Prabir Barooah

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DOB AND CITIZENSHIP

- **Date of Birth**: February 24, 1975
- **Citizenship**: India.

EMPLOYMENT

- **Professor**: University of Florida, Gainesville, FL., Aug. 16, 2019 - present. (Primary department: Mechanical and Aerospace Engineering. Affiliate faculty with the Dept. of Electrical and Computer Engineering)
- **Associate Professor**: University of Florida, Gainesville, FL., Aug. 16, 2013 - Aug. 16, 2019.
- **Assistant Professor**: University of Florida, Gainesville, FL., Sept. 15, 2007 - Aug. 16, 2013.
- **Associate Research Engineer**: United Technologies Research Center, East Hartford, CT. Oct. 29, 1999 – Nov 1, 2002.
- **Trainee Engineer**: Tata Engineering and Locomotive Company, Jamshedpur, India. July/1996 – May/1997.

EDUCATION

- **University of California Santa Barbara**:
  Ph.D. in Electrical and Computer Engineering, Jan./2003 – July/2007. (degree awarded: 14 September, 2007)
  Thesis: *Distributed Estimation and Control with Relative Measurements: Algorithms and Scaling Laws.* Advisor: Prof. João P. Hespanha.
- **University of Delaware**:
  M.S. in Mechanical Engineering, Aug./1997 – June/1999. (degree awarded: 8 January, 2000)
  Thesis: *Lineal Sensor for Flow Sensing and Optimal Control of Flow Progression in Resin Transfer Molding*. Advisor: Prof. Jian-Qiao Sun.
- **Indian Institute of Technology, Kanpur**:
  B. Tech. in Mechanical Engineering, Aug/1992 – April /1996 (degree awarded: 20th May, 1996).

RESEARCH

- **Application: Energy efficiency, renewable energy integration, and resiliency:** (a) Developing control algorithms and systems for extracting virtual energy storage (VES) from loads by manipulating their demand, to balance intermittency of solar and wind. (b) Improving energy efficiency of buildings and occupant comfort through advanced control of heating, ventilation and air conditioning (HVAC) systems. (c) Resiliency to natural disasters through intelligent control of distributed energy resources.
- **Theory: Data-driven learning and control, decentralized control:** Algorithms for autonomous control using data-driven learning, coordinated control of networked systems consisting of large number of sub-systems.

TEACHING/ADVISING

- **Graduate courses:** EML 6934 (*Non Linear Programming*) in Spring 2022, EML 6352 (*Optimal Estimation and Kalman Filtering*) in Fall 2018, Fall 2016, Spring 2014,

Fall 2011, Fall 2009 & Spring 2008, EML 5311 (*Control Systems Theory*) in Spring: 2022, 2021, 2020, 2019, 2018, 2017, 2015, 2012, 2011, & 2010, EML 6934 (*System Identification*) in Spring 2013 & Fall 2008, EML 6934 (*Buildings and Energy*) in Fall 2014, and EGM 6936 (*Graduate Seminar*) in Fall 2011 & Spring 2012.

- **Undergraduate courses:** EML 4314C (*Dynamics and Controls System Design Laboratory*) in Fall 2021, Fall 2020, Fall 2019, EML 4312 (*Control of Mechanical Engineering Systems*) in Spring 2019, Fall 2017, Fall 2016, Fall 2014, Spring 2014, Fall 2013, Fall 2012, Fall 2010 & Spring 2009, EML 4930 (*System Identification*) in Spring 2013 & Fall 2008.
- **Graduate Student Mentoring**: I currently individually supervise two Ph.D. students:

  2. Austin Coffman (topic: Coordination of thermostatically controlled loads for demand side services to the power grid, expected graduation date: Dec. 2021.)
  1. Zhong Guo (topic: Model-based and model-free optimal control of HVAC systems, expected graduation date: Dec. 2022.)

  I have individually supervised nine Ph.D. students:

  9. Naren Raman, dissertation title: "Energy-efficient control of commercial building HVAC systems and analysis for grid support", graduation date: April 2021.
  8. Kendall Parker, dissertation title: "Smart grid advancements toward enhanced meter privacy and grid reliability", graduation date: April 2021.
  7. Tingting Zeng, dissertation title: "Autonomous data-driven control of building HVAC systems", graduation date: April 2021.
  6. Jonathan Brooks, dissertation title: "Distributed Coordination of Smart Loads to Provide Ancillary Service to the Power Grid", graduation date: December 2017.
  5. Yashen Lin, dissertation title: "Application of commercial building HVAC systems for power grid ancillary service", graduation date: August 2014.
  4. Siddharth Goyal, dissertation title: "Modeling and control to improve energy efficiency of buildings", graduation date: August 2013.
  3. Joseph Knuth, dissertation title: "A study of single and multi-robot localization: a manifolds approach", graduation date: May 2013.
  2. Chenda Liao, dissertation title: "Distributed time synchronization from relative measurements in mobile wireless sensor networks", graduation date: May 2013.
  1. He Hao, dissertation title: "Distributed control of large multi-vehicle teams", graduation date: August 2012.

  and co-supervised one

  1. Siddhartha Mehta, dissertation title: "A daisy-chaining approach for vision-based control and estimation", graduation date: August 2010. Chair: Prof. Warren Dixon.

  I have individually supervised two M.S. students:

  1. Rahul Subramany, thesis title: "Wireless sensor networks for HVAC control", graduated May, 2013.
  2. Saket Kumar, "Scalable wireless sensor network for HVAC control", graduated May, 2014.

  I have served/serving on a total of 73 Ph.D supervisory committees and 15 M.S. supervisory committees.
  Among the nine PhD students under my supervision who have already graduated,

two have won the Best Dissertation of the Year Award among Dynamic Systems and Controls group PhDs in MAE at UF (He Hao in 2013 and Siddharth Goyal in 2015).

- **Undergraduate Student Mentoring**: I currently advise two undergraduate researchers in conducting research:
  1. Joseph Rosenberger (topic: IoT network for smart building control. Joseph has co-authored a paper "Personal Comfort Node: Prototyping of a Comfort Sensor for HVAC Control", *UF Journal of Undergraduate Research*, 2020. Supported by NSF REU).
  2. Christopher Crouch (topic: Smart Fridge prototype for power grid ancillary service. Chris is an University Scholar, 2021-2022.).

  Since joining University of Florida in 2007, I have advised many undergraduate students in conducting original research. Six of these research projects have led to Honors Theses: B. Hood, B. Huval, J. Brooks, M. Goff, G. Armanious, B. Herrald. and several were selected as University Scholars by the University of Florida's University Scholar Program that supports undergraduate research: G. Armanious, B. Herrald, and C. Crouch. These mentoring activities have led to two peer-reviewed journal articles (one by Bryan Hood and another by Jordan Ehren), one Knox Millsaps Outstanding Undergraduate Technical paper award (Bryan Hood, 2012), and a 3rd prize in UF's MAE Undergraduate Research Symposium (George Armanious, Spring 2014).

