MINISTERIO DE CIENCIA, INNOVACIÓN Y UNIVERSIDADES

CURRICULUM VITAE

CV date	24/11/2020

Part A. PERSONAL INFORMATION

First and Family name	Unai Irusta		
Social Security, Passport, ID number	30658989N	Age	47
Researcher numbers	Researcher ID	T-6327-2019	
	Orcid code	0000-0001-9521-1852	

A.1. Current position

Name of University/Institution	University of the Basque Country (UPV/EHU)			
Department	Communications Engineering			
Address and Country	Alameda Urquijo SN. Bilbao 48013. Spain			
Phone number	+34946013957	E-mail	unai.irusta@ehu.eus	
Current position	Associate Professor		From	01/06/2011
Espec. cód. UNESCO	330417, 330602, 330609, 330703, 330706, 331107			
Keywords	Biomedical signal processing, machine learning, cardiopulmonary resuscitation, emergency medicine			

A.2. Education

MsC Telecom Engineering	UPV/EHU	1998
PhD Telecom Engineering	UPV/EHU	2010

A.3. JCR articles, h Index, thesis supervised

Three six-year research periods (last one 2014-2019). Three thesis (two international) supervised in the last 10 years, currently co-supervising seven. I have co-authored 48 journal papers (30 Q1, 13 Q2, 5 Q3), including a review paper (Q2), and 47 of those since 2007. My citation metrics from different sources:

Citation metrics	WOS	Scopus	Scholar (since 2015)	
Cites	648	692	1150	(851)
h-index	16	16	20	(18)
I10-index	-	-	31	(28)

Details on publications/metrics in my public profiles: scholar, Scopus and researcherID.

Part B. CV SUMMARY

ACADEMICS: I am a Telecoms Engineer (graduated with honors as first of the class with a grade of 9.46/10) and European PhD with extraordinary prize, both from the UPV/EHU. I have done a pre-doc research stay at the University of Stavanger (Norway) with professor T Eftestol, and a postdoc research stay in Oslo at the institute for pre-hospital medicine (NAKOS) with professor J Kramer-Johansen. In both cases I worked in signal processing and machine learning algorithms to improve out-of-hospital cardiac arrest (OHCA) treatment.

RESEARCH: I have (co)-authored 48 indexed papers (30 Q1), 3 book chapters, over 100 conference contributions (mainly international), 2 patents (one European), and one registered software. I have participated in 20 research projects funded through competitive calls (PI in 7), and in 4 R&D contracts with private companies.

I started my research career in 1996 in photonic technologies, and in 1998 I was awarded a pre-doc grant to complete my PhD, which I refused to work in the private sector. I worked 5 years for private companies, 3 of which were spent in Holland working for international companies in the mobile communications sector. In 2003 I joined the university and restarted my research career, but to start work in biomedical signal processing applied to resuscitation in a pre-hospital setting. Since 2014 my technical focus has been on multimodal signal processing and machine learning applications in resuscitation. Currently I am a member and

co-founder of the BioRes (Bioengineering and Resuscitation) research group, a group recognized as type A group by the Basque Science Network with stable financing from the Basque Government for the 2019-2021 three year period.

I have worked in three research topics, plastic fiber optic devices and sensors (1996-1999, 1 publication), electrical power supply quality (2005-2008, 3 publications) and biomedical signal processing applied to resuscitation (2005-present, rest of publications), my current line of research. In this field I have made contributions to OHCA arrhythmia classification, shock advice algorithms for adults and children, design of adaptive filters to remove chest compression artifacts, prediction of defibrillation success, detection of pulse, and to the automatic assessment of treatment quality (prospective and retrospective). These developments originate from the datasets of signals recorded using defibrillators during OHCA treatment. And the techniques involve multimodal signal processing, statistical signal processing, machine learning, and statistics. My publications fall mainly into two categories Biomedical Signal Processing (focus on techniques and algorithms) and Emergency Medicine (focus on medical impact).

Part C. RELEVANT RESEARCH MERITS

C.1. Publications: 48 JCR papers, 30 Q1

Isasi, I., **Irusta, U.** , Aramendi, E., Idris, A.H., Sörnmo, L. Restoration of the electrocardiogram during mechanical cardiopulmonary resuscitation. Physiological measurement, 2020, 41(10), pp. 105006.

Alonso, E., **Irusta, U**., Aramendi, E., Daya, M.R. A Machine Learning Framework for Pulse Detection during Out-of-Hospital Cardiac Arrest (2020) IEEE Access, 8, art. no. 9184797, pp. 161031-161041.

Jaureguibeitia, X., Zubia, G., **Irusta, U**., Aramendi, E., Chicote, B., Alonso, D., Larrea, A., Corcuera, C. Shock Decision Algorithms for Automated External Defibrillators Based on Convolutional Networks (2020) IEEE Access, 8, art. no. 9174724, pp. 154746-154758.

X Jaureguibeitia, **U Irusta**, E Aramendi, P Owens, H Wang, A Idris Automatic detection of ventilations during mechanical cardiopulmonary resuscitation. (2020) IEEE JBHI 2020, 24 (9), pp. 2580-2588.

Elola, A., Aramendi, E., Rueda, E., **Irusta, U**., Wang, H., Idris, A. Towards the Prediction of Rearrest during Out-of-Hospital Cardiac Arrest (2020) Entropy, 22, 758.

