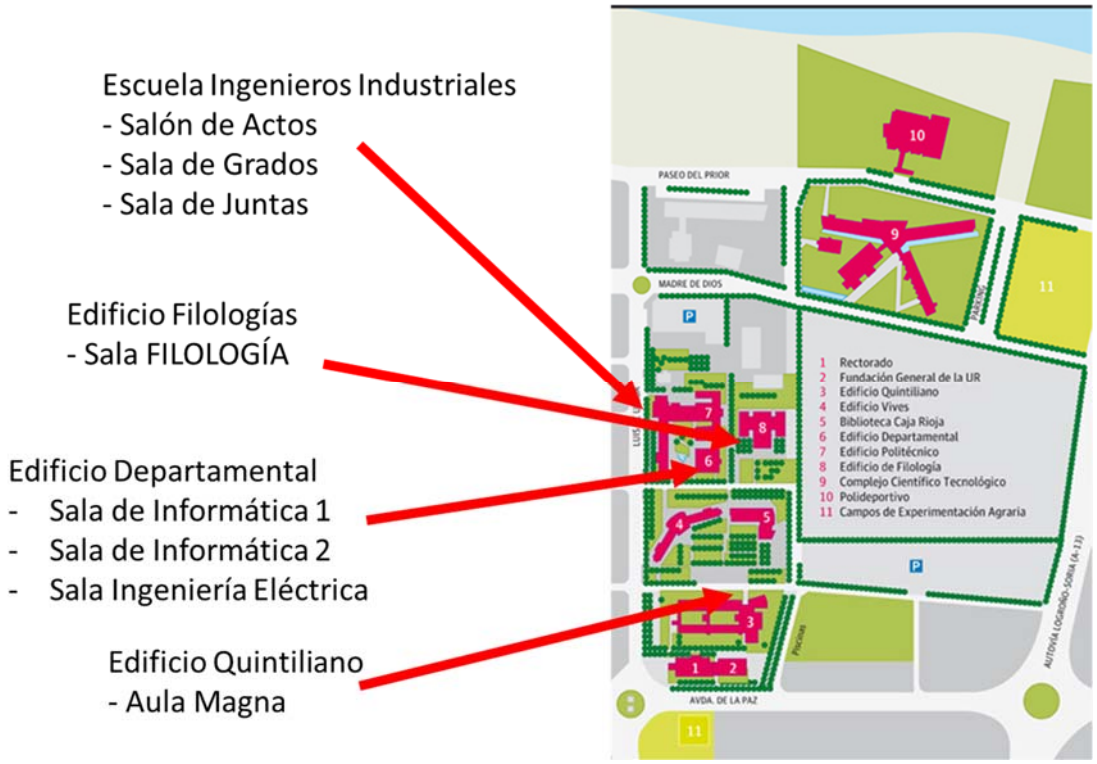
SEDE del SIMPOSIO

La sede es la Escuela Técnica Superior de Ingenieros Industriales (Edificio Politécnico), situada en la calle Luis de Ulloa 20, 26004 Logroño (https://goo.gl/maps/mUxKv1tV3qAYwHBw6), en la que se encuentran las aulas: Salón de Actos, Sala de Grados, y Sala de Juntas, y el Aula Magna de la Universidad de La Rioja, en el Edificio Quintiliano (https://goo.gl/maps/AfpPzQaWfPSmqseQ9), situado en la calle La Cigüeña 60, 26006 Logroño.

Todas las actividades se desarrollan en la Escuela de Ingenieros Industriales, donde se encuentra la secretaría técnica, salvo la sesión de apertura conjunta Eurosim-CEA el martes 2 de julio a las 9.00, que se realiza en el Aula Magna de la Universidad de La Rioja.