AWARDS

- **Research Promotion Initiative award, February 2021**, awarded by University of Florida's Office of Strategic Communications & Marketing for the paper, "Reinforcement Learning-Based Home Energy Management System for Resiliency", to be presented at the American Control Conference, May 2021.
- **University of Florida Term Professor, 2021- 2024, and 2018- 2020**, by the University of Florida in recognition of excellence in teaching, research, and service.
- **MAE Excellence Term Professor, 2021- 2024**, by Mechanical and Aerospace Engineering Department, University of Florida, in recognition of excellence in teaching, research, and service.
- **FSMP visiting fellowship, 2017,** Awarded by the Fondation Sciences Mathématiques de Paris (FSMP), for a two-month long research visit in 2017 (May-June) to Inria, Paris, to work in collaboration with Ana Búsič on distributed control.
- **Endeavour Executive Fellowship, 2016,** Awarded by the Dept. of Education and Training, Government of Australia, to undertake collaborative research on energy efficiency and renewable energy in Australia for a period of three months in 2016 in an Australian institution of higher education.
- **ASEE-SE (American Society of Engineering Education - South East Section)'s New Faculty Research Award, 1st place, 2012,** Awarded annually by ASEE-SE section.
- **National Science Foundation (NSF) Faculty Early Career Development (CAREER) award,** 2010, "Distributed Estimation and Control for Energy Efficient Buildings".
- **General Chair's Recognition Award for Interactive Papers**, IEEE Conference on Decision and Control, December, 2009, for the paper "P. Barooah and P. G. Mehta, Optimal Mistuning for Improved Stability Margin of Vehicular Platoons, In Proc. of 48th IEEE Conf. on Decision and Control, pp. 3020-3025".
- **Best Paper Award**, 2nd International Conference on Intelligent Sensing and Information Processing (ICISP), 2005, for the paper "P. Barooah and J. P. Hespanha, Estimation From Relative Measurements : Error Bounds from Electrical Analogy, In Proc. of the 2nd ICISIP, 2005, pp. 88-93".

- **NASA Group Achievement Award,** for successful demonstration of active aero-engine instability control, 2003 (as part of the Active Combustion Control Team comprised of scientists from United Technologies Research Center and NASA).

PROFESSIONAL SOCIETY ACTIVITIES

- **Associate Editor**, IEEE Transactions on Control of Network Systems (July 2018-), International Journal of Distributed Sensor Networks (April 2010 - April 2018).
- **Member** IEEE, ASME, ASHRAE, ASEE. Senior member of IEEE from April 2021.
- **Associate Editor for contributed papers**, IEEE Conference on Decision and Control (2019, 2020, 2021) and IEEE Conference on Control Technology and Applications (2019, 2020, 2021), and American Control Conference (2020 and 2021).
- **Associate Editor for invited papers**, American Control Conference, 2019, 2020 and 2021.
- **Member, International Program Committee,** Indian Control Conference, 2019 and 2020.
- **Program committee member**, International Conference on Cyber Physical Systems (ICCPS), 2014 and 2015.
- **Program committee member**, IEEE Multi-conference on Systems and Control, 2014.
- **Technical program committee member**, BuildSys'13 (4th ACM Workshop On Embedded Systems For Energy-Efficiency In Buildings).
- **Publicity Chair** for ACM/IEEE International Conference on Cyber-Physical Systems (ICCPS) 2013.
- **Technical program committee member**, BuildSys'12 (4th ACM Workshop On Embedded Systems For Energy-Efficiency In Buildings).
- **Member**, IEEE Control Systems Society Technical Committee on Power Generation Control (Energy Utilization), Jan 2012 - present
- **Member**, IEEE Computer Society Smart Grid Vision Committee, Oct. 2011 - 2014.
- **Program Committee Member**, 2010 IEEE Conference on Decision and Control.
- **Co-organizer of special sessions** in several IEEE Conference on Decision and Control and American Control Conference.

PLENARY LECTURES

- "Improving Energy Efficiency and Grid Friendliness of Buildings", 2nd International Congress on Energy Efficiency and Energy Related Materials, Oludeniz, Turkey, Oct 17, 2014.

INVITED TALKS

- "How to Convert the Air Conditioners in a City into a Giant Battery to Help Integrate Wind and Solar Energy", International Virtual Workshop on Smart cities: A Road Map for Future Development, Jan 10-12, BITS Pilani, Hyderabad, India.
- "Can a building provide both energy efficiency and demand flexibility?", IEEE Power and Energy Society General Meeting, 2021, panel presentation in "The Interplay Between Energy Efficiency and Demand Response for Smart Buildings: Implications for Power Systems - Part II", July 29, 2021.
- "Capacity of grid interactive buildings to provide virtual energy storage", in *Building Technologies office, U. S. Department of Energy*, Washington, D.C. (delivered online), November 10, 2020.
- "Capacity Characterization of On/Off and Variable Flexible Loads Providing Virtual Energy Storage", in *Autonomous Energy Systems Workshop, National Renewable Energy Laboratory*, (delivered online), August 19-20, 2020.
- "Capacity of flexible residential loads to provide battery-like services to help mitigate volatility of renewable energy sources", in *Dept. of Mechanical Engineering, University of California*, Merced, CA, November 15, 2019.

- "Model-free control of commercial HVAC systems using Artificial Intelligence", in *Oak Ridge National Laboratory*, Oak Ridge, TN, October 25, 2019.
- "Autonomous Buildings: Data-Driven Control of HVAC systems", in *Energy and Efficiency Institute, Univ. of California*, Davis, CA, June 11, 2019
- "Frequency-domain characterization of demand flexibility for grid support", in *Lawrence Berkeley National Laboratory*, Berkeley, CA, June 10, 2019.
- "Coordination of distributed energy resources for the smart power grid without inter-agent communication", in *Center for Control, Dynamical Systems and Computation, University of California*, Santa Barbara, CA, June 7, 2019.
- "Distributed control of residential and commercial HVAC loads for Virtual Energy Storage", in *Workshop on Innovative Optimization and Control Methods for Highly Distributed Autonomous Systems*, National Renewable Energy Laboratory, Golden, CO. April 11, 2019.
- "Control of building demand for energy efficiency and grid support services", in *Grid Science Winter School & Conference*, Santa Fe, NM, January 9, 2019.
- "Simultaneous Identification of Linear Building Dynamic Model and Disturbance Using Sparsity-Promoting Optimization", in workshop on Big Data Science and Engineering Research, *ASME Dynamic Systems and Control Conference*, Sept. 30, 2018.
- " Ancillary services from large commercial buildings", *Intelligent Building Operation Workshop* in the High Performance Buildings Conference, Purdue University, Indiana, July 8, 2018.
- "Control of Flexible Loads to Provide Virtual Energy Storage", in *Energy Storage and Responsive Loads for Grid Resiliency* Meeting, Seattle, organized by Pacific Northwest National Laboratories, March 27, 2018.
- "Robust Distributed Coordination of Loads for providing Virtual Energy Storage", School of Computer Science, Florida International University, Miami, Florida, USA, Sept. 29, 2017.
- "Distributed coordination of residential loads with randomized control to provide Virtual Energy Storage", in *Robert Bosch Center for Cyber Physical Systems, Indian Institute of Science*, Bangalore, India, July 25, 2017
- "Virtual energy storage for solar and wind with distributed coordination of smart devices", in *CPS symposium, Indian Institute of Science*, Bangalore, India, July 19, 2017.
- "Distributed coordination of air-conditioning loads to provide demand-side flexibility to the power grid", in *Laboratory for Information, Networking, and Communication Sciences, (LINCS)*, Paris, France, June 7, 2017.
- "Distributed control of loads to provide virtual energy storage for renewable integration", in *Smart Grid Workshop, American Control Conference*, July 5, Boston, MA, USA, 2016.
- "Distributed control of loads to provide virtual energy storage for renewable integration", in *University of Melbourne*, Melbourne, Australia, May 13, 2016.
- "Demand side management for creating virtual energy storage from flexible loads", in *University of Sydney*, Sydney, Australia, May 11, 2016.
- "Virtual storage of intermittent renewable energy by intelligent loads", in *Queensland University of Technology*, Brisbane, Australia, May 6, 2016.
- "Helping grid-integration of intermittent renewable energy sources with intelligent loads", in *University of Queensland*, Brisbane, Australia, April 26, 2016.
- "A renewable energy rich future: are we there yet?", in *Daytona State College*, Daytona, FL, USA, Nov. 30, 2015.

