, 16-11-2009.