Argüeso, D., Picon, A., **Irusta, U**., Medela, A., San-Emeterio, M.G., Bereciartua, A., Alvarez-Gila, A. Few-Shot Learning approach for plant disease classification using images taken in the field (2020) Computers and Electronics in Agriculture, 175, art. no. 105542.

Skogvoll, E., Nordseth, T., Sutton, R.M., Eftestøl, T., **Irusta, U**., Aramendi, E., Niles, D., Nadkarni, V., Berg, R.A., Abella, B.S., Kvaløy, J.T. Factors affecting the course of resuscitation from cardiac arrest with pulseless electrical activity in children and adolescents (2020) Resuscitation, 152, pp. 116-122.

Isasi, I., **Irusta, U**., Aramendi, E., Eftestøl, T., Kramer-Johansen, J., Wik, L. Rhythm analysis during cardiopulmonary resuscitation using convolutional neural networks (2020) Entropy, 22 (6), art. no. 595

Isasi, I., Zabihi, M., **Irusta, U**., Eftestøl, T., Rad, A.B., Kramer-Johansen, J., Aramendi, E., Wik, L. Automatic cardiac rhythm classification with concurrent manual chest compressions (2019) IEEE Access, 7, pp. 115147-115159.

Elola, A., Aramendi, E., **Irusta, U**., Alonso, E., Lu, Y., Chang, M.P., Owens, P., Idris, A.H. Capnography: A support tool for the detection of return of spontaneous circulation in out-of-hospital cardiac arrest (2019) Resuscitation, 142, pp. 153-161.

Berve P.O., **Irusta U.**, Kramer-Johansen J., Skålhegg T., Kongsgård H.W., Brunborg C., Aramendi E., Wik L.. Transthoracic Impedance Measured with Defibrillator Pads—New Interpretations of Signal Change Induced by Ventilations (2019) Journal of clinical medicine 8 (5) art no 724.

Isasi, I., **Irusta, U.**, Elola, A., Aramendi, E., Ayala, U., Alonso, E., Kramer-Johansen, J., Eftestøl, T. A Machine Learning Shock Decision Algorithm for Use During Piston-Driven Chest Compressions (2019) IEEE Transactions on Biomedical Engineering, 66 (6), pp. 1752-1760.

Chicote, B., Aramendi, E., **Irusta, U.**, Owens, P., Daya, M., Idris, A. Value of capnography to predict defibrillation success in out-of-hospital cardiac arrest (2019) Resuscitation, 138, pp. 74-81.

Picón, A., **Irusta, U.**, Álvarez-Gila, A., Aramendi, E., Alonso-Atienza, F., Figuera, C., Ayala, U., Garrote, E., Wik, L., Kramer-Johansen, J., Eftestøl, T. Mixed convolutional and long short-term memory network for the detection of lethal ventricular arrhythmia (2019) PLoS ONE, 14 (5), art. no. e0216756.

Elola, A., Aramendi, E., **Irusta, U.**, Picón, A., Alonso, E., Owens, P., Idris, A. Deep neural networks for ECG-based pulse detection during out-of-hospital cardiac arrest (2019) Entropy, 21 (3), art. no. 305.

Elola, A., Aramendi, E., **Irusta, U.**, Del Ser, J., Alonso, E., Daya, M. ECG-based pulse detection during cardiac arrest using random forest classifier (2019) Medical and Biological Engineering and Computing, 57 (2), pp. 453-462.

Nordseth, T., Niles, D.E., Eftestøl, T., Sutton, R.M., **Irusta, U.**, Abella, B.S., Berg, R.A., Nadkarni, V.M., Skogvoll, E. Rhythm characteristics and patterns of change during cardiopulmonary resuscitation for in-hospital paediatric cardiac arrest (2019) Resuscitation, 135, pp. 45-50.

Isasi, I., **Irusta, U.**, Aramendi, E., Ayala, U., Alonso, E., Kramer-Johansen, J., Eftestol, T. A Multistage Algorithm for ECG Rhythm Analysis during Piston-Driven Mechanical Chest Compressions (2019) IEEE Transactions on Biomedical Engineering, 66 (1), pp. 263-272.

Aramendi, E., Lu, Y., Chang, M.P., Elola, A., **Irusta, U.**, Owens, P., Idris, A.H. A novel technique to assess the quality of ventilation during pre-hospital cardiopulmonary resuscitation (2018) Resuscitation, 132, pp. 41-46.

Chicote, B., **Irusta, U.**, Aramendi, E., Alcaraz, R., Rieta, J.J., Isasi, I., Alonso, D., Baqueriza, M.M., Ibarguren, K. Fuzzy and sample entropies as predictors of patient survival using short ventricular fibrillation recordings during out of hospital cardiac arrest (2018) Entropy, 20 (8), art. no. 591.

Alonso, E., Aramendi, E., **Irusta, U.**, Daya, M., Corcuera, C., Lu, Y., Idris, A.H. Evaluation of chest compression artefact removal based on rhythm assessments made by clinicians (2018) Resuscitation, 125, pp. 104-110.

Rad, A.B., Eftestøl, T., **Irusta, U.**, Kvaløy, J.T., Wik, L., Kramer-Johansen, J., Katsaggelos, A.K., Engan, K. An automatic system for the comprehensive retrospective analysis of cardiac rhythms in resuscitation episodes (2018) Resuscitation, 122, pp. 6-12.