Programa Científico y Social

Lunes, 1 de julio de 2019

Lugar: Escuela Técnica Superior de Ingeniería Industrial de la Universidad de La Rioja

10:00h-13.00h FlexSim: Simulación de procesos y casos de éxito. (Salón de Actos) ENTRADA LIBRE https://goo.gl/maps/mUxKv1tV3qAYwHBw6

Este curso, en español, tiene dos sesiones prácticas, la tarde del lunes y ma mañana del martes, en inglés. Las INSCRIPCIONES a ambos eventos se hacen en:

https://www.eventbrite.es/e/entradas-flexsim-simulacion-de-procesos-y-casos-de-exito-63856883658

https://www.eventbrite.es/e/flexsim-training-tickets-63858572710

16:00h Inscripción y entrega de documentación (en la Sede) https://goo.gl/maps/mUxKv1tV3qAYwHBw6

16:00h-16:30h Inauguración, acto de apertura e Informe de los coordinadores (Salón de Actos) https://goo.gl/maps/mUxKv1tV3qAYwHBw6

16:30h-18:30h Conferencias Inaugurales (Salón de Actos) https://goo.gl/maps/mUxKv1tV3qAYwHBw6

Prof. Manuel Silva. Técnica e Ingeniería en España. El Prof. Silva, además de ser referente mundial en modelado y simulación de sistemas dinámicos de eventos discretos, así como en su control, es el actual premio (edición 2018) del Comité Español de Automática, y colaborador incansable de la Universidad de La Rioja y del Grupo Temático de Modelado Simulación y Optimización de CEA. Pero en esta ocasión le hemos vuelto a requerir su presencia por una faceta diferente, aunque no menos exitosa, desarrollada como miembro de la Real Academia de Ingeniería, en la que ha promovido y editado una fantástica colección de nueve (hasta ahora) volúmenes titulada Técnica e Ingeniería en España(http://www.raing.es/es/publicaciones/libros/colecci-n-t-cnica-e-ingenier-en-espa), que presentará en una manera global. La Real Academia de Ingeniería ha donado dicha colección a la Universidad de La Rioja para que pueda ser contemplada directamente por los asistentes a la inauguración, lo que desde la Universidad de La Rioja y el Comité Organizador de este Simposio queremos agradecer, así como al Profesor Silva, fuente de dicha donación.

Prof. José Manuel Andújar. Medias verdades del coche eléctrico. El Prof. Andújar, antiguo coordinador y todavía alma del Grupo de Control Inteligente de CEA, nos tratará un tema de total actualidad, transcendencia e interés. Según la agencia europea del medio ambiente (AEMA), el sector del transporte representa, en media en Europa, el 30% del consumo de energía final y más del 20% de las emisiones de gases de efecto invernadero. También es responsable de buena parte de la contaminación atmosférica y acústica urbana. No obstante y a nivel mundial, hay países donde el sector del transporte puede llegar a generar el 40% del CO2 vertido a la atmósfera. Estos datos explican fácilmente la necesidad imperiosa de cambiar el modelo de transporte basado en combustibles fósiles, algo que está siendo utilizado con muy buen marketing por gobiernos y, sobre todo, por empresas automovilísticas, que están fomentando la adquisición de coches eléctricos a baterías. El coche eléctrico, cuya penetración en el mercado es ahora anecdótica, podría generar un problema enorme de contaminación (eso sí, trasladada de las ciudades a otro lugar) y de saturación de las redes eléctricas si su uso fuera masivo, hasta el punto de hacer inviable el modelo. En esta conferencia, se trata de demostrar que el coche eléctrico a baterías no es la solución definitiva, aunque pueda ser un primer paso, para corregir el problema de la contaminación generada por el sector del transporte. Por el contrario, se apuesta por el coche eléctrico alimentado por pila de hidrógeno; solución que no requiere intervención apenas en las redes eléctricas actuales y que puede convertir el sector transporte en auténticamente verde.

Javier Sanz. Historia del vino. Por último, para que nadie se olvide que este Simposio se realiza en La Rioja, no podía faltar una ponencia sobre el vino, en este caso a través de una perspectiva histórica, realizada por el escritor y divulgador Javier Sanz, habitual colaborador del Aula Pedro Vivanco de la Universidad de La Rioja (cátedra académica dedicada al vino y su cultura, patrocinada por Dinastía Vivanco y su Museo Cultura del Vino, patrocinadora y colaboradora de este evento), a través de la cual podremos también entender otras perspectivas de lo que en la antigüedad era un Simposio. Es la conferencia ideal de cierre de la sesión, antes de ir a realizar las prácticas.

