

## IEEE ICNSC 2023

October 25-27, 2023, Marseille, France



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### Proposal for Special Session at ICNSC'23

#### Session Title: Advances in Unknown Input Observers Design and their application et FDI and FTC

##### Description and Aim:

This Invited Session aims to give a up to date survey of linear and nonlinear Unknown Input Observers (UIO) design. This type of observers, including Decoupling UIO, Proportional-Integral-Observer, functional observer, and descriptor observer, can take into account disturbances, faults or model uncertainties. Such observers have the ability to estimate the state of a system even in the presence of unknown inputs, and also, for some types of observers, to estimate simultaneously the states and unknown inputs. Different techniques and methods have been considered for designing such observers for linear and nonlinear systems subject to unknown input signals and applied in fault detection and isolation methods. This Invited Session aims to track the history and the evolution of observer design ideas in the last decades, benefiting practitioners by enabling them to find an appropriate solution quickly. This call also focusses on results proposing solutions to some issues, such as relative degree 1, slow invariant zeros or internal dynamics, the use of neural networks in modeling of unknown inputs (ARTISMO project), online learning, and some other limitations and constraints of the existing results. The session is open to experimental applications (including transportation, vehicles, robotics, energy systems, etc.), and simulation results using benchmarks to evaluate and compare different design of various UIOs.

##### The potential topics include (but are not limited to):

The UIOs can be used in some applications related to control, diagnosis, and fault-tolerant control of dynamical systems such as drones, vehicles, biological systems, etc. This session will include some topics related to (but not limited to):

- Fault detection and isolation (FDI)
- Fault tolerant control (FTC)
- Inverse problem
- Feed-forward control
- Dynamical linear and nonlinear systems
- Aerial ground vehicles dynamics estimation
- Robotics
- Etc.

##### Expected number of papers: 6-8



GDR Groupement de recherche  
MACS Modélisation, Analyse et  
Conduite des Systèmes dynamiques



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### Organizers:

**Dalil ICHALAL**

IBISC-Lab, Univ Evry, Universit  Paris Saclay

E-mail: [dalil.ichalal@univ-evry.fr](mailto:dalil.ichalal@univ-evry.fr)

**Naima AIT-OUFROUKH**

IBISC-Lab, Univ Evry, Universit  Paris Saclay

E-mail: [naima.aitoufroukh@univ-evry.fr](mailto:naima.aitoufroukh@univ-evry.fr)

**Sofiane AHMED ALI**

IBISC-Lab, Univ Evry, Universit  Paris Saclay

E-mail: [sofiane.ahmedali@univ-evry.fr](mailto:sofiane.ahmedali@univ-evry.fr)

**Vincent VIGNERON,**

IBISC-Lab, Univ Evry, Universit  Paris Saclay

E-mail: [vincent.vigneron@univ-evry.fr](mailto:vincent.vigneron@univ-evry.fr)

**Said MAMMAR,**

IBISC-Lab, Univ Evry, Universit  Paris Saclay

E-mail: [said.mammar@univ-evry.fr](mailto:said.mammar@univ-evry.fr)