Rad, A.B., Eftestol, T., Engan, K., **Irusta, U.**, Kvaloy, J.T., Kramer-Johansen, J., Wik, L., Katsaggelos, A.K. ECG-Based classification of resuscitation cardiac rhythms for retrospective data analysis (2017) IEEE Transactions on Biomedical Engineering, 64 (10), pp. 2411-2418.

Aramendi, E., Elola, A., Alonso, E., **Irusta, U.**, Daya, M., Russell, J.K., Hubner, P., Sterz, F. Feasibility of the capnogram to monitor ventilation rate during cardiopulmonary resuscitation (2017) Resuscitation, 110, pp. 162-168.

Chicote, B., **Irusta, U.**, Alcaraz, R., Rieta, J.J., Aramendi, E., Isasi, I., Alonso, D., Ibarguren, K. Application of entropy-based features to predict defibrillation outcome in cardiac arrest (2016) Entropy, 18 (9), art. no. 313.

Figuera, C., **Irusta, U.**, Morgado, E., Aramendi, E., Ayala, U., Wik, L., Kramer-Johansen, J., Eftestøl, T., Alonso-Atienza, F. Machine learning techniques for the detection of shockable rhythms in automated external defibrillators (2016) PLoS ONE, 11 (7), art. no. e0159654.

Rad, A.B., Engan, K., Katsaggelos, A.K., Kvaløy, J.T., Wik, L., Kramer-Johansen, J., **Irusta, U.**, Eftestøl, T. Automatic cardiac rhythm interpretation during resuscitation (2016) Resuscitation, 102, pp. 44-50.

Alonso, E., Aramendi, E., Daya, M., **Irusta, U.**, Chicote, B., Russell, J.K., Tereshchenko, L.G. Circulation detection using the electrocardiogram and the thoracic impedance acquired by defibrillation pads (2016) Resuscitation, 99, pp. 56-62.

Aramendi, E., **Irusta, U.**, Ayala, U., Naas, H., Kramer-Johansen, J., Eftestøl, T. Filtering mechanical chest compression artefacts from out-of-hospital cardiac arrest data (2016) Resuscitation, 98, pp. 41-47.

Ayala, U., **Irusta, U.**, Ruiz, J., Ruiz de Gauna, S., González-Otero, D., Alonso, E., Kramer-Johansen, J., Naas, H., Eftestøl, T. Fully automatic rhythm analysis during chest compression pauses (2015) Resuscitation, 89 (C), pp. 25-30. Cited 12 times.

Ruiz De Gauna, S., **Irusta, U.**, Ruiz, J., Ayala, U., Aramendi, E., Eftestøl, T. Rhythm analysis during cardiopulmonary resuscitation: Past, present, and future (2014) BioMed Research International, 2014, art. no. 386010.

González-Otero, D.M., Ruiz, J., Ruiz De Gauna, S., **Irusta, U.**, Ayala, U., Alonso, E. A New Method for Feedback on the Quality of Chest Compressions during Cardiopulmonary Resuscitation (2014) BioMed Research International, 2014, art. no. 865967.

Ayala, U., Eftestøl, T., Alonso, E., **Irusta, U.**, Aramendi, E., Wali, S., Kramer-Johansen, J. Automatic detection of chest compressions for the assessment of CPR-quality parameters (2014) Resuscitation, 85 (7), pp. 957-963.

Ayala, U., **Irusta, U.**, Ruiz, J., Eftestøl, T., Kramer-Johansen, J., Alonso-Atienza, F., Alonso, E., González-Otero, D. A reliable method for rhythm analysis during cardiopulmonary resuscitation (2014) BioMed Research International, 2014, art. no. 872470.

Ruiz, J., Ayala, U., de Gauna, S.R., **Irusta, U.**, González-Otero, D., Alonso, E., Kramer-Johansen, J., Eftestøl, T. Feasibility of automated rhythm assessment in chest compression pauses during cardiopulmonary resuscitation (2013) Resuscitation, 84 (9), pp. 1223-1228.

Ruiz, J., Ayala, U., Ruiz De Gauna, S., **Irusta, U.**, González-Otero, D., Aramendi, E., Alonso, E., Eftestøl, T. Direct evaluation of the effect of filtering the chest compression artifacts on the uninterrupted cardiopulmonary resuscitation time (2013) American Journal of Emergency Medicine, 31 (6), pp. 910-915.

Irusta, U., Ruiz, J., Aramendi, E., Ruiz de Gauna, S., Ayala, U., Alonso, E. A high-temporal resolution algorithm to discriminate shockable from nonshockable rhythms in adults and children (2012) Resuscitation, 83 (9), pp. 1090-1097.

Aramendi, E., Ayala, U., **Irusta, U.**, Alonso, E., Eftestøl, T., Kramer-Johansen, J. Suppression of the cardiopulmonary resuscitation artefacts using the instantaneous chest compression rate extracted from the thoracic impedance (2012) Resuscitation, 83 (6), pp. 692-698.

Ruiz, J., **Irusta, U.**, Ruiz de Gauna, S., Eftestøl, T. Cardiopulmonary resuscitation artefact suppression using a Kalman filter and the frequency of chest compressions as the reference signal (2010) Resuscitation, 81 (9), pp. 1087-1094.