17:30h-20.30h FlexSim Training: Learn how to create simulation models. (Salas de Informática 1 y 2 del Edificio Departamental) ENTRADA LIBRE con inscripción https://goo.gl/maps/tT29kzajBybfiReh9

https://www.eventbrite.es/e/flexsim-training-tickets-63858572710 (inscripción)

19.00h-20.00h Vino español con jamón y concierto en Colegio de Ingenieros Industriales, Plaza de San Bartolomé 1, https://goo.gl/maps/7i2s33P4PGdoa6s88

20:00h-21:30h Visita guiada al centro histórico de la ciudad, Plaza de San Bartolomé 1, https://goo.gl/maps/7i2s33P4PGdoa6s88

21:30h Cóctel de bienvenida y cena de confraternización con EUROSIM en la Sociedad Gastronómica La Becada, Calle Santiago 3, https://goo.gl/maps/Awrm4v1y5J5kQPYn9

Martes, 2 de julio de 2019

Lugar: Aula Magna de la Universidad De La Rioja (Edificio Quintiliano)

9:00h-12:00h Acto de Inauguración de Eurosim, con participación de los Grupos Temáticos de Control Inteligente y Modelado Simulación y Optimización (Aula Magna, Edificio Quintiliano) https://goo.gl/maps/AfpPzQaWfPSmqseQ9

Incluye las conferencias (el resumen de las mismas junto al CV de los ponentes se encuentra al final de este documento):

- **Prof. Manuel Silva**. Formal Methods and Simulation: Cooperation makes strength

- **Prof. José Manuel Andújar**. Renewable sources-based smart micro grids with hydrogen as backup: modeling, control, implementation and management. A real case

- **Prof. Felix Breitenecker**. Nature, Features and Properties of Developments in Modelling and Simulation – from A -Alternative to Z – Zippy

12:00h-14:00h Lunch de recepción (Edificio Quintiliano)
https://goo.gl/maps/AfpPzQaWfPSmqseQ9

Martes, 2 de julio de 2019

Lugar: Escuela Técnica Superior de Ingeniería Industrial de la Universidad de La Rioja

11:00h-14.00h FlexSim Training: Learn how to create simulation models. (Salas de Informática 1 y 2 del Edificio Departamental) ENTRADA LIBRE con inscripción https://goo.gl/maps/tT29kzajBybfiReh9

https://www.eventbrite.es/e/flexsim-training-tickets-63858572710 (inscripción)

15:00h-16:30h Sala ING. ELECTRICA (Edificio Departamental Planta 3). Sesión Final del Concurso de Tesis Doctorales del Grupo Temático de Modelado, Simulación y Optimización.

Chair. Pedro Jesús Cabrera

15:00h-16:30h Sala de Grados. Sesión de trabajo 1 (Conjunta con EUROSIM 2019). Special Session on Trends and Perspectives of Machine Learning in Automation (I)

Chairs:
-Matilde Santos, University Complutense of Madrid, Spain, msantos@ucm.es
-Juan G. Victores, University Carlos III of Madrid, Spain, jcgvicto@ing.uc3m.es
-Gonzalo A. Farias, Pontificia Universidad Católica de Valparaiso, Chile, gonzalo.farias@pucv.cl

Pablo Zambrana-Lopez, J. Jesus Fernandez-Lozano, Javier Fernandez-Quijano, Pedro Mayorga-Rubio and Alfonso Garcia-Cerezo	A methodology for improving the PI controller of a wind turbine on a semi-submersible offshore platform: development and evaluation of an anti windup algorithm
José Luis Pitarch and César de Prada	Machine learning and the digital era from a Process Systems Engineering perspective
Javier Bonilla, Jose Antonio Carballo, Manuel Berenguel, Jesús Fernández and Loreto Valenzuela	Machine Learning Perspectives in Concentrating Solar Thermal Technology
Raul Fernandez-Fernandez, Juan G. Victores, David Estevez and Carlos Balaguer	Quick, Stat!: A Statistical Analysis of the Quick, Draw! Dataset

16:30h-17:00h Café

17:00h-18:15h Sala de Grados. Sesión de trabajo 2 (Conjunta con EUROSIM 2019). Special Session on Trends and Perspectives of Machine Learning in Automation (II)

