

## A Pre-Congress Tutorial Workshop Proposal for 2014 IFAC World Congress

**Title:** Linear Systems - A Measurement Based Approach

**Category:** Tutorial, Half-day Program

### Organizers and Presenters:

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**Goal of the Tutorial Workshop:** To introduce a new measurement-based approach to control system design and analysis, and future research.

**Abstract:** In this workshop we present recent results obtained by us on the analysis, synthesis and design of linear systems for which models are unknown or not readily available. We show that for such systems it is possible to develop a measurement based approach that captures the behavior of the system when new design or control elements are added. In particular new elements to be added to the unknown system can be designed by strategically processing a few measurements made on the otherwise unknown system. These results constitute a generalization and extension of Thevenin's Theorem (1883) of classical circuit theory, to arbitrary linear systems. The workshop will explore applications of these concepts to Electrical, Mechanical, Civil and Hydraulic Engineering problems and to the design of Control Systems and Fault Tolerant Control. A detailed listing of topics follows:

### Program Topics:

1. Linear Equations with Parameters
2. Parametrized Solutions for Unknown Systems
3. Application to DC and AC Circuit Design
4. Application to Mechanical and Civil Engineering Systems
5. Application to Hydraulic Engineering
6. Application to Block Diagrams and Control Systems.
7. Application to Fault Tolerant Design and Fault Tolerant Control.
8. Suggestions and Ideas for Future Research

### The main reference for the workshop is our recent monograph:

Linear Systems: A Measurement Based Approach, S.P.Bhattacharyya, L.H.Keel and D.N.Mohsenizaden, Springer-Verlag, 2013.