BISWADIP DEY
Intelligent Servosystems Laboratory
2210 A. V. Williams Bldg.
Department of Electrical & Computer Engineering
University of Maryland, College Park, MD 20742, USA.

http://ece.umd.edu/~biswadip
email: biswadip@umd.edu
Phone: 301-405-6585
Mobile: 512-657-0805

Research Interests

• **Control Theory:** Optimal & Nonlinear Control and associated Geometric Aspects, Optimization, Adaptive Control.
• **Robotics:** Collective Behavior, Consensus, Motion Planning.
• **Other:** Data Dimensionality Reduction, Learning Theory, Statistical Causality, Port Hamiltonian Systems, Behavioral Theory, Inverse Problems Related to Brain-Machine Interface.

Education

• **University of Maryland, College Park** — College Park, MD, USA
PhD candidate — *August 2009 –*
- **Major:** Electrical & Computer Engineering - Controls
- **Dissertation Title:** Reconstruction, Analysis and Synthesis of Collective Motion

• **Indian Institute of Technology - Bombay** — Mumbai, India
Master of Technology — *July 2006 – July 2008*
- **Major:** Systems & Control Engineering
- **Masters Thesis Title:** Stabilizing a Flexible Beam on a Cart: A Distributed Port-Hamiltonian Approach

• **Jadavpur University** — Kolkata, India
Bachelor of Engineering — *June 2002 – May 2006*
- **Major:** Electrical Engineering
- **Project Title:** Model Reduction using Genetic Algorithm

Research Experience

• **Graduate Research Assistant** — College Park, MD, USA
Institute for Systems Research, University of Maryland — *June 2010 – Present*
- **Advisor:** P. S. Krishnaprasad
- Developing control-theoretic algorithms for data smoothing, with an emphasis on extraction of parameters of motion (speed, curvatures etc.) from sampled position data.
- Analyzing flight data of European starling flocks to infer the underlying flight strategies and steering control laws.
- Analyzed pursuit events of echolocating bats to show the presence of a context specific switch in flight strategy.
- Introduced a novel strategy for collective motion, and currently analyzing the effectiveness of the proposed feedback law.

• **Lab Manager** — College Park, MD, USA
Intelligent Servosystems Laboratory, University of Maryland — *August 2011 – Present*
- Developed a collective robotics test-bed involving Vicon motion capture system, Pioneer-3 robots and ROS.
- Working with undergraduate researchers on decentralized control law implementation for pursuit-evasion and collective behavior.

• **Summer Research Intern** — Rockville, MD, USA
Intelligent Automation Inc. — *June 2012 - August 2012*
- **Mentor:** Eric van Doorn
- Developed a support vector machine (SVM) based clustering algorithm for cellphone localization in an indoor environment.

- Worked towards development of a robust system (based on sensor fusion) for anti-texting law enforcement.

• **Project Staff** Mumbai, India
Inter Disciplinary Program in Systems & Control Engineering, IIT Bombay *July 2008 - June 2009*
- **Mentor:** R. N. Banavar
- Worked on modeling and control of fuel slosh using a distributed port-Hamiltonian approach.

• **Research Assistant** Mumbai, India
Inter Disciplinary Program in Systems & Control Engineering, IIT Bombay *April 2007 - July 2008*
- **Advisor:** R. N. Banavar
- Modeled a flexible beam fixed on a cart as a mixed finite- and infinite-dimensional port-Hamiltonian system.
- Derived a control law to stabilize the system.

• **Undergraduate Researcher** Kolkata, India
Electrical Engineering, Jadavpur University *July 2005 - May 2006*
- **Advisor:** T. K. Ghoshal
- Approximated a higher-order dynamical system by a lower-order model, and the problem was addressed by solving an $\mathcal{L}_2$-norm minimization problem using real coded genetic algorithm.

Teaching and Mentoring Experience

• **Graduate Teaching Assistant** College Park, MD, USA
Electrical and Computer Engineering, University of Maryland

Fundamental Electric and Digital Circuit Laboratory (*Spring 2010*), Numerical Techniques in Engineering (*Fall 2009*).

• **Teaching Assistant** Mumbai, India
Systems and Control Engineering, IIT Bombay

Special Topics in Systems and Control (*Spring 2009, Spring 2008*), Systems and Control Engineering Laboratory (*Spring 2009, Spring 2008*), Systems Theory (*Autumn 2008, Autumn 2007*).