Chairs:
- Matilde Santos, University Complutense of Madrid, Spain, msantos@ucm.es
- Juan G. Victores, University Carlos III of Madrid, Spain, jcgvicto@ing.uc3m.es
- Gonzalo A. Farias, Pontificia Universidad Católica de Valparaiso, Chile, gonzalo.farias@pucv.cl

David Estevez, Juan G. Victores, Raul Fernandez-Fernandez and Carlos Balaguer	Towards Clothes Hanging via Cloth Simulation and Deep Convolutional Networks
Esko Juuso	Advanced machine learning in recursive data-based modelling
Jennifer J Gago, Valentina Vasco, Bartek Łukawski, Ugo Pattacini, Vadim Tikhanoff, Juan G Victores and Carlos Balaguer	Sequence-to-Sequence Natural Language to Humanoid Robot Sign Language
Ignacio Trojaola, Iker Elorza, Eloy Irigoyen and Aron Pujana	Machine Learning Control for the Commissioning of Hydraulic Presses

18:30h-20:30h Autobuses a visita guiada a Bodega y Museo del Vino en Bodegas Vivanco (Briones). Los autobuses se cogen en la entrada de la Escuela de Ingenieros Industriales, Calle Luis de Ulloa 20 (entrada al edificio de la Sede) https://goo.gl/maps/mUxKv1tV3qAYwHBw6

20:30h-21:00h Degustación y visita guiada a Museo Cultura del Vino "Vivanco" ("Vivanco" Wine Culture Museum) https://goo.gl/maps/pP92fRQmSoWBqSbJA

21:00h Cena del simposio en Bodegas Vivanco (Briones). Como es habitual, pero no por ello menos estimado, al final de la cena tendremos una actuación de nuestro querido Mago Automático. https://goo.gl/maps/pP92fRQmSoWBqSbJA

Miércoles, 3 de julio de 2019

Lugar: Escuela Técnica Superior de Ingeniería Industrial de la Universidad de La Rioja

09.00h Salón de Actos. Conferencia Plenaria (Conjunta con EUROSIM 2019).

Chair. Felix Breitenecker

Martin Bicher, Matthias Wastian, Dominik Brunmeir, Matthias Rößler and Niki Popper	Review on Monte Carlo Simulation Stopping Rules: How Many Samples Are Really Enough?

9:30h-11:30h Sala de Grados. Sesión de trabajo 3 (Conjunta con EUROSIM 2019). Special Session on Approaching Floating Off-shore Wind Turbines (FOWT): modelling, optimization and control

Chairs:
- Matilde Santos, University Complutense of Madrid, Spain, msantos@ucm.es
- María Tomás-Rodríguez, The City, University of London, UK, Maria.Tomas-Rodriguez.1@city.ac.uk
- Segundo Esteban, University Complutense of Madrid, segundo@dacya.ucm.es

Jesus Enrique Sierra Garcia and Matilde Santos	Cable suspended load UAV hybrid automata modelling and neuro-control
Sergio Díaz González, Jesús Torres Jorge and Rosa María Aguilar Chinea	Using Deep Learning to classify emotions in images in the tourism field
Daniel Villoslada, Matilde Santos and María Tomás-Rodríguez	Identification and Validation of a Barge Floating Offshore Wind Turbine Model with Optimized Tuned Mass Damper
Maria Tomas-Rodriguez, Kamal Feroz and Matilde Santos	Floating Offshore Wind Turbines Oscillations Damping
Segundo Esteban, Rafael Lopez, Maria Guijarro and Matilde Santos	Simulation of Regular Waves on Floating Wind Turbines: Preliminary Analysis
Maria Guijarro, Segundo Esteban and Matilde Santos	A survey of damage control methods for wind turbines based on sensors: a first approach

9:30h-11:30h Sala ING. ELÉCTRICA (Edificio Departamental, Planta 3). Sesión de trabajo 4, Presentaciones orales y sesión de posters, de los trabajos:

