



UNIVERSITÀ
degli STUDI
di CATANIA



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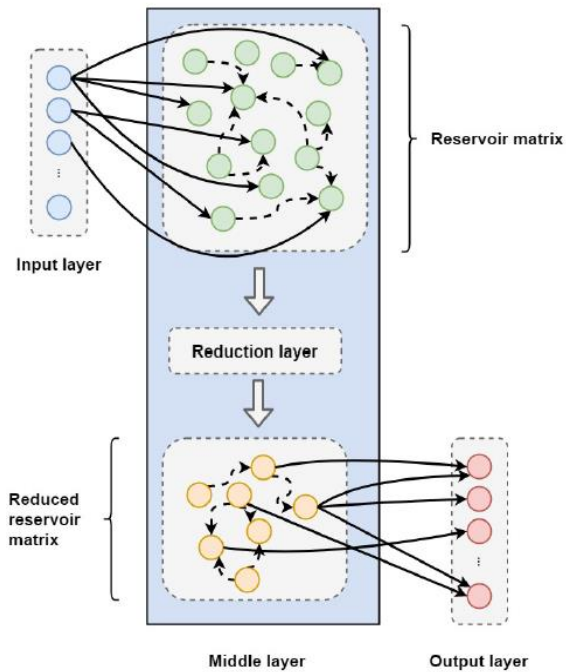
Neuro-inspired complex systems for Biorobotics

Student: Angelo Giuseppe Spinosa

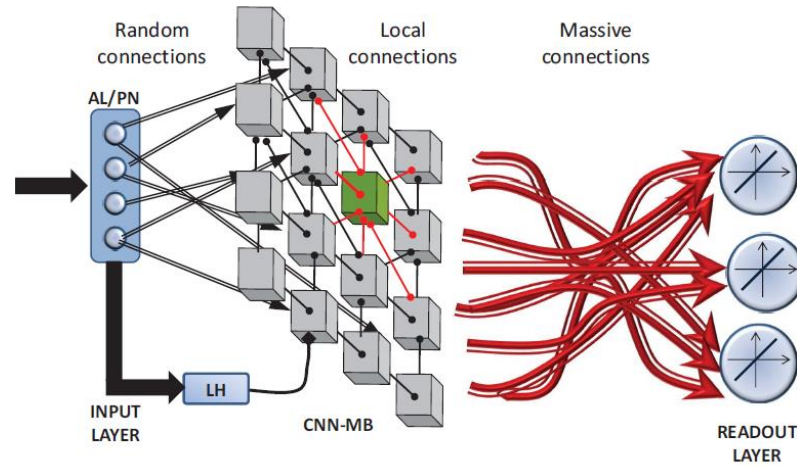
Tutor: Prof. Paolo Pietro Arena

Co-tutor: Dr. Luca Patané

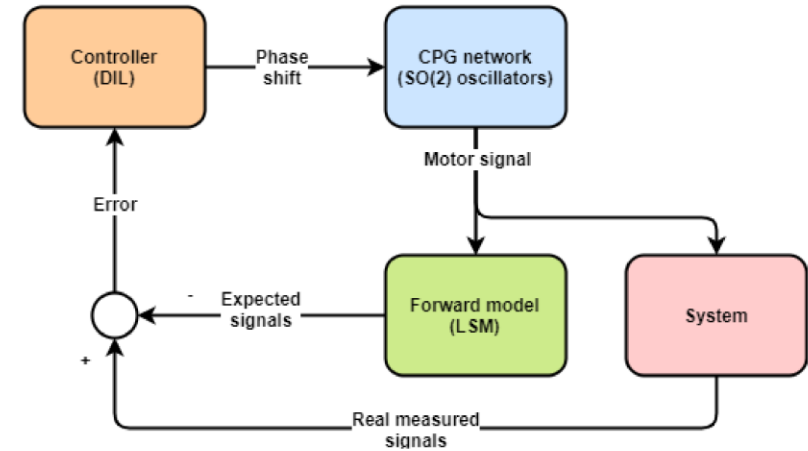
Tuesday, Oct. 29th, 2019



Dimensionality reduction
(refs. 3,5,6)

