X International Summer School on Fault Diagnosis of Complex Systems

Valladolid (Spain) July, 1st-5th , 2024

Promoted by:

Spanish Thematic Network on Supervision and Diagnosis of Complex Systems

Supported by:

Presentation

The International Summer School on Fault Diagnosis of Complex Systems is a biennial event promoted by the Spanish Network on Supervision and Diagnosis of Complex Systems (http://www.lsi.us.es/~rdiag/index.php/RedSuperv/HomePage) that aims to promote the research on this challenging field and provoke the interaction among research groups and practitioners in Spain and abroad. The school is organized as an intensive one-week course.

Expected attendants are PhD and master students interested in fault detection, diagnosis and prognostics topics, and practitioners involved in monitoring and supervision projects.

The 10th edition of this successful and already established event will take place between the 1st and 5th of July 2024 in the University of Valladolid, Spain.

The teaching will take place at the **Escuela de Ingeniería Informática building, in the Miguel Delibes** Campus.

Summer School Web Site: https://dxsummerschool24.infor.uva.es/

Organization

Local Organizing Committee:
Belarmino Pulido, Anibal Bregon (Departamento de Informática, Universidad de Valladolid)

School Steering Committee:
Belarmino Pulido, Anibal Bregon (Departamento de Informática, Universidad de Valladolid)

Special Guests
Erik Frisk (Linköping University, Sweden)
Louise Travé-Massuyès (LAAS-CNRS, France)
Gautam Biswas (Vanderbilt University, USA)

Academic Staff:
C. Alonso-González (U. Valladolid), J. Armengol (U. Girona), A. Bregon (U. Valladolid), M.J. de la Fuente (U. Valladolid), R. M. Gasca (U. Sevilla), M. Teresa Gomez (U. Sevilla), J. Melendez (U. Girona), V. Puig (UPC), B. Pulido (U. Valladolid).

Programme

T1. INTRODUCTION. FUNDAMENTAL CONCEPTS
T1.1 Definitions: fault, failure, detection, diagnosis, reliability...
T1.2 Foundations for fault detection and diagnosis in FDI and DX: detectability, observability, diagnosability...

T2. THE FDI APPROACH
T2.1. Structural analysis and analytical redundancy.
T2.2. Model-based detection methods: parameter estimation, parity equations, state observers for linear and non-linear models.
T2.3. Fault detection: residual evaluation by consistency tests, and envelope generators.
T2.4. Fault isolation: structured and directional residuals.

T3. THE DX APPROACH
T3.1 Model-based diagnosis from AI Community. Consistency-based diagnosis, CBD: Theoretical (Reiter's) approach.
T3.2 GDE: the computational approach to CBD.
T3.3 Computational alternatives to GDE. Diagnosing multiple faults.
T3.4 Constraint-driven fault diagnosis.

T4. BRIDGE: INTEGRATION OF FDI AND DX APPROACHES
T4.1 Theoretical links and comparison.
T4.2 Practical comparison and potential synergies.

T5. DIAGNOSING BUSINESS PROCESSES
T5.1 Introduction to Business Processes
T5.2 Diagnosis in the Business Process lifecycle
T5.3 Self-adaptative Business Processes
T5.4 Challenges and applications

T6. SOFTWARE DIAGNOSIS
T6.1 Introduction
T6.2 Software Testing
T6.3 Software Debugging
T6.4 Software Configuration Diagnosis

T7. STATISTICAL APPROACHES TO FAULT DIAGNOSIS
T7.1. Fault diagnosis using statistical methods.

T8. MACHINE LEARNING MODELS FOR PROGNOSTICS AND CONDITION BASED MAINTENANCE
T8.1 Introduction to prognostics
T8.2 Statistical background: survival analysis and reliability
**T8.3 Machine learning models for prognostics**
T8.4 Application

T9. INTRODUCTION TO DEEP REINFORCEMENT LEARNING

Schedule & Index

Time	Monday	Tuesday	Wednesday	Thursday	Friday
9:00-10:00	Opening and Invited Conference	T2. FDI Approach	T4. BRIDGE	T8. ML for Prognostics and CBM	T7. FDI based on statistical models
10:00-11:00	T1. MBD Fundamentals				
11:00-11:30	Coffee Break	Coffee Break	Coffee Break	Coffee Break	Coffee Break
11:30-12:30	T1. MBD Fundamentals	T3. AI-DX approach	T5. Diagnosing Business Processes	T8. ML for Prognostics and CBM	T7. FDI based on statistical models
12:30-13:30	T2. FDI Approach				Closing
13:30-15:00	Lunch	Lunch	Lunch	Lunch	Lunch
15:00-16:30	T2. FDI Approach	T3. AI-DX approach	T6. Software diagnosis	T9. Introduction to Deep Reinforcement Learning	
16:30-17:00	Coffee Break	Coffee Break	Coffee Break	Coffee Break	
17:00-18:30	T2. FDI Approach	T3. AI-DX approach	T8. ML for Prognostics and CBM	T9. Introduction to Deep Reinforcement Learning	