Chairs: Juan Ignacio Latorre y Mercedes Pérez

Gerardo Minguela Castro, Carlos Cerrada and Jose A. Cerrada Somolinos	Decisor Estratégico Operacional Militar mediante bloques retroalimentados, utilizando técnicas de modelización de la incertidumbre
Julián Seco, Antonio José Calderón, Isaías González and Manuel Calderón	Diseño preliminar de electrolizador modular para uso de energía fotovoltaica en Smart Micro-Grids
Ignacio Trojaola, Iker Elorza, Eloy Irigoyen and Aron Pujana	Hydraulic Press Commissioning Cost Reductions via Machine Learning Solutions
Mario Rodríguez Cantelar, Fernando Matía Espada and Pablo San Segundo Carrillo	Modelo Neuronal Aplicado a un Agente Conversacional en un Dominio Cerrado
Gema Fb Martin, Fernando Matía, Paloma De la Puente and M.Guadalupe Sánchez	Technoethics and automation: psychological contribution on intelligent control in social robotics
Mauricio Marcano, Eloy Irigoyen, Sergio Díaz and Joshué Pérez	Strategies for Shared Control in Automated Vehicles
Patricia Arroyo, Félix Meléndez, Jesús Lozano, José Ignacio Suárez, Sergio Rodríguez and José Luis Herrero	Sistema electrónico personal para la medición de calidad del aire
G.N. Marichal, A. Hernández, D. Avila, I. Padrón and M. Tomas-Rodriguez	Inteligencia Artificial para el mantenimiento de depuradoras marinas de aceite
Enrique López-Hinarejos, Matilde Santos and Carlos Armenta	Sintonía Heurística de Control Descentralizado de un Sistema Eólico Multivariable

11:30h-12:00h Café

12:00h-12:45h Sala de Grados**.** Mesa redonda. Reuniones Grupos Temáticos

12:45h-13:00h Sala de Grados**.** Acto de clausura

13:00h-15:00h Cafetería del Edificio Politécnico: almuerzo de trabajo

Formal Methods and Simulation: Cooperation makes strength

Manuel Silva
Instituto de Investigación en Ingeniería de Aragón (I3A),
Universidad de Zaragoza, Spain
silva@unizar.es

A main part of my research activity concern *formal methods* in the field of concurrent *discrete event* [dynamic] *systems* (DES). This correspond to a "view" of dynamic systems where the state takes value in a discrete (possibly infinite) set and events play a fundamental role in its evolution (otherwise stated, DES are *discrete-state* and *event-driven* systems). Even if historically DES views start to develop dealing with artificial (i.e., human designed) systems, today they are also being applied to some natural ones (for a broad historical perspective on the DES field, with a certain bias towards system theory and control, [Silva (ed.), 2018]).

Petri Nets (PNs) −the modelling paradigm to which I devote most of my research attention concerning DES− are transition systems that use a simple non-monotonous consumption–production logic. The interest on *formal* analysis and synthesis techniques in the PN framework is rooted on the many "surprising" behaviors (counter intuitive, "abnormal") that those classes of systems may exhibit. In order to prove *correctness*, the so called *state explosion problem* in their enumerative analysis (e. g., using *model checking* techniques) recommends the combination with *transformation* and *structural* techniques. However, when dealing with highly populated DES, the use of *fluidization* (a classical relaxation technique) may substantially reduce the computations, and provide "accurate enough" analysis of certain properties (the first book dealing with fluid approximations of *Queuing Networks* is [Newell, 1971], at that times introduced because the QN "literature [mainly] grew from *solutions looking for a problem* rather than from *problems looking for a solution*").

Fluid relaxations of PN models lead to particular classes of *hybrid* systems. When fluidization is total and the nets are considered under infinite server semantics, the relaxed models constitute a subclass of *piecewise affine* systems, more precisely with a *polytopic partition* in the state domain and *continuity* in their derivatives (the applicability of the fluidization of PN models depends on the particular properties under study and on the structure of the system under consideration [Silva, 2016]). Because I frequently hear about *simulation* with some reluctance, you can simply interpret this keynote as a *praise for simulation*, assuming it is made taking "enough care" (epistemological matters regarding computer-based simulations is a topic that deserve a number of works, from quite different perspectives; among other examples, [Tolk et al., 2013] and [Greca et al, 2014]).