• **Mentor for Undergraduate Research Program** College Park, MD, USA
Electrical and Computer Engineering, University of Maryland

Nosheen Moosvi (*Spring 2014*, *Fall 2013*), Garrett Wenger (*Spring 2013*, *Fall 2012*), Benjamin Flom (*Summer 2011*).

Publications

Pre-print

P3 B. Dey, P. S. Krishnaprasad, **Control-Theoretic Data Smoothing**, Submitted to *53rd IEEE Conference on Decision and Control (CDC 2014)*.

P2 B. Dey, P. S. Krishnaprasad, **Trajectory Reconstruction via Optimal Control**, To be submitted.

P1 B. Dey, P. V. Reddy, C. Chiu, K. Ghose, K. S. Galloway, T. K. Horiuchi, E. W. Justh, P. S. Krishnaprasad, C. F. Moss, **Context Shapes Bat Flight Behavior: evidence from geometry of prey capture**, Under preparation.

Journal Publications

J1 R. Banavar, B. Dey, **Stabilizing a Flexible Beam on a Cart: A Distributed Port-Hamiltonian Approach**, *Journal of Nonlinear Science*, Volume 20, Number 2, pp. 131-151, April, 2010.

Conference Proceedings

C2 B. Dey, P. S. Krishnaprasad, **Trajectory Smoothing as a Linear Optimal Control Problem**, *50th Annual Allerton Conference on Communication, Control, and Computing (Allerton 2012)*, pp. 1490 - 1497, (*doi*: 10.1109/Allerton.2012.6483395).

C1 R. Banavar, B. Dey, **Stabilizing a Flexible Beam on a Cart: A Distributed Port Hamiltonian Approach**, *10th European Control Conference (ECC 2009)*.

Selected Talks and Posters

- **Control Theoretic Data Smoothing**, Invited Talk at the Department of Electrical Engineering, IIT Bombay, Mumbai, India, Jan 29, 2014.
- **Control Theoretic Tool for Trajectory Reconstruction**, Poster at the Conference on Dynamics of Prey Capture and Escape, Janelia Farm Research Campus, HHMI, *Ashburn, VA*, March 6-9, 2013.
- **Trajectory Reconstruction as an Optimal Control Problem**, Talk at the ECEGSA Seminar Series, University of Maryland, *College Park, MD*, Oct 19, 2012.
- **Energy-Based Control of a Flexible Beam**, Poster at the ECE Research Review Day, University of Maryland, College Park, MD, Oct 9, 2009.

Scholastic Honours

- Kulkarni Graduate Student Summer Research Fellowship for summer 2013, University of Maryland, College Park.
- Clark School of Engineering Distinguished Graduate Fellowship 2009-10, University of Maryland, College Park.
- Ranked *First* in the M.Tech Program at IIT Bombay (GPA: 9.97/10).
- Secured an *All India Rank 97* (among over 19000 students) in **Graduate Aptitude Test in Engineering** (Electrical Engineering) - 2006, a national level graduate entrance examination for the IITs and IISc.
- Ranked *Third* in Bachelor of Electrical Engineering at Jadavpur University.

Relevant Courses Taken

- **At University of Maryland:** Systems Theory, Adaptive Control, Random Processes in Communication and Control, Stochastic Control, Estimation and Detection Theory, Information Theory, Real Analysis, Riemannian Geometry, Differential Topology, Nonlinear Data Dimensionality Reduction, Computational Statistics, Principles and Algorithms for Collectives.
- **At IIT Bombay:** Modeling of Dynamical Systems, Multivariable Control System, Nonlinear Control Systems, Optimal Control, Behavioral Theory of Systems, Special Topics in Systems & Control, Applied Linear Algebra, General Topology.
- **At Jadavpur University:** Control Systems, Process Instrumentation and Control, Advanced Control Theory, Signals and Systems.

Technical Skills

- **Scientific Computing:** Matlab, Simulink, R, Mathematica.
- **Robotic Platform:** *Hardware* - Pioneer-3; *Software* - ROS, CybelePro, ARIA.
- **Motion Capture:** Vicon Nexus, Vicon Tracker.

Professional Activity

- **Student Member:** IEEE, SIAM
- **Reviewer:** IEEE Conference on Decision and Control

References

Available upon request.