Niladri Das

Position A Ph.D. candidate in Aerospace Engineering at Texas A&M University.
Graduating in **August 1, 2020**[1]

Contact
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Research

- **Non-Linear estimation**
- **Situational awareness**
- **Optimal sensing and data sharing**
- **Non-linear control, robotics, and machine learning**

Education

Doctor of Philosophy in **Aerospace Engineering** — Adviser: Dr. R. Bhattacharya
Texas A&M University, USA — 2015 - 2020
Dissertation: Optimal Transport Based Filtering and Sensing for Space Situational Awareness. — GPA: 3.826/4

Master of Technology in **Electrical Engineering** — Adviser: Dr. L. Behera
Indian Institute of Technology Kanpur, India — 2012 - 2014
Dissertation: Learning to Grasp & Programming by Demonstration Using a 7-DOF Barrett WAM. — GPA : 7.91/10

Bachelor of Engineering in **Electrical Engineering** — Adviser: Dr. A. Chatterjee
Jadavpur University, Kolkata, India — 2008 - 2012
Project: Image Processing Based Object Detection. — GPA : 7.84/10

Experiences

Graduate Teaching Assistant — 13 Jan - Present, 2020.
Assisting Prof. Kyle DeMars for *Advanced Control for Aerospace Vehicles* to senior Aerospace undergrads.

Graduate Teaching Fellow — 26 Aug - 12 Dec, 2019.
Teaching *Advanced Control for Aerospace Vehicles* to senior Aerospace undergrads (72 students).
- Linear Systems, PID control, Root Locus, Freq. Domain design
- Teaching Matlab to design linear controller

Winner of A-Hack-of-the-Drones — 28-30 Sep,2018.
Member of the **A-Team** from Texas A&M that won the A-Hack-of-the-Drones competition (Sponsor: USArmy Futures Command and MD5) in Austin, Texas.
- Developed vision based solution for C-SUAS.
- Co-founded AIMS Technologies, LLC

Graduate Research I — Adviser: Dr. R. Bhattacharya
Dept. of Aerospace Engineering, Texas A&M. — Sep 2015-Present

[1] Last edited: February 25, 2020

- Worked on an AFRL project project, *Adaptive Markov Inference Game Optimization for Rapid Discovery of Evasive Satellite Behaviors*, in collaboration with Intelligent Fusion Technology, Inc (2018-Present)
- Worked on an AFOSR project, *Cloud Computing Based Robust Space Situational Awareness*, in collaboration with Dept. of Statistics, TAMU (2015-2018)
  - Developed Optimal Transport filter based framework for SSA.
  - Developed Orbit Propagator.

Project Associate PI: Dr. L. Behera
Dept. of Electrical Engineering, IIT Kanpur Aug 2014 - Jun 2015

- Developed Gaussian Mixture based model to compensate the unknown non-linearities of 7 degree of freedom Barrett WAM.
- Collaborated in implementing a inverse kinematic model and higher order Sliding Mode Control for 7 degree of freedom Barrett WAM. [C++ codes][video]
- Developed dynamical system based trajectory learning for Barrett WAM.
- Served as a Thesis mentor for a master's student.
- Taught ROS to two Master's student.

Graduate Research II Adviser: Dr. L. Behera
Dept. of Electrical Engineering, IIT Kanpur July 2013-July 2014

- Developed Inverse Kinematic model for Barrett WAM.
- Implemented Kinect based Object segmentation for grasping using **Deep Learning**.
- Developed a hand-eye autonomous calibration technique for Barrett WAM.
- Implemented Symbolic Encoding based skill learning on Barrett WAM.[video1][video2]
- Mentored two Under-Graduate interns.

Publications

Journals

1. *Optimal Precision for Multi-Rate Sensor Fusion with Bounded Errors in a Kalman Filtering Framework* [preparing, 2020]
2. *Privacy-Utility Aware Kalman Filtering for LTI Systems* [preparing, 2020]
3. *Privacy and Utility Aware Data Sharing for Space Situational Awareness from Ensemble and Unscented Kalman Filtering Perspective*
   IEEE Transactions on Aerospace and Electronic Systems [Submitted, 2019][arXiv]
4. *Optimal Transport Based Tracking of Space Objects in Cylindrical Manifolds.*
   Journal of Astronautical Sciences (Springer) [accepted, 2019][preprint]
5. *Optimal Transport based Tracking of Space Objects using Range Data from a Single Ranging Station.*
   Journal of Guidance, Control, and Dynamics [accepted, 2019][preprint]

Conferences

1. *Privacy and Utility in Multi-object Tracking using Kalman Filter*
   International Conference on Information Fusion 2020 [abstract submitted]
2. *Optimal Sensing Precision for Multi-Rate Kalman Filters with Guaranteed Error Bounds*
   IFAC World Congress 2020 [submitted]

3. *Optimal Transport Based Filtering with Nonlinear State Equality Constraints*
   IFAC World Congress 2020 [submitted]
4. *Optimal Sensing Precision in Ensemble and Unscented Kalman Filtering*
   IFAC World Congress 2020 [submitted]
5. *Combining Visible and Infrared Spectrum Imagery using Machine Learning for Small Unmanned Aerial System Detection*
   SPIE Automatic Target Recognition 2020 [Accepted]
6. *Sparse Sensing Architecture For Kalman Filtering With Guaranteed Error Bound.*
   IAA Conference on Space Situational Awareness 2017 .
7. *Control of a 4 DoF Barrett WAM Robot - Modeling, Control Synthesis and Experimental Validation.*
   IEEE First International Conference on Control, Measurement and Instrumentation 2016
8. *Learning Object Manipulation from Demonstration through Vision for the 7-DOF Barrett WAM.*
   IEEE First International Conference on Control, Measurement and Instrumentation 2016
9. *A probabilistic framework of learning movement primitives from unstructured demonstrations.*
   IEEE 13th International Conference on Industrial Informatics 2015
10. *Robot Learns from Human Teacher Through Modified Kinesthetic Teaching.*
    International conference on Advances in Control and Optimization of Dynamic Systems 2014

Skills

Programming Languages and Packages: C | C++ | Python | Julia | Matlab | ROS.

Affiliations

- Student Council **Mentor** of Aerospace Engineering Department at Texas A&M University. (Academic Year 2018)
- Student Council **Member** of Aerospace Engineering Department at Texas A&M University. (Academic Year 2017)
- GPSC: Graduate and Professional Student Council **Delegate** of Aerospace Department. (Academic Year 2017)
- American Institute of Aeronautics and Astronautics (Student Member)
- Institute of Electrical and Electronics Engineers (Student Member)
- Society for Industrial and Applied Mathematics (Student Member)
- American Astronautical Society (Student Member)

Journal Reviewer: IEEE Systems Journal.
Conference Reviewer: IFAC World Congress