Moving first to "fully" continuous systems (even if limited to those modelled with ordinary differential equations, ODEs), we would like to remark that the probability of being able to integrate symbolically an ODE randomly generated is almost surely zero. Because many (most?) engineering problems are dynamically described with equations that have no primitive function, either *linearization* (an approximation at a certain point or along a certain trajectory) or *numerical* solution (another approximation) is a must. Paraphrasing [Cellier & Kofman, 2006: vi], a terminological question is that "whereas applied mathematicians write about *numerical ODEs*", for analogous task "Engineers

talk about *simulation*". The use in CSSL'67 of a command language to carry out experiments with ODEs is a first step towards the separation of the model and the experiment. However, in essence, as a language of sentences, it is more a language of simulation than of modeling.

Changing to the *discrete-event systems* modelling arena, it should be recognized that a pioneer use of the DES acronym came from *discrete event simulation*. In 1957, Keith D. Tocher appeared to be the first to conceive *events* as the required abstraction to characterize the kind of models we mention now (see, for example, [Hollocks, 2008]). Some two decades later, a "discrete-event model-driven" perspective was introduced in [Zeigler 1976], leading to a clear separation of the model construction from the proper simulation techniques (M&S framework; PN-based simulation has always been essentially a model-driven approach). In the DES context, in spite of the numerous formal techniques for performance computation (exact, approximation or bounds), simulation remains a fundamental approach.

Nevertheless, problems like exploring the existence of an initial condition (initial marking in the PN terminology) making a DES deadlock-free (a non-monotonous property) is not reasonable to be addressed by simulation. Even more, the possible explanation for the absence of solution(s), if it is the case, needs some understanding from the structure of the PN model. Thus strong cooperation among *formal techniques* (that provide "understanding") and *simulation* (that in practice gives examples or counter examples of expected behaviors) is more than simply convenient.

As already pointed out, the continuous relaxation of DES formalized with PNs lead to some kind of technically hybrid models. Questions like, characterizing the continuity of the throughput in steady-state (if exist) of timed fluid PNs is also a question that requires the consideration of formal methods. Moreover, many conceptual explorations (like that of time-population *duality*) in order to gain understanding also requires formal analysis techniques. Nevertheless, the computation of the performance of most non-Markovian models necessitates some simulation.

In the previous statements, it is clear that we privilege Model-Based Design (i.e., building *models* instead of *prototypes*), not trial and error approaches. The rational in the use of knowledge-based models is to deal with safer and cheaper (also faster) to develop systems (including easier to repair and maintain). Simulating a model is "like" testing a prototype. Nevertheless, building models of (mainly of the *environment* of) certain systems may be a time consuming and inaccurate task. Moreover, *transparency* is a relevant concept on *model management* (see, for example, [Murray-Smith, 2016]). In model building, it is concerned with the "easiness" that someone not involved in its development can understand it. The goal is that their external users have a good understanding of how the model was built and organized, even what its limits ("entourage" of validity) are.

Looking more carefully to Data-Driven approaches, an emergent question is if such kind of representations can be more or less "automatically generated". The use of some Artificial Intelligence and model learning techniques applied to real data (somehow like "automatic identification") is a promising area. Even if in some cases provide good prediction accuracy ("usefulness"), they most usually suffer from insufficiency on model explainabilility (or explicability; "truthfulness" as a last goal); also scalability limitations should be taken into account. The lack of "explainability" of some Data-Driven approaches is currently a strong obstacle to their use, particularly in systems for which security is a must. Hybrid modelling solutions merging both approaches exist.

For example, looking to enhance Model-Based designs with Data-Driven techniques [Tripakis, 2018].

Alfonso X *el Sabio* (*the Wise*) was a medieval king of Castile and Leon. He was very much interested on Astronomy. It is argued that, when the Ptolomy's geo-centric model of planetary motion (an "useful" model, as it have important predictive capabilities, but "not true") was explained to him, he react saying that (c. 1250):

> If the Lord Almighty had consulted me before embarking upon his creation, I should have recommended something simpler.