- "Virtual storage of solar and wind energy by intelligent loads", in *Cornell University*, Ithaca, NY, USA, Oct 6, 2015
- "Virtual storage of solar and wind energy by intelligent loads", in *Rensselaer Polytechnic Institute*, Dept. of Mechanical Engineering, Troy, NY, USA, Oct. 8, 2015,
- "Virtual storage of solar and wind energy by intelligent loads", in *Jorhat Engineering College*, Jorhat, Assam, India, Sept. 26, 2015.
- "Virtual storage of solar and wind energy by intelligent loads", in *Numaligarh Refinery Ltd.*, Numaligarh, Assam, India, Sept. 24, 2015.
- "HVAC loads can be used as virtual batteries. Pay attention to bandwidth, though", in *Center for Nonlinear Studies*, Los Alamos National Laboratory, Los Alamos, NM, USA, December 17, 2014.
- "Inexpensive Ancillary Service from Automated Load Tuning", in *NSF workshop on Future of Control, Communication and Signal Processing in Power*, Washington D.C., USA, November 2013.
- "Flying the electric grid through wind and Sun", in *Dept. of Electrical and Computer Engineering, University of Florida*, Gainesville, FL, USA, Halloween, 2013.
- "Making buildings smarter, providing energy efficiency and grid friendliness through control,", in *Indian Institute of Technology*, Guwahati, India, Nov 2, 2012.
- "Making buildings smarter, providing energy efficiency and grid friendliness through control,", in *Dept. of Mechanical Engineering, Indian Institute of Technology*, Mumbai, India, Oct 30, 2012.
- "Occupancy based control of building HVAC: a cyber physical system", in *Chemical Engineering, University of California*, Los Angeles, May 17, 2012.
- "Occupancy based control of building HVAC: a cyber physical system", in *Mechanical and Aerospace Engineering, University of California*, San Diego, CA, USA, May 11, 2012.
- "Improving robot localization by using robot-to-robot relative measurements in cooperative multi-robot teams", in *Control and Dynamical Systems program, CalTech*, Pasadena, CA, USA, May 10, 2012.
- "Control and Identification Problems for Energy Efficient Buildings", in *Center for Control, Dynamical Systems and Computation, University of California*, Santa Barbara, CA, USA, April 13, 2012.
- "Improving Building Energy Efficiency through Control (and Modeling)", Nov 18, 2011, Dept. of Mechanical Engineering and Mechanics, Lehigh University, Bethlehem, PA, USA.
- "Improving Building Energy Efficiency: Modeling and Control issues", 2011 symposium on emerging topics in control and modeling: Cyber Physical Systems, October 20-21, 2011, University of Illinois, Urbana-Champaign, IL, USA.
- "Collaborative localization of multiple vehicles from relative measurements", Oct. 6, Dept. of Aerospace Engineering, Texas A & M University, College Station, TX, USA.
- "Energy efficient buildings through distributed estimation and control", 2nd summer school on Cyber Physical Systems, June 23-25, 2010, Georgia Tech, Atlanta, GA. USA
- "Stability and robustness issues in decentralized formation control", Mathematics and Statistics Dept. , Oregon State University, Portland, OR, USA, Feb 19, 2010.
- "Scaling laws and algorithms for estimation and control with relative measurements", November, 2007, Dept. of Mathematics, Indian Institute of Technology, Guwahati, India.

- "Estimation and Control from Relative Measurements : Algorithms and Error Scaling Laws", Aug. 14, 2006, United Technologies Research Center, East Hartford, CT, USA.

	Total	Barooah's portion
As PI	4.35	2.65
As Co-PI	3.16	0.2
Combined	7.51	2.85

Summary of funding (in million $'s).

FUNDED PROJECTS

- **As PI**

1. " Characterizing capacity of controllable DERs to provide energy storage service to the power grid", July 2021 - June 2024 (NSF). PI: Prabir Barooah. Total award:$ 369,000. Barooah's portion: $ 369,000.
2. "Autonomous Control of Building HVAC Systems", Sept. 2019 - Aug. 2022 (NSF). PI: Prabir Barooah. Total award:$ 450,000. Barooah's portion: $ 450,000.
3. Data science supplement to "Autonomous Control of Building HVAC Systems", Sept. 2019 - Aug. 2022 (NSF). PI: Prabir Barooah. Total award:$ 70,000. Barooah's portion: $ 70,000.
4. Supplement to existing NSF grant "Methods for dynamic network identification with application to the control of smart buildings", through NSF's INTERN program, to support a PhD student of the PI (Ms. Tingting Zeng) for an internship at an industry, Jan. 2020- Jun. 2020. PI: Prabir Barooah. Total award:$ 54,000. Barooah's portion: $ 54,000.
5. "Self-running buildings: An autonomous system for reducing energy consumption and increasing demand flexibility of commercial buildings in hot-humid climates": Dec. 2017- Dec. 2019 (Florida Dept. of Agr. & Cons. Services, Renewable Energy and Energy Efficiency (REET) program). PI: Prabir Barooah, co-PIs: Sean Meyn, Grant funds: 400,000. Barooah's portion: $ 318,000.
6. "CPS: Synergy: Distributed coordination for a smarter and sustainable power grid": Oct. 2016- Oct. 2019 (NSF). PI: Prabir Barooah, co-PIs: Sean Meyn and Arturo Bretas (UF). Total award: $ 750,000. Barooah's portion: $ 300,000.
7. "Methods for dynamic network identification with application to the control of smart buildings", 2015-2018 (NSF). PI: Prabir Barooah. Total award (= Barooah's portion) $\$300,000$.
8. "Buildings and Energy: Design and Operation Vs. Sustainability: An Energy Engineering Course Development for Florida-specific Building Design": 2014-2015 (Florida Energy Systems Consortium), PI: Prabir Barooah, co-PIs Duzgun Agdas and Ravi Srinivasan. Total award: : $\$67,960$, Barooah's portion: $\sim \$20,000$.
9. "CAREER: Distributed Estimation and Control for Energy Efficient Buildings" 2010-2015 (NSF). PI: Prabir Barooah. Total award (=Barooah's portion): $\$400,000$ over 5 years.
10. "CPS: Medium: Collaborative Research: GOALI: Methods for Network-Enabled Embedded Monitoring and Control for High-Performance Buildings", 2010-2013 (NSF). PI: Prabir Barooah, co-PIs: Alberto Speranzon (United Technologies), Prashant Mehta and Sean Meyn (UIUC), Luca Carloni (Columbia). Total award: $\$1,500,000$. Barooah's portion: $\$375,000$.

11. REU supplements from NSF totaling $32,000. REU stands for Research Experience for Undergraduates.

- **As co-PI**
  1. "Virtual Batteries" (Grid Modernization Lab Consortia, DOE Building Technologies Office, 2016-2018). lead: PNNL. UF PI: P. Barooah. Total award: $\$3,000,000$. Barooah's portion: $\$\ 100,000$.
  2. "Florida Driver Assistive Truck Platooning Analysis", 2/17-9/17 (Fl Dept of Transportation). Total award : $75,000. PI: C. Crane, Barooah's portion: $ 15,000.
  3. "GeoTrack: Target Localization and Tracking by Networked Layers of Unmanned Systems", 2009-2010. (ARO/ICB). PI: Joao Hespanha, co-PI: Gaemus Collins, Prabir Barooah. Barooah's portion: $\$85,000$.

