



IV International Workshop

The Use of Synchrophasors in Power Systems

An Indispensable Infrastructure in the 21st Century

Glauco N. Taranto



COPPE/UFRJ

Programa de Engenharia Elétrica



Motivations

- The increasing number of PMU applications in the electric power industry
 - At I Workshop (2012): 500 PMUs
 - At IV Workshop (2016): > 10.000 PMUs (BIG DATA)
- The reported positive outcome from implemented practical applications
- The encouraging feedback we've received from you, the audience, in the 2012, 2013 and 2014 Workshops.



Some Applications

- State estimation
- System monitoring (with nearly raw-data)
- Post-mortem analysis
- Fault identification
- Model validation/calibration
- Parameter identification
- Oscillating modes monitoring
- Angular and voltage instability identification
- Out-of-step protection
- Adaptive protection
- and more ...



Acknowledgements

Organizers



Sponsors





Acknowledgements

● Panelists

- ▣ Prof. Luigi Vanfretti, KTH, Sweden
- ▣ Prof. Federico Milano, University College Dublin, Ireland
- ▣ Eng. Guilherme Zat, Fundação Parque Tecnológico de Itaipú, Brazil
- ▣ Dr. José Eduardo Alves, CEPEL, Brazil
- ▣ Eng. Ricardo Lira, GE Software Solutions, Brazil
- ▣ Sergio Atayde del Moral, Opal-RT
- ▣ Dr. Jaime Cepeda, CENACE, Ecuador
- ▣ Eng. Rafael Fernandes, ONS, Brazil



The Morning Program

Time	Subject	Panelist
8h–8h30	Welcome and Introduction	Glauco Taranto (COPPE/UFRJ)
8h30–9h10	Synchrophasor Applications Facilitating Interactions between Transmission and Distribution Operations	Luigi Vanfretti (KTH - Sweden)
9h10–9h50	Determination of bus frequencies for power systems transient stability models	Federico Milano (University Dublin)
9h50–10h20	Poster Session / Coffee-break	
10h20–11h	Performance Testing of Phasor Measurement Units at CEPEL's LabPMU	José Eduardo Alves (CEPEL)
11h–11h40	Perturbations Monitoring and Phasor Measurements (RPMF)	Guilherme Zat (FPTItaipú)
11h40–12h10	Round Table (chaired by G. Taranto)	Morning Panelists
12h10–13h30	Lunch	



The Afternoon Program

Time	Subject	Panelist
13h30–14h10	Advances in Synchrophasor-Based Wide Area Defence and Control	Ricardo Lira (GE-Software Solutions)
14h10–14h50	OPAL-RT's Synchrophasor Applications in Real Time: Power Systems, Testing and Development	Sergio Atayde del Moral (Opal-RT)
14h50-15h10	Poster Session / Coffee-break	
15h10–15h50	The Ecuadorian Wide Area Monitoring, Protection and Control System WAMPAC	Jaime Cepeda (CENACE - Ecuador)
15h50-16h30	Time Synchronization Analysis and Its Impact on PMU Applications	Rafael Fernandes (ONS)
16h30–17h	Round Table (chaired by N. Martins)	Afternoon Panelists



Poster Session (1/2)

- R. T. Bernando and D. Dotta, "Wide-Area Damping Control Design using Non-Convex Optimization Algorithm", Unicamp.
- F. Gomez and L. Vanfretti, "Meta-Modeling and Model Transformations for Power System Simulation using Model Driven Technologies", KTH.
- T. Bogodorova and L. Vanfretti, "Estimation of Power System Model Parameters: Uncertainty Distributions and Confidence Intervals", KTH.
- M. Baudette and L. Vanfretti, "OpenIPSL and RaPIId: OSS Tools for Power System Modeling, Simulation and Model Validation", KTH.
- L. Vanfretti, G. Taranto, T.M.L. Assis and J Lavenius, "COPPE/UFRJ and KTH SmarTSLab: Collaborating for Smarter Electrical Power Grids", COPPE/UFRJ/KTH.



Poster Session (2/2)

- L. Vanfretti, J.E. Alves Jr., M.S.Almas and F. Mahmood, "KTH SmarTS Lab Collaboration with the CEPEL Electric Power Research Center of Brazil and UFF", KTH/CEPEL/UFF.
- B. C. Bernardes, J. P. A. Vieira, U. H. Bezerra and G. N. Taranto, "Assessing the Performance of a Thevenin-Based Algorithm to an Actual Voltage Instability Incident using Real PMU Data", UFPA/COPPE/UFRJ.
- M. A. R. Guimarães, J. C. S. de Souza and M. B. do Coutto Filho, "Enhanced Bad Data Processing by Phasor-Aided State Estimation", UFF.
- J. E. Gómez Castro, "Model Validation – from Theory to Practice", XM, Colombia.