Probably that wise king will have a similar reaction looking to the complexity and size of many of the systems (e. g., cyber-physical, biological…) being considered as entities to analyze and control today. Even if the *proof of correctness* promise of formal methods is slowly becoming a reality in practice, simulations will most frequently remain an indispensable complementary tool.

Some references

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[Ziegler, 1976] Bernard P. Zeigler, *Theory of modeling and simulation,* John Wiley, 1976.

Brief speaker CV

Manuel Silva received the Industrial-Chemical Engineering degree from the University of Seville (1974) and the postgraduate (1975) and Ph.D. (1978) degrees in Automatic Control from the INP de Grenoble. From 1975 to 1978, he worked for the CNRS at the Laboratoire d'Automatique de Grenoble. In 1978 he started the group of Systems Engineering and Computer Science at the University of Zaragoza, where is full professor since 1981. Prof. Siva has been awarded the prize of the Spanish Committee of Automatics (Comité Español de Automática, CEA-IFAC), in its 2018 edition (the current edition). Founding Member of the Spanish Association of Robotics, his current research interests include modeling, validation, performance evaluation, control and implementation of distributed concurrent systems using Petri Nets. Among his books, he has authored *Las Redes de Petri en la Automática y la Informática* (AC, 1985; also Thomson-AC, 2002), coauthored *Practice of Petri Nets in Manufacturing* (Chapman & Hall, 1993), and coedited and coauthored *Control of Discrete-Event Systems: Automata and Petri-Net Perspectives* (Springer, 2013). Prof. Silva has been distinguished with a medal from the city of Lille (France, 1996), by the Association of Telecommunication Engineers of Aragón (2001), by the Thematic Group on *Modeling and Simulation* (CEA/IFAC, 2015), and with the National Automatic Control Award (CEA / IFAC, 2018). He is *Honoris Causa* Doctorate by the University of Reims-Champagne-Ardennes, member of the Royal Academy of Engineering of Spain (2000), and member of the Royal Academy of Exact, Physical, Chemical and Natural Sciences of Zaragoza (2014). Editor of *Técnica e Ingeniería en España* (in Spanish; 9 volumes), it is an historical, epistemological and sociological encyclopedia placing technology and engineering in a broad cultural framework.

Renewable sources-based smart micro grids with hydrogen as backup: modeling, control, implementation and management. A real case

José Manuel Andújar
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This conference deals with the complex problem of designing and putting into work an electrical grid where the primary sources (principally sun and wind) are intermittent and sometimes difficult to predict but, however, whereas mandatory, the users must have the guaranteed supply. As sources and backup systems grow, especially if they are of different types, the grid freedom degrees also grow, and consequently its capacity to guarantee the supply, but, the complexity of the modelling, control, implementation and management as well. Thus, introducing intelligence to the network in order to make it operational seems unavoidable, but…, what is the meaning of smart grid? Well, let's start from the beginning; the concept of distributed generation, very close to consumption points, usually produced by small power plants, has led to what is known as micro grids. When a micro grid includes control and management smart technology becomes a smart micro grid. The term smart means that the micro grid has a control system with its own energy management strategy that is able to match demand, increases the lifetime of the elements, reduces operating costs and maximizes the microgrid performance. The concepts of micro grid and smart micro grid seem to be a perfect match for renewable energies. Firstly, because renewable energy is essentially distributed and different depending on the place; and secondly, because renewable energy is intermittent. Therefore, in order to assure a continuous supply with quality, hybridizing different renewable sources and equipping the whole system with intelligent technologies for getting the proper performance. In this conference, we are going to present a methodological foundation for modelling and designing a model predictive control (MPC) applied to renewable sources-based micro grids with hydrogen as backup. The goal of the MPC is to guarantee the best energy distribution and, in order to optimize the micro grid operation, technical and economic parameters have been included in the modelling process. Then, putting together the developed model and the designed MPC, a regulated operation of the micro grid is guaranteed during all its operating scope at the time that it meets with the energy demand saving the useful lifetime of its elements, while the most economical benefit as possible is obtained. This is, as the result of the modelling methodology and the designed MPC, it is conceivable to optimize the micro grid operation both in the short- and in the long-term basis. The micro grid model and the designed MPC controller have been validated in an actual smart micro grid, specifically in the University of Huelva's smart micro grid. In fact this is its current controller.

