Sumit Kumar Ram

Personal Data

Place and Date of Birth:	Jashipur, India | 24 Feb 1995
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Education

Oct 2017-Present	PhD in Entrepreneurial Risks, Supervisor: Prof. Didier Sornette, **ETH-Zurich**
June 2017	BS-MS Dual Degree in Physics, **IISER-Kolkata**
June 2012	CHSE, Odisha, 10+2, **Ravenshaw Junior College**, Cuttack, India
June 2010	BSE, Odisha, 10^{TH}, **Jashipur Govt. High School**, Mayurbhanj, India

Publications

- Ram, Sumit Kumar, Geir Kulia, and Marta Molinas. "On wind Turbine failure detection from measurements of phase currents: a permutation entropy approach." arXiv preprint arXiv:1601.05387 (2016).
- Ram, Sumit Kumar, and Marta Molinas. "Entropic Empirical Mode Decomposition." arXiv preprint arXiv:1507.03157 (2015).

Media Coverage

- NRK http://www.nrk.no/trondelag/far-drone-til-a-fly-ved-a-blunke-1.12492845
- GEMINI http://gemini.no/en/2015/09/think-a-thought-and-then-take-flight/
- AUTOMATISERING http://www.automatisering.org/artikler/forsker-pa-tankestyring/224650
- ABCnyheter http://www.abcnyheter.no/livet/2015/09/06/194870294/tenk-tanken-og-fly-av-garde
- TEK.NOhttp://www.tek.no/artikler/her-styrer-han-dronen-med-hjernebolger/192625
- TU.no http://www.tu.no/artikler/forsker-pa-tankestyring/224650
- NRK TV https://tv.nrk.no/serie/distriktsnyheter-midtnytt/DKTL98081015/10-08-2015t=59s
- NRK RADIO https://radio.nrk.no/serie/her-og-naa-hovedsending/DMNH01015615/10-08-2015t=1h20m2s

Research Experience

Aug 2016- Present | Master Thesis at IISER Kolkata, Mohanpur | Advisor: Dr. Supratim Sengupta

Income inequality in a dynamic network

The thesis consists of two parts. In the first part, a simple agent based model is proposed. The agents are playing a variant of trust game. These agents interact within a random regular network with other agents to form a collective decision. This model is employed to investigate the moderation of wealth inequality due to collective decision making. In the second part, a more detailed study has been carried out on the effect of economic inequality due to collective decision making. In the model, agents play a cooperation game within a dynamic network with different levels of initial economic inequality. The effect of wealth visibility is explored and it is found that the wealth inequality is facilitated when the information about the connected neighbors is accessible. The visibility of wealth has an adverse effect on overall cooperation, inter-connectedness and wealth growth. https://drive.google.com/file/d/0B69LrTLysiIEOFBhWWxHX21EUWM/view?usp=sharing

Jul-Aug 2016 | Summer Project at Eötvös Loránd University, Budapest | Advisor: Prof. Tamas Vicsek

Emergence of hierarchical network in a multi-player prisoner's dilemma game

A collective decision making scheme in a multiplayer prisoner's dilemma game is proposed. Based on certain microscopic rules a hierarchical network emerges to optimize the global pay off.

May-Jul 2016 | Summer Project at Aalto University, Finland | Advisor: Prof. Mikko Alava

Fractal nature of crack growth in fibrous material

An experimental study was conducted for understanding the nature of crack growth in paper samples. The fractal nature of crack growth and the emergence of power law distributions in various observables (Eg. Crack steps, Acoustic Energy and Waiting times) were observed. A markovian model, an empirical model and self organised criticality model satisfying the experimental observations were proposed.

Dec-Jan 2016 | Winter Project at NTNU, Norway | Advisor: Prof. Marta Molinas

Wind turbine failure detection from Complexity measure of phase currents

Developed a failure detection machine learning technique for the wind turbines using the complexity measure(Permutation Entropy) of the phase current data. http://arxiv.org/pdf/1601.05387v1.pdf

May-Aug 2015 | Summer Project at NTNU, Norway | Advisor: Prof. Marta Molinas

Brain Actuated Drone

A brain computer interface was developed using the eye blink EEG signal. The system can extract various eye blink expressions using adaptive data analysis techniques in real time to give commands like moving forward, backward, up and down to a drone connected via wifi with the system. http://www.nrk.no/trondelag/far-drone-til-a-fly-ved-a-blunke-1.12492845

May-Jun 2015 | Summer Project at NTNU, Norway | Advisor: Prof. Marta Molinas

Entropic Empirical Mode Decomposition

An adaptive data analysis technique is proposed by combining the concepts of Permutation Entropy (PE) and Empirical Mode Decomposition (EMD) to resolve the Mode Mixing in the process of Hilbert Huang Transformation (HHT). http://arxiv.org/pdf/1507.03157v3.pdf

May-Jul 2014 | Summer Project at JNCASR, India | Advisor: Prof. Kalyan B.Sinha

Stochastic Processes

• Rigorous proof of the central limit theorem using the concepts of Complex analysis, Advanced Real analysis, Linear Algebra, Abstract Algebra. • Exploration on diffusion equation, its rigorous solution, various outcomes with their physical significances. • Introduction to various nonlinear phenomena from a mathematician's point of view.

