Collective neuron dynamics in animals and plants

Fact Sheet

Project Information

CONEDAP

Grant agreement ID: 39996

Project closed

Start date
1 February 2007

End date
31 January 2009

Funded under
Human resources and Mobility in the specific programme for research, technological development and demonstration "Structuring the European Research Area" under the Sixth Framework Programme 2002-2006

Total cost
No data

EU contribution
€ 136 375,00

Coordinated by
CNR - ISTITUTO NAZIONALE DI OTTICA APPLICATA
Italy

Objective

The aim of the proposal is to model the coupled neuron behaviour within a single cortical module and code the collective activity of previous modules through suitable indicators. This would be a contribution toward a dynamically rooted Theoretical Neuroscience, complementary to other approaches.

The collaboration of scientists from different fields as Physics, Biology, Neuroscience

and Psychology, will contribute to interdisciplinary aspects of the proposed project, being however, focused on the common problem: the understanding of the brain functioning.

According to the above description of the problem we establish the following research lines: study of dynamics of homoclinic chaos (HC) and synchronization of HC arrays, exploring higher cognitive functions as decision making and neural computation, study of time limited psychophysical tasks, study of neurobiology of plants and applications to development of bio-robots inspired by plants (plantoid).

The research method mainly will consist on numerical work, carried both on differential equations and coupled map lattices. A new line of analog programmable chips is being prepared to assist the numerics with fast preliminary results.

Furthermore a two-way interaction with experimentalists is planned in order to formulate appropriate models with meaningful parameter values and vice-versa what suggest laboratory implementations of theoretical conjectures.

The objectives of the proposal are the following: selection of the optimal neuron dynamical model, compare neuron array coupling and synchronization with pattern formation in reaction-diffusion media, start exploring quantum implications and corresponding parallelism in brain computation, define collective indicators and find the psycho-physical counterpart, apply the above strategy to plant neurons, to explore the yet unknown facts related to plant neuron coupling and coding.

Fields of science (EuroSciVoc)

natural sciences > biological sciences > neurobiology > **cognitive neuroscience**

natural sciences > mathematics > pure mathematics > mathematical analysis > **differential equations**

social sciences > **psychology**

natural sciences > biological sciences > neurobiology > **computational neuroscience**

natural sciences > biological sciences > **botany**

Keywords

bio-robots | decision times | feature binding | homoclinic chaos | neural coding | neuron modelling | nonlinear dynamics | plant neurobiology | quantum optics | synchronization | transitions to synchronization

Programme(s)

FP6-MOBILITY - Human resources and Mobility in the specific programme for research, technological development and demonstration "Structuring the European Research Area" under the Sixth Framework Programme 2002-2006

Topic(s)

MOBILITY-2.1 - Marie Curie Intra-European Fellowships (EIF)

Call for proposal

FP6-2005-MOBILITY-5
See other projects for this call

Funding Scheme

EIF - Marie Curie actions-Intra-European Fellowships

Coordinator

CNR - ISTITUTO NAZIONALE DI OTTICA APPLICATA

EU contribution

No data

Total cost

No data

Address

Largo Enrico Fermi 6
FLORENCE
Italy

Links

Contact the organisation Website
HORIZON collaboration network

Last update: 5 April 2023

Permalink: https://cordis.europa.eu/project/id/39996