Brief speaker CV

Prof. Dr. José M. Andújar is full professor of System and Automatic Control Engineering at the University of Huelva (southwest of Spain) and director of the "Remote Piloted Aerial Systems (RPAS)" Master, first Master in Continental Europe specialized in medium and large RPAS. During 32 years of academic experience he has been awarded with 25 prizes and distinctions, as well as he has held numerous academic and research positions in management. He has supervised 11 doctoral theses with 8 awards, and he has 13 international patents (extended to 164 countries). His numerous publications, more than 350 and, among them, more than 100 articles indexed in the JCR SCI (55 are Q1, 27 belong to the first decile and several of them

are numbers 1) have more than 3,500 citations with an indexed score of h-index = 32 and i10-index = 72. He is the main researcher of the “Control and Robotics” research group, which has obtained more than 7.5 M € from competitive calls in recent years. He has carried out 55 research projects and contracts with companies, almost always as principal researcher. He has been coordinator of the thematic group "Intelligent Control" of the Spanish Committee of Automatic Control, as well as of its Board of Directors. He is the national coordinator of the hydrogen and fuel cells Spanish platform and member of its governing council. Also, he is member of the expert committee for the design of the 2020 energetic Andalusian strategy, as well as a project certifying expert. His research lines are in the scope of control engineering, intelligent control, renewable energy systems, building retrofitting and energy efficiency and engineering education.

Nature, Features and Properties of Developments in Modelling and Simulation – from A -Alternative to Z – Zippy

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The development of modelling and simulation has gone various ways. Shannon's definition for simulation as "the process of designing a model of a real system and conducting experiments with this model for the purpose either of understanding the behaviour of the system or of evaluating various strategies for the operation of the system" allows developments of different nature and invites for application in any area. Furthermore, computer advance and software improvement have stimulated the development of system simulation essentially. Consequently, the development of modelling and simulation shows different nature, various features, and characteristic properties.

Nature, features and properties of modelling and simulation development may range from A to Z, the following incomplete list includes also controversial features and properties: adjustable, alternative, behavioural, classical, conservative, controversial, delayed, direct, dogmatic, early, expected, exiting, exotic, fascinating, generic, helpful, improper, joyous, keen, late, limited, meaningful, necessary, needless, novel, obsolete, pragmatic, puzzling, reasonable, recycled, reused, special, standard, straightforward, strange, surprising, tricky, typical, untimely, unusual, various, wanted, willing, x-fold, yielding, zany, zippy, etc.

This contribution picks out features and properties with unusual and conflictive character as straightforward vs surprising, expected vs coincidental, novel vs recycled, classic vs exotic, boon and bane, dogmatic vs adjustable, necessary vs needless, early vs late, etc and discusses and documents them by new and elder publications, and by case studies. Interestingly, this approach allows different views and alternative insights into topics as nonlinearity, model analysis, algorithms, simulation software, numerics, causality, etc.

An oral presentation of this contribution may last from ten minutes to three hours. For a proper and time-controlled presentation course the audience is invited to select the features and properties to be presented and to be discussed discuss – by use of a stochastic process..

Brief speaker CV

Felix Breitenecker studied 'Applied Mathematics' and, after professorships at University Glasgow, at University Budapest, at University Ljubljana and at other universities, he acts since 1992 as professor for Mathematical Modelling and Simulation at TU Wien (Technical University Vienna). He covers a broad research area, from mathematical modelling to simulator development, from numerical mathematics to

symbolic computation, from biomedical and mechanical simulation to process simulation, and he also deals with ‘unusual’ simulation areas, like archaeology and poetry. In teaching area, he is organizing e-learning development for basic mathematics and basic simulation.

Felix Breitenecker is active in various simulation societies: president and past president of EUROSIM since 1992, board member and president of the German Simulation Society ASIM, and member of INFORMS, SCS and others. He is engaged in many projects in the area of modelling and simulation, partners being industry and research institutions. Felix Breitenecker has published about 400 scientific publications, and he is author of three books and editor of 25 books (proceedings and monographs). Since 1995 he is Editor in Chief of EUROSIM’s scientific journal SNE Simulation Notes Europe..