Jun-Jul 2013 | Summer Project at NIT, Sikkim, India | Advisor: Dr. Md Nurujjaman

Synchronization of coupled modified wien bridge circuits

Frequency locked and amplitude locked synchronization of coupled modified wien bridge circuits in its various configuration were studied and analysed. Nonlinear behavior of Chua's , Shilnikov circuits and Chua-Shilnikov, Shilnikov-Shilnikov, Chua-Chua coupled circuits were studied using electrical circuits, SPICE simulation and MATLAB. https://www.dropbox.com/s/x2whzwy6uy8kwpr/Summer%20report$_s umit.pdf?dl = 0$

Reading Projects

Feb 2016 | Reading Project | Advisor: Prof. Giorgio Parisi
Spin glass systems
A reading project to develop sufficient background knowledge in the field of spin glasses to undertake advanced research. This project is aimed at studying the theory of super cooled liquid starting from the concept of statistical field theory and spin glass systems.

Dec-Jan 2015 | NNMCB Project | Advisor: Prof. Sandeep Krishna
Games in bacterial population
A review of Game theory from materials of Game Theory. Concepts of various games being played such as snowdrift, prisoner's dilemma, rock-paper-scissors were studied and analyzed from various research articles and journals.

Conferences

Jul 2014 | Physics of Life at Simons Centre For Study of Living Machines, NCBS, India.

Feb 2011 | INSPIRE Internship KIIT University, Bhubaneswar, India

Scholarships and Achievements

Jul-Aug 2016	Visiting Researcher Fellowship, Department of Biological Physics, Eötvös Loránd University.
May-Jul 2016	Summer Research Fellowship, Department of Applied Physics,Aalto University(7,500 USD).
Dec-Jan 2016	Jens Balchen Fellowship,Department of Engineering Cybernetics,NTNU(2,500 USD).
May-Aug 2015	Jens Balchen Fellowship, Department of Engineering Cybernetics,NTNU(4,000 USD).
Aug-Nov 2015	NNMCB Research Internship.(1,000 USD).
Jul 2014	Monsoon school award, Simons Center for Living machines.
May-Jul 2014	Summer research fellowship, JNCASR.
Jun-Jul 2013	Summer research fellowship, National Institute of Technology (NIT) Sikkim (500 USD).
Aug-May 2012-17	Inspire Scholarship (7000 USD).
Jul 2012	CHSE Odisha (STD-XII) Rank 41 from 0.27 million applicants.
Jul-Aug 2011-2012	National Merit scholarship .
Jul 2010	HSE Odisha (STD-X) Rank 34 from 0.45 million applicants.
Sep-Aug 2008-2012	NMMS (NTSE) Scholarship .

Languages

Odia, Hindi:	Mothertongue
English:	Fluent
Sanskrit, Bengali:	Basic Knowledge

Computer Skills

Programing Languages:	Python, MATLAB, Fortran, Mathematica, R.
Software Packages:	Origin, LabView, Spice simulation, LaTeX, MS Office.

Course Work at IISER

Physical Sciences	Physics-I, Physics Laboratory I, Physics II, Physics Laboratory II, Physics III, Electricity and Electronics, Physics Laboratory III, Physics IV, Thermal Physics, Physics Laboratory IV, Intermediate Classical Mechanics, Intermediate Quantum Mechanics, Mathematical Methods of Physics, Electronics Laboratory, Computational Physics, Basic Statistical Mechanics, Intermediate Electricity and Magnetism, Advanced Quantum Mechanics, Advanced Optics Laboratory, Basic Nuclear Physics - Theory and Laboratory, Basic Condensed Matter Physics, Introductory Astrophysics, Condensed Matter Laboratory, Advanced Mathematical Methods of Physics, Basics of Field Theory and Relativistic Quantum Mechanics, Advanced Experimental Physics, Advanced Statistical Mechanics, Research Methodology, General Theory of Relativity and Cosmology
Mathematical Sciences	Mathematics I, Mathematics II, Analysis I, Linear Algebra, Foundations I, Probability and Statistics, Analysis II, Foundations II, Graph Theory and Combinatorics, Analysis IV, Numerical Analysis Laboratory, Inverse Theory, Statistics Laboratory.
Biological Sciences	Introduction to Biology I, Biology Laboratory I, Introduction to Biology II, Biology Laboratory II, Biochemistry, Introductory Biophysics, Biology Laboratory III, Evolutionary Biology, Molecular genetics, Biology Laboratory IV, Biophysics II.
Computer Sciences	Computer Science I,Computer Science II.
Chemical Sciences	Chemistry I, Chemistry Laboratory I, General Physical Chemistry, Physical and Theoretical Chemistry Lab.
Earth and Planetary Sciences	Earth and Environmental Science I, Earth System Processes.
Online Courses	Nonlinear Dynamics and Chaos - Steven Strogatz, Cornell University, Chaos, Fractals and Dynamical Systems, Principles of Complex Systems, Information Theory.

Teaching

Teaching Assistant	CS1101: Introduction to Computer Programming-I
Teaching Assistant	ID4201: Evolutionary Dynamics

Hobbies

Photography
Programming
Cricket
Travelling

References

Prof. Didier Sornette | Professor, Department of Management Technology, Swiss Federal Institute of Technology (ETH), Zurich, Switzerland. dsornette@ethz.ch