Aramendi, E., **Irusta, U.**, Pastor, E., Bodegas, A., Benito, F. ECG spectral and morphological parameters reviewed and updated to detect adult and paediatric life-threatening arrhythmia (2010) Physiological Measurement, 31 (6), pp. 749-761.

Irusta, U., Ruiz, J. An algorithm to discriminate supraventricular from ventricular tachycardia in automated external defibrillators valid for adult and paediatric patients (2009) Resuscitation, 80 (11), pp. 1229-1233.

Ruiz, J., Gutierrez, J.J., **Irusta, U.**, Lazkano, A. A precise analysis of the IEC flickermeter when subject to rectangular voltage fluctuations (2009) IEEE Transactions on Instrumentation and Measurement, 58 (11), pp. 3839-3846.

Irusta, U., Ruiz, J., De Gauna, S.R., Eftestøl, T., Kramer-Johansen, J. A least mean-Square filter for the estimation of the cardiopulmonary resuscitation artifact based on the frequency of the compressions (2009) IEEE Transactions on Biomedical Engineering, 56 (4), art. no. 4749355, pp. 1052-1062.

Gutierrez, J.J., Ruiz, J., **Irusta, U.**, de Gauna, S.R. A new alternative for the input-voltage adaptor of the IEC flickermeter (2008) IEEE Transactions on Instrumentation and Measurement, 57 (5), pp. 923-930.

Ruiz de Gauna, S., Ruiz, J., **Irusta, U.**, Aramendi, E., Eftestøl, T., Kramer-Johansen, J. A method to remove CPR artefacts from human ECG using only the recorded ECG (2008) Resuscitation, 76 (2), pp. 271-278.

Ruiz, J., Gutierrez, J.J., **Irusta, U.** Singular frequencies in rectangular fluctuations in the IEC flickermeter (2007) IEEE Transactions on Power Delivery, 22 (2), pp. 1255-1256.

Aramendi, E., de Gauna, S.R., **Irusta, U.**, Ruiz, J., Arcocha, M.F., Ormaetxe, J.M. Detection of ventricular fibrillation in the presence of cardiopulmonary resuscitation artefacts (2007) Resuscitation, 72 (1), pp. 115-123.

Zubia, J., **Irusta, U.**, Arrue, J., Aguirre, A. Design and characterization of a plastic optical fiber active coupler (1998) IEEE Photonics Technology Letters, 10 (11), pp. 1578-1580. Cited 9 times.

C.2. Research projects and grants

Reference: IT-1229-19
Title: BioRes (Bioengineering and Resuscitation)
Call: Convocatoria Grupos Gobierno Vasco
PI: Elisabete Aramendi (UPV/EHU)
Duration: 01/01/2019-31/12/2021
Financing: 97.000 €
Participation: Researcher

Reference: RTI2018-101475-B100
Title: Procesado multimodal de señal y aprendizaje automático para la mejora del tratamiento de la parada cardiorrespiratoria extrahospitalaria
Call: Retos I+D+i, Ministerio de Ciencia Innovación y Universidades
PIs: Unai Irusta and Elisabete Aramendi (UPV/EHU)
Duration: 01/01/2019-31/12/2021
Financing: 116.160 €
Participation: Principal Investigator

Reference: GIU17/31
Title: BioRes (Biomedical Engineering and Resuscitation).
Call: Convocatoria Grupos de Investigación, UPV/EHU
PI: Elisabete Aramendi and Unai Irusta (UPV/EHU)
Duration: 21/12/2017-20/12/2020
Financing: 15.000 €
Participation: Principal Investigator

Reference: SAN17/12, SAN18/10
Title: Determinación de valores de oximetría cerebral para la predicción de los resultados de intervención en pacientes en parada cardiorrespiratoria extrahospitalaria.
Call: Convocatoria Salud, Gobierno Vasco
PI: Unai Irusta (UPV/EHU)
Duration: 01/01/2017-31/12/2019
Financing: 45.000 € (estimated 2 years granted, third under evaluation)
Participation: Principal Investigator

Reference: EHU16/18
Title: Hacia la monitorización de la resucitación cardiopulmonar orientada a la respuesta del paciente.
Call: Proyectos de investigación, UPV/EHU
PI: Unai Irusta (UPV/EHU)
Duration: 25/11/2016-18/03/2018
Financing: 11.392 €
Participation: Principal Investigator

Reference: TEC2015-64678
Title: Hacia la monitorización inteligente en el entorno de la resucitación
Call: Retos I+D+i, Ministerio de Economía y Competitividad
PIs: Elisabete Aramendi and Unai Irusta (UPV/EHU)
Duration: 01/01/2016-31/12/2018
Financing: 99.825 €
Participation: Principal Investigator

Reference: AE15/20
Title: Monitorización avanzada de la oxigenación cerebral durante la resucitación
Call: UPV/EHU, convocatoria de acciones especiales
PI: Unai Irusta (UPV/EHU)
Duration: 15/07/2015-15/07/2016
Financing: 4.700 €
Paticipation: Principal Investigator

Reference: AE14/18
Title: Creación del registro de paradas cardiorespiratorias atendidas mediante desfibrilador externo automático (DEA) en la CAPV
Call: UPV/EHU, convocatoria de acciones especiales
PI: Unai Irusta (UPV/EHU)
Duration: 30/6/2014-30/6/2015
Financing: 4.250 €
Paticipation: Principal Investigator