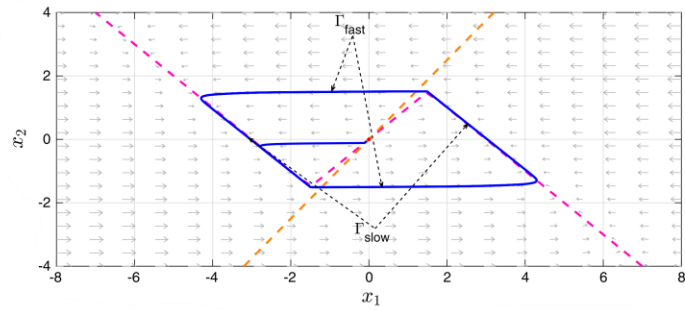


Supervised classification
(refs. 1,2,3,5,6)

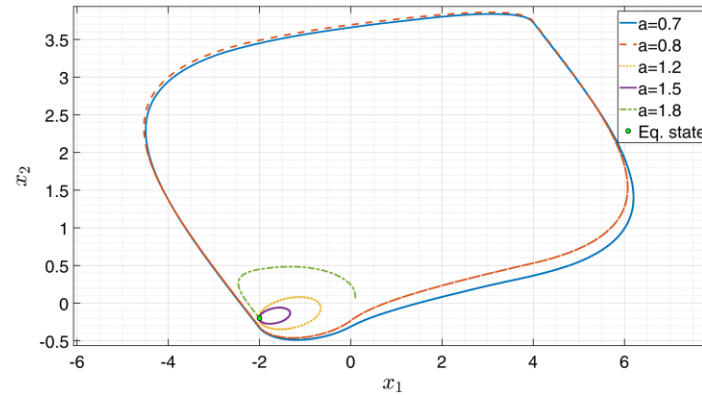


Internal models for
locomotion control

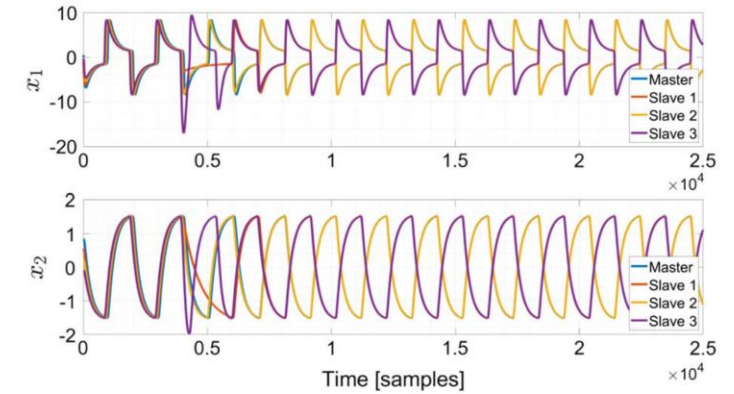
