# 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 Topics**

- **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 Sensing for Estimation of Nonlinear Dynamical Systems. — 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

**Research Experiences**

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

- 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]

[1] Last edited: February 28, 2020

- 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 during M.Tech** 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. *Eigen Value Analysis in Lower Bounding Uncertainty of Kalman Filter Estimates*
   **IFAC World Congress 2020** [accepted]
3. *Optimal Transport Based Filtering with Nonlinear State Equality Constraints*
   **IFAC World Congress 2020** [accepted]
4. *Optimal Sensing Precision in Ensemble and Unscented Kalman Filtering*
   **IFAC World Congress 2020** [accepted]
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**

## Teaching Experiences

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

**Graduate Teaching Fellow at TAMU** 26 Aug - 12 Dec, 2019.
Taught *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

**Graduate Teaching Assistant at IIT Kanpur** July 2012 - July 2014.

## Technical Skills

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

## Current Professional Affiliations

- 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)

## Past Professional Affiliations

- 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)

## Services

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

## Projects

- National Science Foundation under Grant Award No. NSF 1762825 (2020) PI: Raktim Bhattacharya et.al.
- Graduate Teaching Fellowship for Fall 2019 from Department of Engineering at Texas A&M University.
- Adaptive Markov Inference Game Optimization (AMIGO) for Rapid Discovery of Evasive Satellite Behaviors (2018) PI: Raktim Bhattacharya, Intelligent Fusion Technology, Inc.

- Cloud Computing Based Robust Space Situational Awareness (2015-2018), PI: Raktim Bhattacharya, Co-PI: Bani Mallick, AFOSR

## Awards

- 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
- Awarded AERO Graduate Excellence Fellowship for Spring 2020.
- Awarded AERO Graduate Excellence Fellowship for Fall 2019.

## Honors

Student Council **Mentor** of Aerospace Engineering Department at Texas A&M University. (Academic Year 2018)

## Work Authorization

F1 Visa, Eligible to work in the US for 36 months with Optional Practical Training (OPT)

## Primary Referee

- Dr. Raktim Bhattacharya (Dissertation Advisor)
  Associate Professor, Departement of Aerospace Engineering
  Texas A&M University
  3141 TAMU
  College Station, TX 77843-3141
  Office: HRBB 727C
  Phone: +1 979.862.2914
  Email: raktim@tamu.edu
- Dr. Srinivas Rao Vadali (PhD Committee Member)
  Professor, Departement of Aerospace Engineering
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- Dr. Suman Chakravorty (PhD Committee Member)
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- Dr. Laxmidhar Behera (Masters Advisor)
  Professor, Departement of Electrical Engineering
  Indian Institute of Technology Kanpur
  Phone: +91.0512.259.7198
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- Dr. Amitava Chatterjee (Bachelors Advisor)
  Professor, Departement of Electrical Engineering
  Jadavpur Univsersity
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- Dr. Swagata Munshi (Jadavpur University)
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