Gayathri Ramesan

Currently pursuing Doctoral thesis at Max Planck Institute for Neurobiology of Behaviour - Caesar

Personal information

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Research interests

Theoretical neuroscience, dynamical systems, complex systems

Education

2022–present PhD — **Life-long learning in biological networks**, Max Planck Institute for Neurobiology of Behaviour-Caesar, Under the supervision of Dr. Aneta Koseska, Cellular Computations and Learning

2017–2022 Undergraduate studies — **Bachelor of Science-Master of Science, Major in Physics**, Indian Institute of Science Education and Research (IISER) , Tirupati
Secured 8.3 CGPA on a 10 point scale

PhD

Aug 2021- July 2022

Title: Life-long learning in biological networks

Supervisor: Dr. Aneta Koseska

Objective: We propose to investigate natural computation with non-asymptotic transients in networks characterised with "ghost" or attractor ruin sets. We will investigate the generality of ghost-network computations as a basis for natural computations, life-long and on-the-fly learning.

Master's thesis

Aug 2021- July 2022

Title: Explosive synchronization induced by environment

Supervisor: Prof Manish Dev Shrimali, Central University of Rajasthan

Objective: To investigate the onset and the mechanism beneath the explosive synchronization (ES) transition through numerical methods in a network of dynamical systems. We prefer to follow the adiabatic continuation method to trace out the hysteric areas where ES occurs. At the outset, we wish to investigate the models displaying limit cycle and chaotic dynamics.

(June 2021 - July 2021) Early warning signals for critical transitions in epidemics

Supervisor: Prof G Ambika, IISER Tirupati

Description Early warning signals such as lag-1 autocorrelation, skewness etc were used to detect critical transition and formation of a second wave in the covid-19 time series of India. Later the presence of saddle escape transitions were also checked in the time-series.

Publications

[1] **G. Ramesan et al.**, Explosive synchronization induced by environmental coupling (2022), *Physics Letters A*, 441, 128147.

[2] D. Koch, A. Nandan, **G. Ramesan et al.**, Beyond fixed points: transient quasi-stable dynamics emerging from ghost channels and ghost cycles, *under revision*

[3] D. Koch, A. Nandan, **G. Ramesan et al.**, Biological computations: limitations of attractor-based formalisms and the need for transients, *under revision*

Conferences/Workshops

March 2023 *Participant:* Nonlinear Data Analysis and Modelling, Advances, Applications, Perspectives,

April 2023 *Workshop* Mathematical Foundations of Biological Organisation, MFO, Oberwolfach

November 2023 Condensed Complexity, *Poster:* Ghost Channels and cycles for transient quasi-stable dynamics

Languages

English, Malayalam, Hindi

Programming and Applications

Python - Pandas, NumPy, SciPy, Tensorflow, Matplotlib, Seaborn, Jupyter, Networkx, Scikit-learn

References

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Cellular Computations and Learning

Max Planck Institute for NeuroBiology of Behaviour