Reference: UFI11/16
Title: Ayuda a las Unidades de Formación e Investigación en la UPV/EHU
Call: Convocatoria UFI UPV/EHU
PI: José Luis Martín (UPV/EHU)
Duration: 01/10/2012-30/09/2014
Financing: 75550 €
Participation: Researcher

Reference: TEC2012-31928
Title: Estudio y caracterización de la impedancia transtorácica en un desfibrilador externo automático para la mejora de la resucitación cardiopulmonar
Call: Retos I+D+i, Ministerio de Ciencia e Innovación-
PI: Elisabete Aramendi (UPV/EHU)
Duration: 01/02/2013-31/01/2016
Financing: 42.471 €
Participation: Researcher

Reference: GIC12/145
Title: Grupo de señal y comunicaciones
Call: Gobierno Vaco, Ayudas para apoyar las actividades de grupos de investigación del sistema universitario vasco
PI: Jesús Mª Ruiz Ojeda (UPV/EHU)
Duration: 01/01/2013-31/12/2015
Financing: 62.900 €
Participation: Researcher

Reference: TEC2009-10460
Title: Optimización del intervalo hands-off en la resucitación cardiaca
Call: Ministerio de Ciencia e Innovación, proyectos I+D+i
PI: Jesús Mª Ruiz Ojeda (UPV/EHU)
Duration: 01/01/2010-31/12/2012
Financing: 34.400 €
Participation: Researcher

Reference: GIC10/143
Title: Grupo de señal y comunicaciones
Call: Gobierno Vaco, Ayudas para apoyar las actividades de grupos de investigación del sistema universitario vasco
PI: Jesús Mª Ruiz Ojeda (UPV/EHU)
Duration: 01/01/2010-31/12/2012
Financing: 88.000 €

Participation: Researcher

Reference: TEC2006-11978
Title: Desfibrilación cardiaca en pacientes pediátricos
Call: Ministerio de Ciencia e Innovación, proyectos I+D+i
PI: Jesús Mª Ruiz Ojeda (UPV/EHU)
Duration: 01/10/2006-30/09/2009
Financing: 78.650 €
Participation: Researcher

Reference: TIC2003-08460
Title: Estudio y análisis de hitos relacionados con la desfibrilación cardíaca mediante procesado digital de la señal ECG
Call: Ministerio de Ciencia y Tecnología, proyectos I+D+i
PI: Jesús Mª Ruiz Ojeda (UPV/EHU)
Duration: 12/01/2003-30/11/2006
Financing: 51.520 €
Participation: Researcher

Reference: UE-1998-04
Title: Diseño y desarrollo de un sensor óptico de barrera para la determinación de la dirección y velocidad del viento en un generador eólico de alto rendimiento
Call: Empresa Universidad, Gobierno Vasco
PI: Joseba Zubia Zaballa (UPV/EHU)
Duration: 01/01/1999-01/01/2001
Financing: 65.443 €
Participation: Researcher

C.3. Contracts

Title: Pilot Study on Pragmatic Airway Resuscitation Trial CPR Process and Ventilation Ancilliary Study
Company: University of Texas Health Science Center (Houston).
PI: Elisabete Aramendi (UPV/EHU)
Duration: 01/01/2019-31/12/2020
Financing: 25.000 USD
Participation: Researcher

Title: Estudio de nuevos hitos en el ámbito de la desfibrilación cardíaca
Company: Osatu S. Coop.
PIs: Jesús Mª Ruiz y Elisabete Aramendi (UPV/EHU)
Duration: 01/04/2012-01/04/2015
Financing: 60.000 €
Participation: Researcher

Title: Sistema de ayuda a la resucitación cardiopulmonar (CPR)
Company: Osatu S. Coop.
PI: Jesús Mª Ruiz Ojeda (UPV/EHU)
Duration: 01/12/2008-01/12/2009
Financing: 20.150 €
Participation: Researcher

Title: Bases de registros ECG pediátrica y desarrollo de algoritmos para la discriminación de ritmos desfibrilables
Company: Osatu S. Coop.
PI: Jesús Mª Ruiz Ojeda (UPV/EHU)
Duration: 01/07/2005-31/12/2007
Financing: 96.000 €
Participation: Researcher

Title: Estudio de técnicas de tratamiento digital de señal aplicadas a imágenes radiológicas
Company: Teccon Ingenieros y Redytel.
PI: Elisabete Aramendi Ecenarro (UPV/EHU)
Duration: 01/10/2004-31/12/2005
Financing: 35.000 €
Participation: Researcher

C.4. Patents

Aramendi E, Romo JA, Gutiérrez A, Muñoz E, Santos A, Irusta U. Método de Segmentación de un Órgano Hepático en una Secuencia de Imágenes Tomográficas. Ref. P200931161 (Spanish patent). Date 12-14-2009.
Owned and explotied by TECCON Ingenieros SL.

Ruiz J, González-Otero DM, Ruiz de Gauna S, Irusta U, Aramendi E, Alonso E, Ayala U. Dispositivo y método para asisitir en la realización de compresiones torácicas durante una resucitación cardiopulmonar. Ref. EP13382514.1 (European patent). Date 12-16-2013.
Owned and exploited by Bexen Cardio (Osatu SCoop).