ARTIFICIAL NEURAL NETWORKS WITHIN THE RESERVOIR COMPUTING PARADIGM



Example of PWL approximation



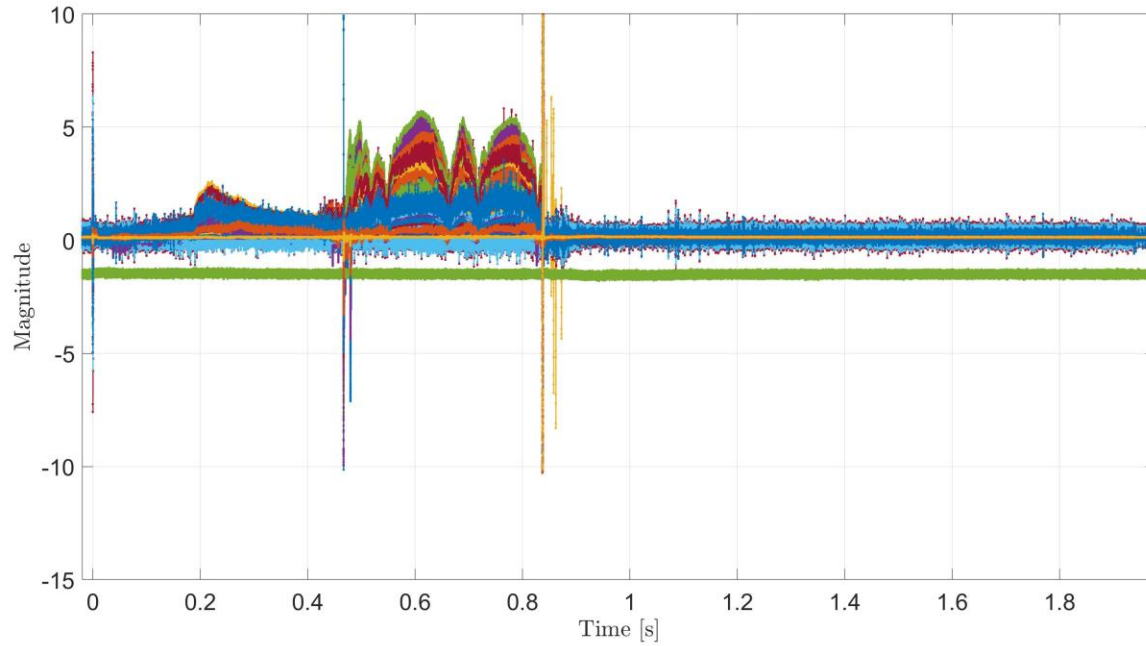
Canards through PWL approx.



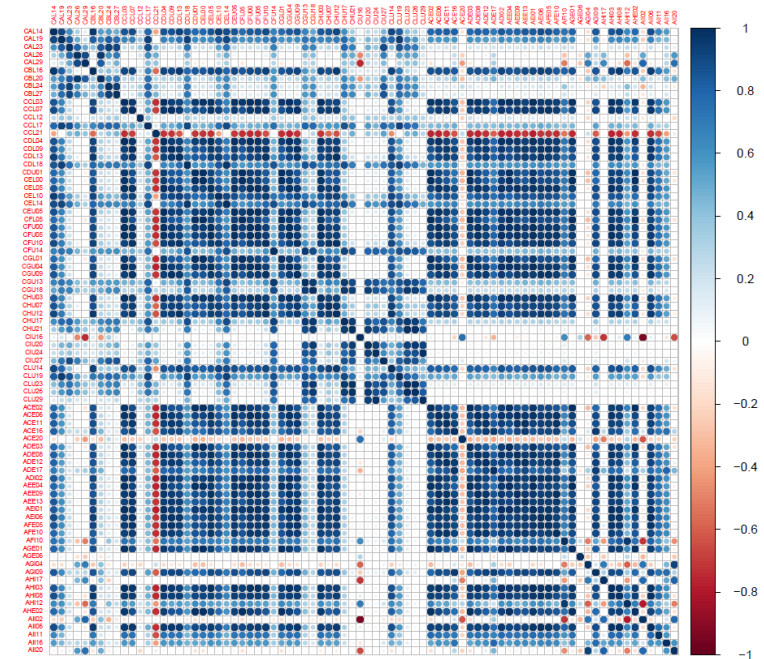
Anti-phase synchron. through PWL approx.

