Manaoj Aravind

Postdoctoral Fellow

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Manaoj Aravind, Ph.D.
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Research Interests

Application of nonlinearity and emergent phenomena to yield better design.

My PhD work involved using the interplay of noise and nonlinearity to make better logic gates. My present work involves the study of emergent behavior and control of coupled nonlinear systems, using both numerical simulations and experiments.

I'm deeply passionate about *using complexity for better computation* and most of my work has revolved around that theme.

Work Experience

Institute Postdoctoral Fellow
With **Prof. Punit Parmananda.**
SEPTEMBER 2020 - PRESENT
Indian Institute of Technology Bombay, India

Project Research Assistant
With **Prof. Punit Parmananda.**
NOVEMBER 2019 - MARCH 2020
Indian Institute of Technology Bombay, India

Education

Integrated Ph.D. Physics - *First Class*
"Utilizing Noise to implement Logical operations in Bistable Systems"
Under the guidance of Prof. Sudeshna Sinha
AUGUST 2012 - JANUARY 2020
Indian Institute of Science Education and Research Mohali, India

B.Sc. Physics - *First Class*
JUNE 2009 - APRIL 2012
Loyola College, Chennai, India

Technical Skills

Computational skills

- **Fluent use of Python for scientific computation**, using open source packages such as NumPy, SciPy, Matplotlib, NetworkX and Pandas.
- **Use of MATLAB for live data analysis and interfacing** with experimental systems.
- **Video analysis using Python** used to study flame oscillation in ethanol lamps.

Experimental skills

- **Design, construction and analysis of nonlinear electronic circuits** that serve as a proof-of-principle experimental platform.
- **Data acquisition and automation** using an external DAQ in electronic circuit experiments.
- **Hands on experience** characterizing and studying flame oscillations in ethanol lamps - *a new table top experimental system* .

Publications

1. **Frequency shuffling promotes onset of synchrony**
   V. Pachaulee*, Manaoj Aravind*, Ishant Tiwari and P. Parmananda (2022)
   Manuscript under preparation.

2. **Regulating dynamics through intermittent interactions**
   S. Dixit*, Manaoj Aravind* and P. Parmananda (2022)
   Manuscript under review in *Physical Review E*.

3. **Ethanol lamp: a simple, tunable flame oscillator and its coupled dynamics.**
   M. Aravind*, I. Tiwari*, V. Vasani, J. M. Cruz, D. A. Vasquez and P. Parmananda (2022)
   The European Physical Journal Special Topics 231, 179–184
   DOI: 10.1140/epjs/s11734-021-00414-4

4. **Emergent noise-aided logic through synchronization**
   Manaoj Aravind, S. Sinha and P. Parmananda (2021)
   Physical Review E, 104(6), 064207.
   DOI: 10.1103/PhysRevE.104.064207

5. **Competitive interplay of repulsive coupling and cross-correlated noises in bistable systems**
   Manaoj Aravind, S. Sinha and P. Parmananda (2021)
   Chaos: An Interdisciplinary Journal of Nonlinear Science, 31 (6), 061106.
   DOI: 10.1063/5.0056173

6. **Construction of logic gates exploiting resonance phenomena in nonlinear systems**
   K. Murali, S. Rajasekhar, Manaoj Aravind V, V. Kohar, W.L.Ditto and S. Sinha (2020)
   Philosophical Transactions of the Royal Society A, 379 (2192), 20200238.
   DOI: 10.1098/rsta.2020.0238

7. **Implementation of Noise-aided Logic Gates with Memristive circuits**
   Manaoj Aravind V, K Murali and Sudeshna Sinha (2020)
   Proceedings of the 5th Conference on Perspectives in Nonlinear Dynamics (PNLD) - 2019. (Permalink)

8. **Synchronized Hopping induced by interplay of Coupling and Noise**
Manaoj Aravind V, K Murali and Sudeshna Sinha (2020)
In *Nonlinear Dynamics and Control* (pp. 325-334). Springer, Cham.
DOI: 10.1007/978-3-030-34747-5_33

9. **Coupling induced Logical Stochastic Resonance**
Manaoj Aravind V, K Murali and Sudeshna Sinha (2018)
Physics Letters A, *382*(24), 1581-1585.
DOI: 10.1016/j.physleta.2018.03.043

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References

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