Registered software

Irusta U, González C, Burgos V, Ruiz M. Representación de la presión arterial con balón de contrapulsación. Ref. S-162-14 (00/2015/749). Date 09-01-2014.
Owned and exploited by Fundación instituto de investigación Marqués de Valdecilla y Hospital virtual de Valdecilla.

C.5. Supervised PhD students

Iraia Isasi. Signal Processing and machine learning contributions to rhythm analysis during cardiopulmonary resuscitation. Finished in 2020 with honors. International thesis co-supervised with E Aramendi.

Beatriz Chicote. Nuevas Técnicas de Procesado para la Predicción del Éxito de la Desfibrilación en la Parada Cardiorrespiratoria Extrahospitalaria. Finished in 2019 with honors. Thesis co-supervised with E Aramendi.

Unai Ayala. New strategies to minimize hands-off intervals during cardiopulmonary resuscitation. Finished in 2014 with honors. International thesis co-supervised with J Ruiz.

Currently co-supervising 7 PhD students with prospected defense dates: Andoni Elola (end of 2020), Andima Larrea (end of 2021), Xabier Jaureguibeitia (end of 2021), Enrique Rueda (end 2022), Jon Urteaga (end of 2023), Mariela Coromoto Barón Varela (end of 2024) and Itziar Eguskiza (end of 2024).

Part D. TEACHING

D.1. Teaching and teaching quality

In over 17 years in the UPV/EHU (Faculty of engineering in Bilbao), I have taught 10 different courses in 4 degrees (undergraduate and graduate), including circuit theory and analysis, microwave engineering, optical communications, digital signal processing (basic to advanced) and biomedical signal processing.

I have taught in Basque (B), Spanish (S) and English (E) with excellent results in the students' satisfaction questionnaires (on average over 4.5/5). I have been awarded several teaching recognitions (see section D.7) by my institution for my excellent results in the satisfaction questionnaires. This is a summary of my teaching and its quality (student satisfaction):

Course	Language	Degree (school-year)	School years	Quality
Circuit Analysis	B/S	TTE (1)	2003-2010	4.45
Circuit Theory I	B/S	TE (1)	2003-2010	4.6
Circuit Theory II	B/S	TE (1)	2003-2010	4.7
Microwaves	B	TE (4)	2005-2013	4.8
Optical Commun.	S	TTE (3)	2009-2012	-
Circuit Analysis	B/S	TTED (1)	2010-Current	4.5
Signal Processing	B/S/E	TTED (1)	2010-Current	4.45
Multimedia Signal Processing	S	TTED (3)	2014-2016	4.4
Biomedical Signal Processing	S	MTE (2)	2015-Current	4.8
Introduction to Bioengineering	S	MBE (1)	2010-Current	-

TTE: Technical Telecoms Engineering; TE: Telecoms Engineering; TTED: Telecoms Technology Engineering Degree; MTE: Master in Telecoms Engineering; MBE: Online Master in Biomedical Engineering.

D.2. Docentiaz Program

I have participated in Docentiaz twice for the 2006/7-2010/11 period and the 2011/12-2015/16 periods. In both cases I was awarded a grade of Excellent, with grades 92.64/100 and 108.5/100 (rounded to 100).

D.3. Supervision of students final degree projects

I have co-directed three PhD thesis (see research), and supervised 40 students in their final degree projects. The detailed account is:

Final degree projects in TE

1. Desarrollo de una base de datos de electrocardiogramas pediátricos y de una plataforma para el diseño de algoritmos de detección de ritmos en desfibriladores externos automáticos. Jorge Cuervo, 2005/6, grade: 9.5.
2. Fibrilazio eta takikardia bentrikularren arteko ezberdinketa dinamika ez linealean oinarritutako metodoak erabiliz. Irune Garramiola, curso 2006/7, calificación: 9.5.
3. Bihotz-birikietako bizkortze zarata ezabatzeko algoritmoen diseinu tresnaren prototipoa. Aintzane Ojinaga, 2008/9, grade: 9.5.
4. ECGak eskuratzeko eta demostradore batean bistaratzeko anplifikagailu baten diseinua. Maider Meabe, 2009/10, grade: 9.5. (co-supervised).
5. EKG sintetikoak denbora errealean sortzeko tresna. Julen Cimadevilla, 2010/11, grade: 9.5.

6. QRS algoritmoen doiketa eta emaitzen azterketarako aplikazio baten garapena. Itziar Gallego, 2012/13, grade: 9.
7. Visualizador ECG. Carlos González, 2012/13, grade: 8.5. (co-supervised).
8. Sakaden artefaktoa ezabatzeko algoritmoen diseinua eta ebaluaketa. Iraitz Bilbao, 2014/15, grade: 6.5.
9. Detección de fibrilación auricular a partir de intervalos RR, Xabier Jaureguibeitia, 2015/16, grade: 8.0.
10. Implantación de tecnología LTE en emplazamientos existentes y despliegue de fibra óptica para el operador Orange en el municipio de Valladolid. Izaskun Vidal, 2015/16, grade: 8.5.