Location

Valladolid
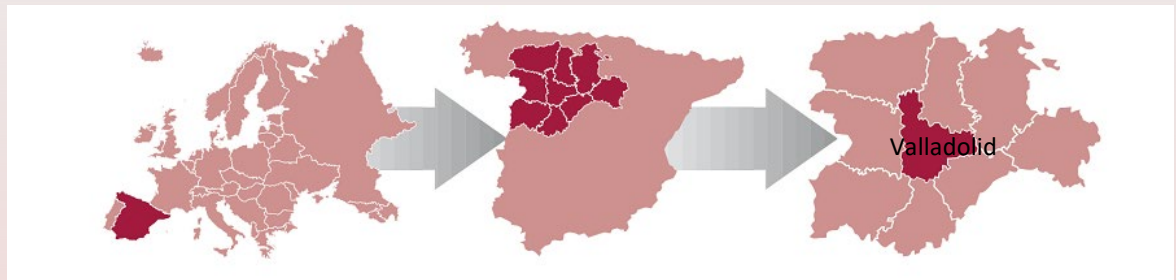
Dates
School: 1st-5th July, 2024

Registration Fees
Registration fees include attendance of the course, lunch (not dinner) from Monday to Friday and coffee-breaks
  - **Early registration**: before May, 31st: 500 euro
  - **Late registration**: from June, 1st: 750 euro

Registration site: https://funge.uva.es/area-formacion/fault-diagnosis-of-complex-systems/

Venue
The teaching will take place at the Escuela de Ingenieria Informática de Valladolid (Valladolid Informatics Engineering School), in the Valladolid Campus Miguel Delibes. It can be easily accessed by car, but preferred transportation is by bus (line 8 – last stop).
http://www.auvasa.es/auv_linea.asp?lin=8

       Escuela de Ingeniería Informática. Campus Miguel Delibes.Paseo de Belén, número 15
       47011 VALLADOLID

How to reach the Escuela de Ingeniería Informática at Campus Miguel Delibes:

Accommodation (not included in the Registration Fee):
There are some available rooms at the university dorm **"RUP Reyes Católicos".** Reservations can be made, while there are available rooms, directly at the dorm webpage **(https://reyescatolicos.uva.es/reserva/)** indicating **"Diagnosis Summer School"** in the "activity" box **(Actividad que viene a realizar**, in the form in Spanish**)** and **"B. Pulido/A. Bregon"** in the "responsible professor" box **(Profesor Responsable** , in the form in Spanish**).**

Information

Organized by:

About Valladolid

Valladolid is a historic city located in the Castile and León region of central Spain. Known for its rich cultural heritage and significant historical landmarks, Valladolid has played a crucial role in Spanish history. The city boasts a well-preserved medieval core with charming narrow streets, historic buildings, and impressive architecture.

Valladolid served as the capital of Spain in the 16th and 17th centuries during the reign of Philip II, making it an important political and cultural center. The city is home to various landmarks, including the Valladolid Cathedral, a stunning Gothic masterpiece, and the Plaza Mayor, a vibrant square surrounded by picturesque buildings.

In addition to its historical significance, Valladolid is known for its festivals, such as Semana Internacional de Cine de Valladolid (SEMINCI). The city also has a thriving culinary scene, offering a taste of Castilian cuisine with its local specialties.

Overall, Valladolid combines history, architecture, and cultural richness, making it an intriguing destination for those interested in exploring the heritage of Spain. Don't miss this opportunity to discover our city and taste our tapas! (see more: https://www.info.valladolid.es/en/home)

Getting there…?

Valladolid has its own airport although most international flights come into Madrid-Barajas airport. From Madrid to Valladolid you can take a train, a bus or rent a car:
- Trains depart from Madrid-Chamartin train station.
- Buses depart from Mendez Álvaro bus station "Estación Sur"

From Madrid-Barajas airport to Madrid
– By taxi there is a fixed rate of 30 euro from the airport to Madrid.
– Metro is a fast option to go to Madrid from the airport. There are two metro station in the airport, one for Terminal 1-2-3 and other in Terminal 4.
https://www.metromadrid.es/en/index.html
– There is a Train station connecting Terminal 4 with Chamartin train station. Look for "Cercanias" trains.
https://www.renfe.com/es/en/suburban/suburban-madrid

From Madrid to Valladolid by train
This is the fastest option, it takes one hour by train to go from Madrid-Chamartin train station to Valladolid.
Prices for one ride are between 29-38 euro
Please consider to buy your ticket in advance since it could happen that some trains are full.
https://www.renfe.com/es/en/viajar/prepare-your-trip/billetes-ave-y-largadistancia/all-tickets

From Madrid to Valladolid by bus
It takes two hours and half to go from Madrid Estación Sur (Mendez Álvaro) to Valladolid.
One ride ticket cost around 16 euro
There is also a connection from the airport Madrid-Barajas Terminal 4 to Valladolid.
https://www.alsa.com/en/web/bus/home