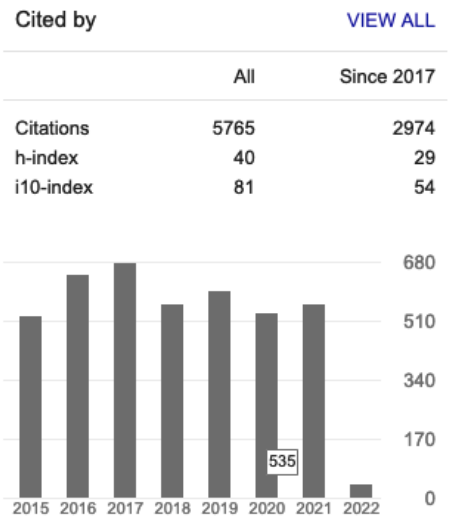
REVIEWER INFORMATION

- **Journals:** Reviewer for *Sustainable Energy, Grids and Networks*, *IEEE Transactions on Automatic Control*, *IEEE Transactions on Signal Processing*, *IEEE Transactions on Smart Grid*, *IEEE Transactions on Control of Network Systems*, *IEEE Transactions on Power Systems*, *Automatica*, *IEEE Transactions on Control System Technology*, *IEEE Transactions on Automation Science and Engineering*, *IEEE Control Systems Letters*, *Proceedings of the IEEE*, *IEEE Transactions on Industrial Informatics*, *International Journal of Robust and Nonlinear Control*, *Journal of Parallel and Discrete Mathematics*, *International Journal of Engineering Science*, *ASME Journal of Dynamic Systems, Measurement, and Control*, *IFAC Reviews*, *IEEE Journal of Selected Areas of Communication*, *ASME Journal of Aerospace Engineering*, *Computer Communications*, *Transportation Research*, *IEEE Transactions on Intelligent Transportation Systems*, *IEEE Intelligent Transportation Systems Magazine*, *International Journal of ggoo Robotics and Automation*, *Energy and Buildings*, *Building and Environment*, *Building Simulation*, *Applied Energy*, *Energy Research and Social Science*, *International Journal of Electrical Power and Energy Systems*, *Joule*, *IEEE Access*, *Stochastic Systems*.
- **Conference Proceedings** Reviewer for *American Control Conference*, *IEEE Conference on Decision and Control*, *IEEE Conf. on Control Technology and Applications*, *IEEE Multi Conference on Systems and Control*, *International Conference on Robotics and Automation*, *IFAC Workshop*, *Indian Control Conference*, *IEEE International Conference on Control, Measurement and Instrumentation*, and many others.
- **NSF Panels** Served as a panelist in the following NSF review panels:
  1. 2021: panelist in one panel.
  2. 2020: panelist in one panel.
  3. 2018: panelist in one panel.
  4. 2018: panelist in one panel.
  5. 2017: panelist in one one panel.
  6. 2016: panelist in one panel.
  7. 2015: panelist in one panel.
  8. 2014: panelist in three panels.
  9. 2012: panelist in one panel.
  10. 2011: panelist in one panel.
  11. 2010: panelist in two panels.
  12. 2008: panelist in two panels.
- **DOE Peer Review** Served as a Peer Reviewer in DOE's Building Technology Office's Peer Review program, in 2015, 2017, and 2018.

- **DOE TCF Review** Served as a Reviewer for DOE's Technology Commercialization Fund program in 2018 and 2019.
- **DOE SBIR** Served as reviewer for BTO's and Solar Energy Technology Office(SETO)'s SBIR proposals, 2017.
- **ORAU Ralph Powe Junior Faculty Award**, 2018, 2019.
- **BTO GEB report** Served as an expert reviewer to the DEO BTO's report on the report on Grid-interactive Efficient Buildings, 2019.

PUBLICATIONS

- **Web**
  1. `Google scholar page` (Google scholar h-index 40; citation statistics from Google Scholar, recorded on January 2022, are shown below.)



- **Journal articles (published/in press)**
  †: Graduate student I supervise(d)
  *: Undergraduate student I supervise(d)
  ‡: Graduate student I co-supervise(d)

51. Kemdall Parker†, Matthew Hale, and Prabir Barooah, "Spectral Differential Privacy: Application to Smart Meter Data", *IEEE Internet of Things Journal*, doi: 10.1109/JIOT.2021.3107770, 25 August, 2021 (early access).
50. Tingting Zeng†and Prabir Barooah, "An adaptive MPC scheme for energy-efficient control of building HVAC systems", *ASME Journal of Engineering for Sustainable Buildings and Cities*, 2(3): 031001, 12 pages, 2021.
49. Naren Srivaths Raman†, Rahul Umashankar Chaturvedi†, Zhong Guo†, Prabir Barooah, "Model Predictive Control-Based Hierarchical Control of a Multi-Zone Commercial HVAC System", *ASME Journal of Engineering for Sustainable Buildings and Cities*, 2(2): 021005 (12 pages), May 2021.
48. Tingting Zeng†, Jonathan Brooks†, and Prabir Barooah, "Simultaneous identification of linear building dynamic model and disturbance using sparsity-promoting optimization", *Automatica*, Volume 129, pp. 109631 (7 pages), July 2021.
47. A. Coffman†, Z. Guo†and P. Barooah, "Characterizing capacity of flexible loads for providing grid support", in *IEEE Transactions on Power Systems*, 36(3), pp. 2428 - 2437, May 2021.
46. Kendall Parker† and Prabir Barooah, "A probabilistic method for reserve sizing in power grids with high renewable penetration", *IEEE Transactions on Power Systems*, 36(3), pp. 2473 - 2480, May 2021.
45. Zhong Guo†, Austin Coffman†, Jeffrey Munk, Piljae Im, Teja Kuruganti, and Prabir Barooah, "Aggregation and data driven identification of building thermal dynamic model and unmeasured disturbance", *Energy and Buildings*, vol. 231, pp. 110500 (9 pages), January 2021.

44. Duzgun Agdas and Prabir Barooah, "Impact of the COVID-19 pandemic on the U.S. electricity demand and supply: an early view from data", *IEEE Access*, vol. 8, pp. 151523-151534 (14 pages), August, 2020.
43. Naren Raman†, Karthikeya Devaprasad†, Bo Chen†, Herbert Ingley, and Prabir Barooah, "Model predictive control for energy-efficient HVAC operation with humidity and latent heat considerations", *Applied Energy*, Vol. 279, pp. 115765, Dec. 2020.
42. Tingting Zeng†and Prabir Barooah, "Identification of network dynamics and disturbance for a multi-zone building", *IEEE Transactions on Control System Technology*, 28 (5), pp. 2061 - 2068, 2020.
41. Naren S. Raman†and Prabir Barooah, "On the round-trip efficiency of an HVAC-based virtual battery", *IEEE Transactions on Smart Grid*, 18 June, 2019, doi: 10.1109/TSG.2019.2923588.
40. Jonathan Brooks†and Prabir Barooah, "Coordination of Loads for Ancillary Services With Fourier Domain Consumer QoS Constraints", *IEEE Transactions on Smart Grid*, January 2019, doi: 10.1109/TSG.2019.2897231.
39. Jonathan Brooks†, Rodrigo T. Trevizan, Prabir Barooah, and Arturo Bretas, "Analysis and Evaluation of an Optimal Load Control Algorithm for Contingency Service", *Electric Power Systems Research*, vol. 167, pp. 86-93, 2019.
38. S. R. Deeba, Prabir Barooah, R. Sharma, Jonathan Brooks†, and T. K. Saha,"A Customer Centric Approach to the Use of Residential Batteries for Distribution Network Support", *IEEE Transactions on Smart Grid*, vol. 10(5), pp. 5449 - 5457, Sept. 2019.
37. Jonathan Brooks†and Prabir Barooah, "Consumer-aware distributed demand-side contingency service in the power grid", *IEEE Transactions on Control of Network Systems*, vol. 5(4), 2018, pp. 1987 - 1997, Dec. 2018.
36. Austin Coffman†and Prabir Barooah, "Simultaneous identification of dynamic model and occupant-induced disturbance for commercial buildings", *Building and Environment*, vol. 128, pp. 153-160, January 2018.
35. Yashen Lin†, Prabir Barooah, and Johanna Mathieu, "Ancillary services through demand scheduling and control of commercial buildings", *IEEE Trans. on Power Systems*, vol. 32, issue: 1, January 2017, pp. 186 - 197.
34. Chenda Liao†and Prabir Barooah, "An Algorithm for Accurate Distributed Time Synchronization in Mobile Wireless Sensor Networks from Noisy Difference Measurements", *Asian Journal of Control*, Feb 2016, DOI: 10.1002/asjc.1348.
33. Sean Meyn, Prabir Barooah, Ana Bušić, Yue Chen and Jordan Ehren, "Ancillary Service to the Grid Using Intelligent Deferrable Loads", *IEEE Transactions on Automatic Control*, Volume: 60, Issue: 11, 2015, pp. 2847-2862.
32. L. Arpan, P. Barooah and R. Subramany†, "The role of values, moral norms, and descriptive norms in building occupant responses to an energy-efficiency pilot program and to framing of related messages", *Applied Environmental Education and Communication*, vol. 14, issue 1, 2015, pp. 23-32.
31. Jonathan Brooks†, Saket Kumar†, Siddharth Goyal†, Rahul Subramany†and Prabir Barooah, "Energy-efficient control of under-actuated HVAC zones in commercial buildings", *Energy and Buildings*, doi: 10.1016/j.enbuild.2015.01.050, v. 93, pp. 160–168, April 2015,
30. Siddharth Goyal†, Prabir Barooah, and Timothy Middelkoop, "Experimental study of occupancy-based control of HVAC zones", *Applied Energy*, vol. 140, pp. 75-84, February, 2015.