Final degree projects in TTE

1. Burmuineko erradiologia-irudien segmentazioa egiteko aplikazio baten garapena. Itziar Gallego, 2005/6, grade: 10.
2. Optimización de algoritmos de detección del complejo qrs basados en la amplitud y en la pendiente del ECG. Jorge Icaza, 2012/13,: 8.5. (co-supervised).
3. Herramientas para el análisis de parámetros para la identificación de ritmos desfibrilables. Miguel Fernández, 2013/14, grade: 9.
4. Evaluación de algoritmos de detección de episodios de arritmias ventriculares para desfibriladores automáticos externos (DEA). Endika González, 2013/14, grade: 8.

Final degree projects in TTED

1. Bihotz biriketako berpiztea simulatzeko panpin baten kudeaketarako tresna. Iraia Isasi, 2013/14, grade: 9.5.
2. Kontrapultsazio-baloi uhin-forma errealistak sortzeko tresna. Goizane Garcia, 2014/15, grade: 9.5.
3. Herramienta gráfica para el desarrollo de prácticas de laboratorio basadas en el procesado digital de señal electrocardiográfica. Laura Lázaro, 2014/15, grade: 9.5. (co-supervised).
4. Bihotz-biriketako geldialdien seinale datu-base anotatuen garapenerako tresnak. Munia Pitarke, 2015/16, grade: 8.5.
5. Diseño de equipamiento en estaciones base de telefonía móvil para la implantación de 4G. Sendoa González, 2015/16, grade: 8.
6. Algoritmo para la detección de latidos en señales de oxihemoglobina de oximetría cerebral. David Argüeso, 2016/17, grade: 10.
7. Algoritmo basado en el ECG para la anotación de episodios de resucitación. María Monzón, 2016/17, grade 9.
8. Caracterización de la fluctuación en la impedancia torácica debido a ventilaciones. Laura Gómez, 2016/17 grade: 9.5.
9. Análisis de métodos para la obtención de la actividad respiratoria derivada del ECG. Héctor Argüeso, 2016/17 grade:10.
10. Fibrilazio Aurikular Paroxistikoa Aurresateko Metodoa. Itziar Eguskiza, 2017/18 grade 8.5
11. Predicción de ataques de epilepsia mediante variabilidad del ritmo cardíaco. Asier López, 2018/19 grade 8.5.
12. An algorithm to detect atrial fibrilation using short ECG segments. Iratxe Asurmendi, 2018/19 grade 6.5.
13. An algorithm to classify heartbeats using the electrocardiogram. Gorka Zubia, 2018/19 grade 10.
14. Desarrollo de una plataforma para la evaluación de la calidad RCP. Javier Barrios, 2019/2020 grade 7.5.
15. Ikasketa automatikoan oinarritutako bihotz geldiketetako sailkatzaile multimodala. Haizea Lasa, 2019/2020 grade 10.
16. Algoritmo para la realimentación de la calidad RCP en un SmartWatch. Isabel Gutiérrez, 2019/2020 grade 7.5.

Masters degree projects

1. Analysis of reference signals in CPR suppression. Unai Ayala, 2010/11, grade: 9.5
2. Pazienteen bihotz eta arnasketa maiztasunen monitorizazioa burmuineko infragorri hurbileko espektroskopia seinaleak erabiliz. Iraia Isasi, 2015/16, grade: 10.
3. Burmuineko infragorri hurbileko espektroskopia seinaleetan oinarritutako bihotz-maiztasuna neurtzeko algoritmoak. Goiuri Peralta, 2015/16, grade: 9.5.
4. Diabetic Retinopathy Detector Based on Exudate Identification Using Color Fundus Images. Laura Aguilera, 2016/17, grade: 9.1.
5. Aplicación de algoritmos Deep Learning para el contaje de mitosis en imágenes histológicas. Juan Pablo Salado, 2016/17, grade: 10.
6. Berpizteko bihotz erritmoak sailkatzeko ikasketa automatikoan oinarritutako algoritmo baten garapena. Munia Pitarke, 2017/18, grade: 8.5.
7. Few-shot learning approach for plant diasease classification over field images. David Argüeso, 2018/19, grade: 10.
8. Deep domain adaptation for semantic segmentation of damaged and multi-crop leaves. Héctor Argüeso, 2018/19, grade: 10.
9. Semi-supervised approach for automatic counting of insects with small annotated dataset. Laura Gómez, 2018/19, grade: 10.
10. Estudio sobre la conectividad estructural y genética del cerebro humano. David Romero, 2018/2019, grade: 9.5
11. Aprendizaje automático para la anotación de ritmos en parada cardiorrespiraroria. Eric López Manibardo, 2018/2019, grade: 10.
12. Ikasketa sakonean oinarritutako klase anitzeko eta etiketa anitzeko landare hosto sailkatzaileak. Itziar Eguskiza, 2019/2020, grade: 9.