(ref. 4)

MODELLING AND CONTROL OF NONLINEAR SYSTEMS



Example of flux intensities for a non-holey plasma profile



Example of correlation matrix amongst channels

TIME SERIES ANALYSIS AND PROCESSING FOR NUCLEAR FUSION



Teaching support for
students attending the
Biorobotics course



Minirobot competition
referee



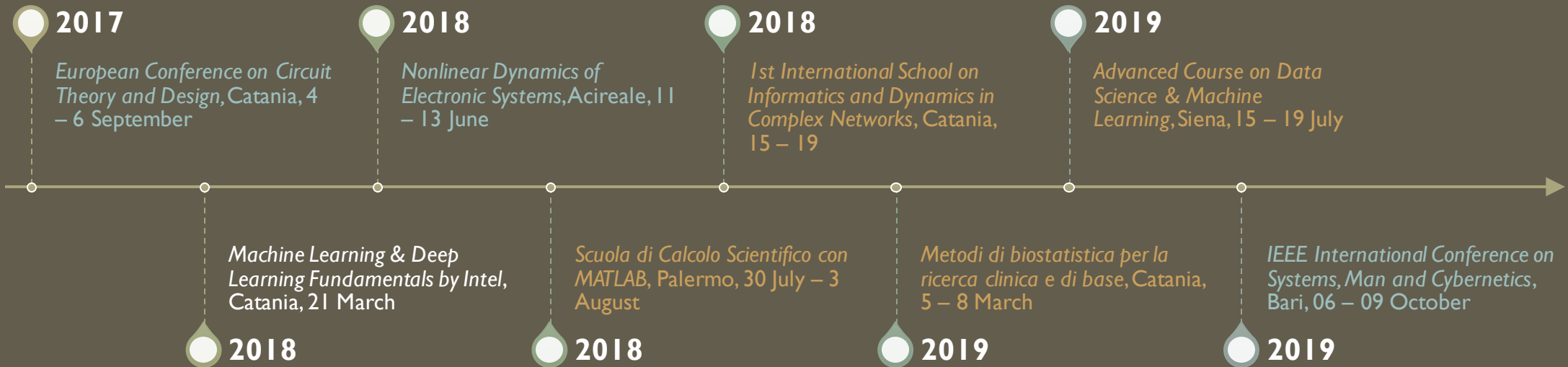
Participation to college fairs

OTHER ACTIVITIES

LIST OF PUBLICATIONS

1. P.Arena, L. Patané, A. G. Spinosa, *Insect inspired spatial-temporal cellular processing for feature-action learning*, European Conference on Circuit Theory and Design (ECCTD), 2017
2. P.Arena, M. Calì, L. Patané, A. Portera, A. G. Spinosa, *A CNN-based neuromorphic model for classification and decision control*, Nonlinear Dynamics, Springer, 2018
3. P.Arena, L. Patané, A. G. Spinosa, *Data-based analysis of Laplacian Eigenmaps for manifold reduction in supervised Liquid State classifiers*, Information Sciences, Elsevier, 2018
4. P.Arena, L. Patané, A. G. Spinosa, *A nullcline-based control strategy for PWL-shaped oscillators*, Nonlinear Dynamics, Springer, 2019
5. P.Arena, L. Patané, A. G. Spinosa, *Structural and input reduction in an ESN for robotic navigation tasks*, IEEE International Conference on Systems, Man and Cybernetics (SMC), 2019 (To be published)
6. P.Arena, L. Patané, A. G. Spinosa, *Robust modelling of binary decisions in Laplacian Eigenmaps-based Echo State Networks*, Engineering Applications of Artificial Intelligence (1st review ongoing)

CONFERENCES, SCHOOLS AND WORKSHOPS





рахмат
Баярлалаа
спасибо
nanni
nandiri
kiitos
dankie
nandiri
ihanyavadi
gracie
huala
mauruuru
koszoni
enkos

danke

謝謝
merisi
kri tera
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thank you

ngiyabonga
tesekkür ederim
paldies
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mahaio

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vinaka
spacisi
blagodarom

thank you

gracias

tapadh leat
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thank you

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rahmat

merci

তোমাকে ধন্যবাদ

감사합니다

ευχαριστώ