29. Yashen Lin†, Prabir Barooah, Sean Meyn and Timothy Middelkoop, "Experimental evaluation of frequency regulation from commercial building HVAC systems", *IEEE Transactions on Smart Grid*, 6(2), pp. 776 - 783, March 2015.
28. Jonathan Brooks†, Siddharth Goyal†, Rahul Subramany†, Yashen Lin†, Chenda Liao†, Timothy Middelkoop, Herbert Ingley, Laura Arpan, and Prabir Barooah, "Experimental evaluation of occupancy-based energy-efficient climate control of VAV terminal units", *Science and Technology for the Built Environment* (formerly *HVAC&R Research*), vol. 21, issue 4, pp. 469-480, 2015.
27. Joseph Knuth†and Prabir Barooah, "Distributed Collaborative 3D Pose Estimation of Robots from Heterogeneous Relative Measurements: an Optimization on Manifold Approach", *Robotica*, vol. 33, issue 7, pp. 1507-1535, August 2015.
26. Kun Deng, Siddharth Goyal†, Prabir Barooah and Prashant G. Mehta, "Structure-Preserving Model Reduction of Nonlinear Building Thermal Models", *Automatica*, 50(4), April 2014, pp. 1188–1195.
25. He Hao†, Anupama Kowli, Yashen Lin†, Prabir Barooah and Sean Meyn, "Ancillary Service to the Grid through Control of Fans in Commercial Building HVAC Systems", *IEEE Transactions on Smart Grid*, 5(4), pp. 2066 - 2074, July 2014.
24. Chenda Liao†and Prabir Barooah, "Clock skew and offset estimation from relative measurements in mobile networks with Markovian switching topology", *Automatica*, vol. 49 (10), October, 2013, pp. 3015–3022.
23. Siddharth Goyal†, Herbert Ingley, and Prabir Barooah, "Occupancy-Based Zone-Climate Control for Energy-Efficient Buildings: Complexity vs. Performance", *Applied Energy*, vol. 106, June, 2013, pp. 209-221.
22. Joseph Knuth†and Prabir Barooah, "Error Growth in Position Estimation from Noisy Relative Pose Measurements", *Robotics and Autonomous Systems*, March 2013, vol. 61, no. 3, pp. 229 - 244.
21. Siddharth Goyal†and Prabir Barooah, "A Method for Model-Reduction of Nonlinear Building Thermal Dynamics of Multi-Zone Buildings", *Energy and Buildings*, vol. 47, April 2012, pp. 332-340.
20. He Hao†and Prabir Barooah, "On achieving size-independent stability margin of vehicular lattice formations with distributed control", *IEEE Transactions on automatic control*, vol. 57, issue 10, pp. 2688 - 2694, 2012.
19. He Hao†and Prabir Barooah, "Stability and robustness of large vehicular platoons with linear and nonlinear decentralized control for two architectures", *International journal of Robust and Nonlinear Control*, first published online 17 July, 2012, doi 10.1002/rnc.2872.
18. He Hao†and Prabir Barooah, "Approximation error in PDE-based modeling of vehicular platoons", *International Journal of Control*, 85(8), 2012, pp. 1121-1129.
17. Prabir Barooah, Harshavardhan Chenji, R. Stoleru, and Tamás Kalmár-Nagy, "Cut Detection in Wireless Sensor Networks", *IEEE Transactions on Parallel and Distributed Systems*, vol. 23, no. 3., pp. 483-490. Mach 2012.
16. Chenda Liao†, Yashen Lin†, Prabir Barooah, "Agent-based and graphical modeling of building occupancy", *Journal of Building Performance Simulation*, vol. 5, issue 1, doi: 10.1080/19401493.2010.531143.
15. He Hao†, Prabir Barooah, Prashant G. Mehta, "Stability Margin Scaling of Distributed Formation Control as a Function of Network Structure", *IEEE Transactions on Automatic Control*, vol. 56, issue 4, pp. 923 - 929, April 2011.

14. Bryan Hood* and Prabir Barooah, "Estimating DoA from Radio-Frequency RSSI Measurements Using an Actuated Reflector", *IEEE Sensors*, vol. 11, no. 2, pp. 413-417, Feb 2011.
13. S. M. George, W. Zhou, H. Chenji, M. Won, Y.-Oh Lee, A. Pazarloglou, R. Stoleru, and Prabir Barooah, "DistressNet: A Wireless AdHoc and Sensor Network Architecture for Situation Management in Disaster Response/Situation Management", *IEEE Communications magazine*, 48(3), March, 2010.
12. Prabir Barooah and João P. Hespanha, "Error Scaling Laws for Optimal Estimation from Relative Measurements", *IEEE Transactions on Information Theory*, 55(12), Dec. 2009, pp. 5661 - 5673.
11. Prabir Barooah, Prashant G. Mehta and João P. Hespanha, "Mistuning-based Control Design to Improve Closed-Loop Stability Margin of Vehicular Platoons", *IEEE Transactions on Automatic Control*, vol. 54, no.9, pp. 2100-2113, Sept. 2009.
10. Prabir Barooah and João P. Hespanha, "Estimation from Relative Measurements: Electrical Analogy and Large Graphs", *IEEE Transactions on Signal Processing*, vol. 56(6), pp. 2181-2193, June 2008.
9. Prabir Barooah and João P. Hespanha, "Estimation on Graphs from Relative Measurements: Distributed Algorithms and Fundamental Limits", *IEEE Control Systems Magazine*, vol. 27, no. 4. August 2007.
8. Satish Narayanan, Prabir Barooah, and Jeffrey M. Cohen, "The Dynamics and Control of an Isolated Jet in Cross-Flow", *AIAA Journal*, vol. 41, no. 12, December 2003, pp. 2316-2330.
7. Prabir Barooah, T. J. Anderson and J. M. Cohen, "Active Combustion Instability Control with Spinning Valve Actuator", *ASME Journal of Engineering For Gas Turbines and Power*, vol. 125, Issue 4, October 2003, pp. 925-932.
6. Prabir Barooah, Berna Berker and J. Q. Sun, "Integrated Switching and Feedback Control for Mold Filling in Resin Transfer Molding", *Transactions of the ASME - Journal of Manufacturing Science and Engineering*, vol. 123, Issue 2, May 2001, pp. 240-247.
5. Prabir Barooah, Berna Berker and J. Q. Sun, "Lineal Sensors for Liquid Injection Molding of Advanced Composite Materials", *Journal of Materials Processing & Manufacturing Science*, vol. 6, no. 3, 1999, pp. 169-184.
4. Prabir Barooah and J. Q. Sun, "Lineal sensors for flow sensing in liquid injection molding of composites", *Journal of Materials Processing & Manufacturing Science*, vol. 7, no. 4, 1999, pp. 416-427.
3. Berna Berker, Prabir Barooah, M. K. Yoon. and J. Q. Sun, "Sensor Based Modeling and Control of Fluid Flow in Resin Transfer Molding", *Journal of Materials Processing & Manufacturing Science*, vol. 7, no. 2, 1998, pp. 195-214.
2. Berna Berker, Prabir Barooah and J. Q. Sun, "Sequential Logic Control of Liquid Injection Molding with Automatic Vents and Vent-to-Gate Converters", *Journal of Materials Processing and Manufacturing Science*, vol. 6, no. 2, 1998, pp. 81-103.
1. M. K. Yoon, Prabir Barooah, Berna Berker and J. Q. Sun, "Permeability and Porosity Estimation in Resin Transfer Molding Process", *Journal of Materials Processing & Manufacturing Science*, vol. 7, no. 2, 1998, pp. 173-185.