D.4. Teaching innovation projects

Title: Coordinación interdisciplinar de las asignaturas análisis de circuitos y electrónica básica en las titulaciones de ingeniería técnica de telecomunicaciones
Call: UPV/EHU
PI (team): David de la Vega (4 teachers)
Duration: 01/01/2008-31/12/2009
Financing: 200 €

Title: Uso de vídeos educativos on-line tipo screencast para facilitar el autoaprendizaje en la asignatura de análisis de circuitos
Call: UPV/EHU
PI (team): Unai Irusta (5 teachers)
Duration: 01/01/2012-31/12/2013
Financing: 1500 €

Title: Aprendizaje indagatorio basado en un modelo de conferencia científica. Aplicación a la adquisición de las competencias transversales de máster en ingeniería de Telecomunicación.
Call: UPV/EHU
PI (team): Unai Irusta (8 profesores)
Duration: 01/01/2016-31/12/2017
Financing: 2000 €

Title: Hacia un modelo integral para la adquisición y evaluación de las competencias transversales del Máster en Ingeniería de Telecomunicación basado en el aprendizaje cooperativo y las metodologías activas (TRANSMIT).
Call: UPV/EHU
PI (team): Juan Jose Unzilla (8 profesores)
Duration: 01/01/2019-31/12/2020
Financing: 1700 €

D.5. Conferences and publications, teaching innovation
Participation in teaching innovation conferences

Utilización de vídeos tipo screencast para facilitar el aprendizaje en las sesiones prácticas basadas en un simulador. Poster, conference CUIETT 2014.

Uso de vídeos tipo screencast para mejorar el aprendizaje basado en metodologías activas. Oral presentation, conference CUIETT 2014.

Uso de vídeos tipo screencast para mejorar el aprendizaje basado en metodologías activas. Poster Jornadas IKD-jendartea 2015.

Aprendizaje basado en problemas (ABP) aplicado al tratamiento de señales: una experiencia. Poster, conference CUIETT 2016.

Aprendizaje indagatorio basado en un modelo de congreso científico. Oral presentation, conference CUIETT 2016.

Modelo de congreso científico para la adquisición y evaluación de las competencias transversales en un máster de ingeniería. Oral presentation, conference CUIETT 2017.

Hacia un modelo integral de desarrollo y evaluación de la competencias transversales en un Máster de Ingeniería de Telecomunicación. Oral presentation, conference CUIETT 2019.

Teaching publications, book chapters
S Ruiz de Gauna, J Ruiz, U Irusta, E Aramendi. Cardiac Defibrillation - Mechanisms, Challenges and Implications, 2011. Intech. ISBN: 978-953-307-666-9.
Chapter: AED for Paediatric Use, Implications in the Design of Shock Advice Algorithms. Pages 183-204.

U Irusta, E Aramendi, J Ruiz, S Ruiz de Gauna. Tachycardia, 2012. Intech. ISBN: 978-953-51-0413-1.
Chapter: Accurate Detection of Paediatric Ventricular Tachycardia in AED. Pages 1-24.

A Elola, E Alonso, E Aramendi, U Irusta. Noninvasive Ventilation in Medicine – Recent Updates. ISBN: 978-1-78985-290-5.
Chapter: Noninvasive Monitoring of Manual Ventilation during Out-of-Hospital Cardiopulmonary Resuscitation. Pages 41-60.

U Irusta, JJ Gutiérrez, J Arrue, A Lazkano, LA Leturiondo. Innovación educativa en las enseñanzas técnicas (vol II), 2015. Editorial de la UCLM. ISBN: 9788490441084.
Chapter: Uso de vídeos tipo screencast para mejorar el aprendizaje basado en metodologías activas. Pages 850-868.

U Irusta, A Lazkano, J Arrue, JJ Gutiérrez, LA Leturiondo. Innovación educativa en las enseñanzas técnicas (vol II), 2015. Editorial de la UCLM. ISBN: 9788490441084.
Chapter: Utilización de vídeos tipo screencast para facilitar el aprendizaje en las sesiones prácticas basadas en un simulador. Pages 809-20.

U Irusta, G Durana, E Navas, S Ruiz de Gauna, JL Ordiales, M Vélez, J Zubia, E Ibarrola. 25 Experiencias de Innovación Educativa. ISBN: 9788469776537.
Chapter: Aprendizaje indagatorio basado en un modelo de congreso científico. Pages 219-228.

D.6. Teaching coordinator
I have been teaching coordinator of the following courses:
Teoría de Circuitos I: 2004/5 – 2009/10

Análisis de Circuitos: 2012/13 – 2013/14
Tratamiento de Señales: 2014/15 – 2015/16
Proc. Señales Biomedicas: 2018/19 – currently

D.7. Teaching prices and recoginitions
Recognition by the Faculty of Engineering for my excellent results in the teaching satisfaction questionnaire: 2007/8, 2009/10, 2010/11, 2011/12, 2015/16, 2017/18.

Recognition for my excellent results in the Docentiaz program: 2012/13, 2018/19.

D.8. Courses received related to teaching
(1) Elaboración del plan docente según criterios ECTS (50 horas), 2008.
(2) Técnicas de trabajo en grupo (4h), 2009.
(3) Irakasleen prestakuntza linguistikorako tailerra (45h), 2009
(4) Tutor online para máster en ingeniería biomédica (70h), 2010
(5) Aprendizaje basado en proyectos: como se pone en marcha y como se mantiene en marcha (10h), 2011.
(6) Jendearen aurrean euskera jasoan hitzegiteko teknikak (12h), 2012.
(7) Unibertsitateko testuak zuzentzen (30h), 2013.
(8) Diseño de rúbricas para la evaluación de competencias (50h), 2016
(9) Elaboración de material docente audiovisual para la docencia on-line. Del aula física al aula virtual (25h), 2016.

D.9. Activities to promote science and engineering
Participation in the science week: 2008, 2009, 2011, 2012, 2013, 2014, 2018, 2019.
Participation in the presentation to high-school students of the engineering programs: 2008-2015, and 2017-2020.