The Proceedings

- PDF files of the presentations and the posters will be available at:
http://www.eps.ee.kth.se/personal/vanfretti/Luigi_Vanfretti_is_Website/STINT-CAPEs_Collaboration.html

3rd International Workshop
The use of Synchrophasors in Power Systems:
An Indispensable Infrastructure in the 21st Century
December 11, 2014
Rio, Brazil
Available presentations are below.

Prospective Students Other
Lecturers Social Media

STINT-CAPEs S
Collaboration

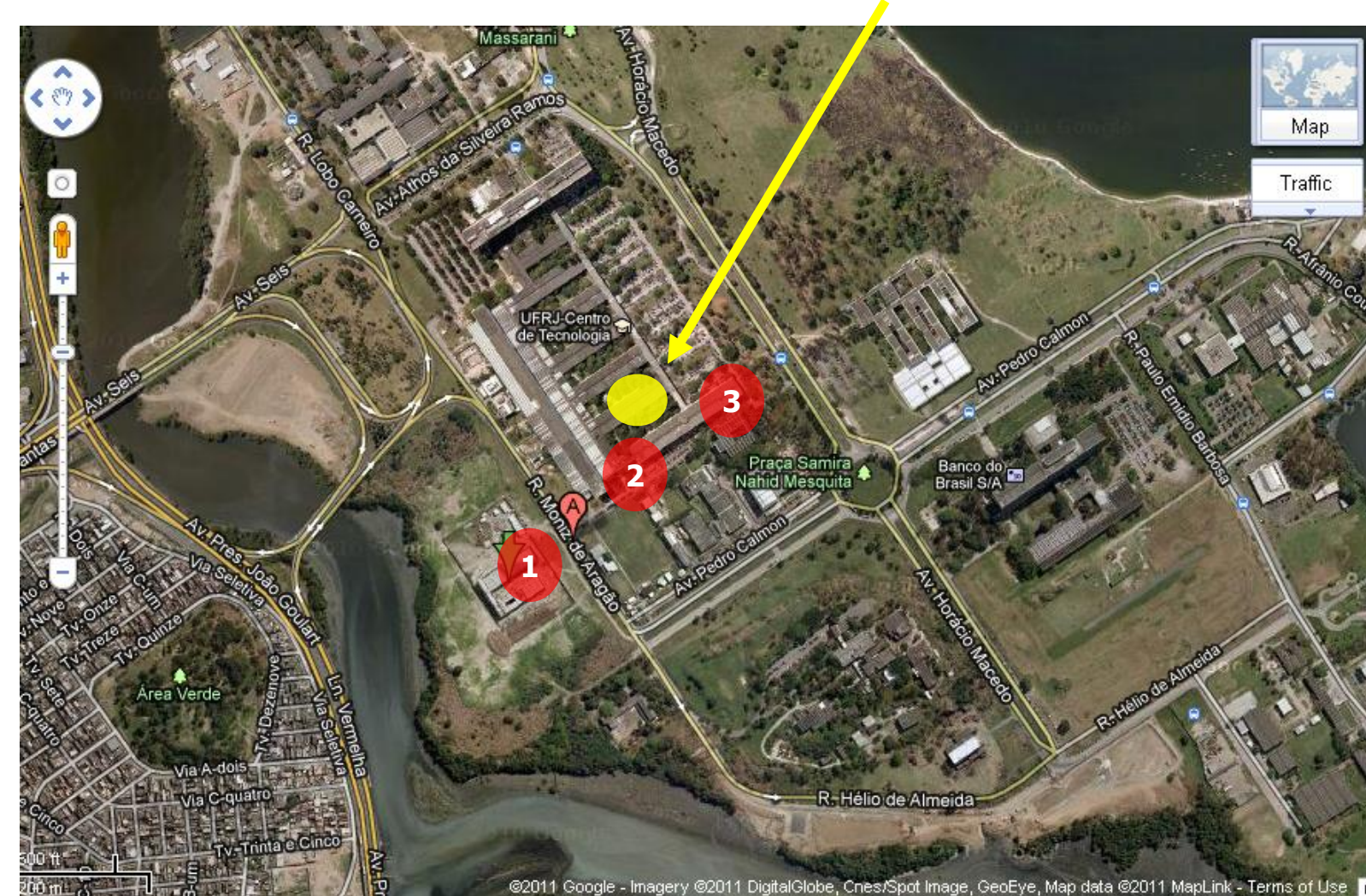
2nd International Workshop
The use of Synchrophasors in Power Systems:
An Indispensable Infrastructure in the 21st Century
December 4, 2013
Rio, Brazil
Available presentations are below.

1st International Workshop
The use of Synchrophasors in Power Systems:
An Indispensable Infrastructure in the 21st Century
December 12, 2012
Rio, Brazil
Available presentations are below.
Click [here](#) to download photos from the event.



Lunch time

We are here.



1 Gourmix
\$\$

2 Kilowatt
\$\$

3 Burguesão
\$

WELCOME TO RIO !

Välkommen till Rio

Bienvenido a Río

Bienvenue à Rio

Benvenuto a Rio