- **Journal articles under review**

5. Naren Srivaths Raman†, Bo Chen†, and Prabir Barooah, "On Energy-Efficient HVAC Operation with Model Predictive Control: A Multiple Climate Zone Study", Oct 2021.

4. Austin Coffman†, Ana Bušić, and Prabir Barooah, "A unified framework for coordination of thermostatically controlled loads",August 2021 (available at https://arxiv.org/abs/2108.05840).
3. Ninad Gaikwad†, Naren Srivaths Raman†, and Prabir Barooah, "Increasing Energy Resiliency to Hurricanes with Battery and Rooftop Solar Through Intelligent Control", Feb 2021. (Available at https://arxiv.org/abs/2102.04406)
2. Naren Srivaths Raman†, Adithya M. Devraj, Prabir Barooah and Sean P. Meyn, "Energy-Efficient Control of a Building HVAC System using Reinforcement Learning", July 2020.
1. Austin R. Coffman†, Neil Camardella, Prabir Barooah, and Sean Meyn, "Aggregate capacity of TCLs with cycling constraints", October 2020. (Available at https://arxiv.org/abs/1909.11497).

- **Book Chapters**

4. Prabir Barooah, "Building Energy Management System", Chapter in the *Encyclopedia of Systems and Control*, Eds. John Baillieul and Tariq Samad, Springer, 2019 (in press).
3. Prabir Barooah, "Virtual energy storage from flexible loads: distributed control with QoS constraints", *Smart Grid Control: Opportunities and Research Challenges*, Springer, 2019. Editors: Jakob Stoustrup, Anuradha Annaswamy, Aranya Chakrabortty and Zhihua Qu. ISBN: 978-3-319-98310-3.
2. Prabir Barooah, Neimar M. Da Silva and João P. Hespanha, "Distributed Optimal Estimation From Relative Measurements for Localization and Time Synchronization", In Phillip B. Gibbons, Tarek Abdelzaher, James Aspnes, Ramesh Rao, *Distributed Computing in Sensor Systems, vol. 4026 of Lect. Notes in Comput. Science*, June 2006, pp. 266-281.
1. Kun Deng, Prabir Barooah, and Prashant G. Mehta, "Supervisory control systems for energy-efficient buildings", Chapter 13, pp. 283-311, in Yong Tao and Yi Jiang (Eds.), *Analytics for building-scale sustainable ecosystems*, 2016, Begell House.

- **Refereed Conference Publications**

80. Naren Srivaths Raman†, Bo Chen†, and Prabir Barooah, "A Unified MPC Formulation for Control of Commercial HVAC Systems in Multiple Climate Zones", *2020-2021 International Conference on High Performance Buildings*, Purdue University, West Lafayette, Indiana, USA, May 2021, 8 pages.
79. Naren Srivaths Raman†, Ninad Gaikwad†, Sean Meyn and Prabir Barooah, "Reinforcement Learning-Based Home Energy Management System for Resiliency", *American Control Conference (ACC)*, New Orleans, USA (held virtually), May 25-28, 2021.
78. Austin Coffman†, Ana Busic, and Prabir Barooah, "Control oriented modeling of TCLs", *American Control Conference (ACC)*, New Orleans, USA (held virtually), May 25-28, 2021.
77. Austin Coffman† and Prabir Barooah, "A model-free method for learning flexibility capacity of loads providing grid support", *American Control Conference (ACC)*, New Orleans, USA (held virtually), May 25-28, 2021.
76. Ninad Gaikwad†, Naren Srivaths Raman†, and Prabir Barooah, "Smart Home Energy Management System for Power System Resiliency", *IEEE International*

Conference on Control Technology and Applications (CCTA), Montreal, Canada, August 2020.

75. Austin Coffman†, Matthew Hale and Prabir Barooah, "Resource allocation with local QoS: Flexible loads in the power grid", *IEEE International Conference on Control Technology and Applications (CCTA)*, Montreal, Canada, August 2020.
74. Austin Coffman†, Zhong Guo†, and Prabir Barooah, "A spectral characterization of aggregate capacity of flexible loads for grid support ", in *American Control Conference*, Denver, CO, July 2020.
73. Tingting Zeng†and Prabir Barooah, "An autonomous MPC scheme for energy-optimal control of building HVAC systems"', in *American Control Conference*, Denver, CO, July 2020.
72. Austin Coffman†, Neil Cammardella, Prabir Barooah and Sean P. Meyn, "Flexibility capacity of TCLs with cycling constraints", in *American Control Conference*, Denver, CO, July 2020.
71. Naren Srivaths†, Adithya M. Devraj , Prabir Barooah, and Sean P. Meyn, "Reinforcement Learning for Control of Building HVAC Systems", in *American Control Conference*, Denver, CO, July 2020.
70. Austin Coffman†, Ana Bušić, and Prabir Barooah, "Aggregate capacity for TCLs providing virtual energy storage with cycling constraints", *IEEE Conference on Decision and Control*, Dec. 12-15, 2019, Nice, France.
69. Zhong Guo†, Austin Coffman†, Jeffrey Munk, Piljae Im, and Prabir Barooah, "Identification of aggregate building thermal dynamic model and unmeasured internal heat load from data". *IEEE Conference on Decision and Control*, Dec. 12-15, 2019, Nice, France.
68. Matthew Hale, Prabir Barooah, Kendall Parker†, and Kasra Yazdani, "Differentially Private Smart Metering: Implementation, Analytics, and Billing", in *UrbSys'19*, (ACM International Workshop On Urban Building Energy Sensing, Controls, Big Data Analysis, And Visualization), Columbia University, New York, NY, November 10, 2019.
67. Naren Srivaths†, Karthikeya Devaprasad†and Prabir Barooah, "MPC-Based Building Climate Controller Incorporating Humidity", *American Control Conference*, July 10-12, 2019.
66. Tingting Zeng†and Prabir Barooah, "Identification of Network Dynamics and Disturbance for a Multi-zone Building"', in *IFAC Conference on Human Cyber Physical Systems*, Miami, Florida, Dec. 2018, 51 (34), 157-163.
65. Kendall Parker†and Prabir Barooah, "Determining Reserve Requirements for Energy Storage to Manage Demand-Supply Imbalance in Power Grids", *IEEE eGrid*,November 12-14, 2018.
64. Austin Coffman†, and Ana Bušić and Prabir Barooah, "Virtual Energy Storage from TCLs using QoS preserving local randomized control, *5th ACM International Conference on Systems for Built Environments (BuildSys)*, Shenzhen, November, 2018.
63. Naren S. Raman†and Prabir Barooah, "Analysis of Round-Trip Efficiency of an HVAC-Based Virtual Battery", *5th International Conference on High Performance Buildings*, July, 2018.
62. Austin Coffman†and Ana Bušić and Prabir Barooah, "A Study of Virtual Energy Storage From Thermostatically Controlled Loads Under Time-Varying Weather Conditions", *5th International Conference on High Performance Buildings*, July, 2018.

61. Roshan Raisoni†, Naren S. Raman†, Prabir Barooah, Jeffrey D. Munk and Piljae Im, "A Control-Oriented Dynamic Model of Air Flow in a Single Duct HVAC System", *5th International Conference on High Performance Buildings*, July, 2018.
60. Tingting Zeng†, Jonathan Brooks†and Prabir Barooah, "Simultaneous identification of building dynamic model and disturbance using sparsity-promoting optimization", *5th International Conference on High Performance Buildings*, July, 2018.
59. Jonathan Brooks†, Rodrigo Daniel Trevizan, Prabir Barooah and Arturo Suman Bretas,"Performance assessment of an optimal load control algorithm for providing contingency service", in proceedings of the 49th *North American Power Symposium (NAPS)*, Morgantown, West Virginia, Sept. 17-19, 2017.
58. Jonathan Brooks†and Prabir Barooah, "Virtual energy storage through decentralized load control with quality of service bounds", in proceedings of the *American Control Conference*, July 2017, pp. 735-740.
57. J. Brooks†and Prabir Barooah, "Consumer-Aware Load Control to Provide Contingency Reserves using Frequency Measurements and Inter-load Communication", *In Proceedings of the American Control Conference*, pp. 5008-5013, Boston, MA, USA, July 6-8, July 2016.
56. Yashen Lin†, Prabir Barooah and Johanna Mathieu, "Ancillary services to the grid from commercial buildings through demand scheduling and control", *In Proceedings of the American Control Conference*, Chicago, IL, USA, July 1-3, 2015, pp. 3007-3012.
55. Yashen Lin†, Prabir Barooah, Sean Meyn and Timothy Middelkoop, "Demand Side Frequency Regulation from Commercial Building HVAC Systems: An Experimental Study", *American Control Conference*, July 2015, pp. 3019 - 3024.
54. Prabir Barooah, Ana Bušić, and Sean Meyn, "Spectral decomposition of demand side flexibility for reliable ancillary service in a smart grid", *48th Hawaii International Conference on Systems Science*, January 2015 (invited paper, peer reviewed), Hawaii, USA, pp 2700-2709.
53. Jonathan Brooks†, Siddharth Goyal†, Rahul Subramany†, Yashen Lin†, Timothy Middelkoop, Laura Arpan, Luca Carloni and Prabir Barooah, "An experimental investigation of occupancy-based energy-efficient control of commercial building indoor climate", in *Proceedings of the IEEE Conference on Decision and Control*, Dec. 2014, Los Angeles.
52. L. Arpan, Prabir Barooah and R. Subramany†, "Predicting employee responses to an energy-saving intervention and descriptive versus moral norms framing of educational messages", presented at the *Association for Education in Journalism and Mass Communication annual conference, Communicating Science, Health, Environment, and Risk division*, August 2014, Montreal, Canada.
51. Jonathan Brooks†and Prabir Barooah, "Energy-Efficient Control of Under-Actuated HVAC Zones in Buildings", *Proceedings of the American Control Conference*, July 2014.
50. Siddharth Goyal†and Prabir Barooah, "Energy-efficient control of an air handling unit for a single-zone VAV system", *IEEE Conf. on Decision and Control*, Dec. 2013, Florence, Italy.
49. Sean Meyn, Prabir Barooah, Ana Bušić and Jordan Ehren, "Ancillary service to the grid from deferrable loads: the case for intelligent pool pumps in Florida", *IEEE Conf. on Decision and Control*, Dec. 2013, Florence, Italy.
48. Yashen Lin†, Sean Meyn and Prabir Barooah, "Low-Frequency Power-Grid Ancillary Services From Commercial Building HVAC Systems", Proceedings of the IEEE SmartGridComm Conference, October 2013, Vancouver, Canada

47. He Hao†, Anupama Kowli, Yashen Lin†, Prabir Barooah and Sean Meyn, "Ancillary Service for the Grid Via Control of Commercial Building HVAC Systems", *American Control Conference*, June 2013, pp. 467-472
46. Chenda Liao†and Prabir Barooah, "Di-Sync: High-accuracy Distributed Clock Synchronization in Mobile Ad-hoc Networks from Noisy Relative Measurements", *Proceedings of the American Control Conference*, June 2013, pp. 3338-3343.
45. Joseph Knuth†and Prabir Barooah, "Maximum-likelihood localization of a camera network from heterogeneous relative measurements", *Proceedings of the American Control Conference*, June 2013, pp. 2380-2385.
44. Joseph Knuth†and Prabir Barooah, "Collaborative localization with heterogeneous inter-robot measurements by Riemannian optimization", *IEEE Conf. on Rob. and Auto. (ICRA)*, 2013
43. Siddharth Goyal†and Herbert Ingley and Prabir Barooah, "Effect of various uncertainties on the performance of occupancy-based optimal control of HVAC zones", *IEEE Conference on Decision and Control*, December 2012, pp. 7565 - 7570.
42. Yashen Lin†and Timothy Middelkoop and Prabir Barooah, "Issues in identification of control-oriented thermal models of zones in multi-zone buildings", *IEEE Conference on Decision and Control*, December 2012, pp. 6932 - 6937.
41. S. S. Mehta‡, E. L. Pasiliao, J. W. Curtis, Prabir Barooah and W. E. Dixon, "PEGUS: An Image-Based Robust Pose Estimation Method", *9th Conference on Computer and Robot Vision*, Toronto,Canada, 2012.
40. Kun Deng, Prabir Barooah, and Prashant Mehta, "Mean-Field Control for Energy Efficient Buildings", Accepted for publication, in proceedings of the *American Control Conference*, June 2012.
39. Siddharth Goyal†, Herbert Ingley and Prabir Barooah, "Zone-Level Control Algorithms Based on Occupancy Information for Energy Efficient Buildings", *American Control Conference*, June 2012.
38. He Hao†and Prabir Barooah, "Improving convergence rate of distributed consensus through asymmetric weights", *American Control Conference*, June 2012.
37. Joseph Knuth†and Prabir Barooah, "Collaborative localization of multiple robots in 3-D from relative pose measurements ", *International conference on Robotics and Automation (ICRA)*, May 14-18, 2012.
36. Siddharth Goyal†, Chenda Liao†, and Prabir Barooah, "Identification of multi-zone building thermal interaction model from data ", *In proceedings of the 50th IEEE Conference on Decision and Control*, pp. 181-186, Dec. 2011.
35. Siddharth Goyal†and Prabir Barooah, "A Method for Model-Reduction of Nonlinear Building Thermal Dynamics", *In Proceedings of the 2011 American Control Conference*, June 29- July 1, 2011, San Francisco.
34. Chenda Liao†and Prabir Barooah, "A Novel Stochastic Agent-based Model of Building Occupancy ", *In Proceedings of the 2011 American Control Conference*, June 29- July 1, 2011, San Francisco.
33. Chenda Liao†and Prabir Barooah, "Time synchronization in mobile sensor networks from difference measurements", *In proceedings of the 49th IEEE Conference on Decision and Control*, Atlanta, GA, 2010, pp. 2118 - 2123.
32. He Hao†, Prabir Barooah, and J. J. P. Veerman, "Effect of Network Structure on the Stability Margin of Vehicle Formation with Distributed Control", *In proceedings of the 49th IEEE Conference on Decision and Control*, Atlanta, GA, 2010, pp. 4783 - 4788.

31. He Hao† and Prabir Barooah, "Control of large 1D networks of double integrator agents: Role of heterogeneity and asymmetry on stability margin ", *In proceedings of the 49th IEEE Conference on Decision and Control*, Atlanta, GA, 2010, pp. 7395 - 7400.
30. Chenda Liao† and Prabir Barooah, "An Integrated Approach to Occupancy Modeling and Estimation in Commercial Buildings", In Proceedings of the 2010 American Control Conference, Baltimore, MD, June 30-July 2, 2010.
29. Kun Deng, Prabir Barooah, Prashant G. Mehta, and Sean Meyn, "Building Thermal Model Reduction via Aggregation of States", In proceedings of the 2010 American Control Conference, Baltimore, MD, June 30 - July 2, 2010.
28. Gaemus Collins, Prabir Barooah, João P. Hespanha, "GeoTrack: An Autonomous Closed-loop Target Tracking System for Small UAV Networks", UAV'10, June 21-23, 2010, Dubai, UAE.
27. Vivek Nagabhushan, Prabir Barooah and Norman Fitz-Coy, "On-Orbit Determination of CMG Initial Gimbal Bias Using Sensor Measurements", AIAA/AAS Astrodynamics Specialist Conference, August 2-5, 2010. Toronto, Canada.
26. Prabir Barooah, Wm. Joshua Russell, João P. Hespanha, "Approximate distributed Kalman filtering for cooperative multi-agent localization", Intl. conference in Distributed Computing in Sensor Systems (DCOSS'10), June 21-23, 2010, Santa Barbara, CA (accepted).
25. Chenda Liao† and Prabir Barooah, "An Integrated Approach to Occupancy Modeling and Estimation in Commercial Buildings", American Control Conference, June 29-July 2, 2010, Baltimore, MD (accepted).
24. K. Deng, Prabir Barooah, P. G. Mehta, S. Meyn, "Building Thermal Model Reduction Via Aggregation of States", accepted, American Control Conference, June 2010.
23. Prabir Barooah and Prashant G. Mehta, "Optimal mistuning for improved stability of vehicular platoons", 48th IEEE Conference on Decision and Control, December 16-18, 2009.
22. Siddharth S. Mehta‡, Prabir Barooah, Sara Susca, and Warren Dixon, "A novel algorithm for refinement of vision-based two-view pose estimates", 48th IEEE Conference on Decision and Control (regular paper), December 16-18, 2009.
21. He Hao†, Prabir Barooah, and Prashant G. Mehta, "Distributed control of two dimensional vehicular formations: stability margin improvement by mistuning", ASME Dynamic Systems and Control Conference (DSCC), October 12-14, 2009, Hollywood, CA.
20. Joseph Knuth† and Prabir Barooah, "Distributed collaborative localization of multiple vehicles from relative pose measurements", 47th Annual Allerton Conference on Communication, Control and Computing, September 30- October 2, 2009, Urbana-Champaign, IL.
19. Nick R. Gans, J. W. Curtis, Prabir Barooah, J. M. Shea, and Warren Dixon, "Balancing mission requirement for networked autonomous rotor-crafts performing video Reconnaissance", AIAA Conference on Guidance, Navigation, and Control, August 2009.
18. Prabir Barooah, Gaemus Collins, João P. Hespanha, "GeoTrack: Bio-inspired global video tracking by networks of unmanned aircraft systems", In Proceedings of the Bio-Inspired/Biomimetic Sensor Technologies and Applications (DS113) conference, part of the 2009 SPIE Defense & Security Symposium (DSS), May 2009, Orlando, FL.

17. Prabir Barooah, "Distributed cut detection in sensor networks", in proceedings of the *47th IEEE Conference on Decision and Control*, Dec., 2008.
16. Prabir Barooah and Ananthram Swami, "Recursive Time-Synchronization in Sensor Networks", IEEE Milcom, Nov 17-19, 2008.
15. N. R. Gans, J. M. Shea, P. Barooah, W. E. Dixon, "Ensuring Network Connectivity of UAVs Performing Video Reconnaissance", IEEE Milcom, Nov 17-19, 2008.
14. H. Chenji, P. Barooah, R. Stoleru, T. Kalmar-Nagy, "Distributed Cut Detection in Wireless Sensor Networks", ACM Conference on Embedded Networked Sensor Systems (SenSys), November, 2008.
13. E. Jonckheere, M. Lou, João P.Hespanha, Prabir Barooah, "Effective resistance of Gromov-hyperbolic graphs: Applications to asymptotic sensor network problems", 46th IEEE Conference on Decision and Control, December 2007.
12. Prabir Barooah, João P. Hespanha, and Ananthram Swami, "On the effect of asymmetric communication on distributed time-synchronization", in proceedings of the *46th IEEE Conference on Decision and Control*, December 2007, New Orleans.
11. Prabir Barooah, Prashant G. Mehta and João P. Hespanha, "Control of Large Vehicular Platoons: Improving Closed Loop Stability by Mistuning", in proceedings of the *American Control Conference*, 2006.
10. Prabir Barooah and João P. Hespanha, "Graph Effective Resistance and Distributed Control: Spectral Properties and Applications", In proceedings of the *45th IEEE Conference on Decision and Control*, December 13-15, 2006, San Diego, pp. 3479-3485.
9. Prabir Barooah and João P. Hespanha, "Motion coordination with noisy measurement in natural and artificial swarms", *25th Army Science Conference*, Nov. 27-30, 2006, Orlando, FL.
8. Prabir Barooah, Neimar M. Da Silva and João P. Hespanha, "Distributed Optimal Estimation From Relative Measurements for Localization and Time Synchronization", presented at the *Int. Conf. on Distributed Computing in Sensor Systems (DCOSS): Algorithms track*, San Francisco, June 18-20, 2006.
7. Prabir Barooah and João P. Hespanha, "Distributed Estimation From Relative Measurements in Sensor Networks", in proceedings of the *3rd Int. Conf. on Intelligent Sensing and Information Processing*, Dec. 14-17, 2005, Bangalore, India, pp. 226-231.
6. Prabir Barooah and João P. Hespanha, "Error Amplification and Disturbance Propagation in Vehicle Strings with Decentralized Linear Control", in proceedings of the *44th IEEE Conference on Decision and Control*, Dec. 12-15, 2005, pp. 4964-4969.
5. Prabir Barooah and João P. Hespanha, "Estimation From Relative Measurements : Error Bounds from Electrical Analogy", in proceedings of the *2nd Int. Conf. on Intelligent Sensing and Information Processing*, Jan. 4-7, 2005 (**Best Paper Award**).
4. Prabir Barooah, T. J. Anderson and J. M. Cohen, "Active Combustion Instability Control with Spinning Valve Actuator", presented at the *ASME Turbo Expo*, June 3-6, 2002, Amsterdam, the Netherlands.
3. Prabir Barooah and Nancy Rey, "Closed Loop control of a Shape Memory Alloy Actuation System for Variable Area Fan Nozzle", *Proceedings of the SPIE*, vol. 4693, Smart Structures and Materials 2002: Modeling, Signal Processing, and Control, Vittal S. Rao, Editor, July 2002, pp. 384-395.

2. Satish Narayanan, Prabir Barooah and J. M. Cohen, "Experimental Study of the Coherent Structure Dynamics and Control of an Isolated Jet in Cross Flow", AIAA paper no. 2002-0272, presented at the *40th AIAA Aerospace Sciences Meeting and Exhibit*, Jan. 14-17, 2002, Reno, Nevada.
1. Prabir Barooah and J. Q. Sun, "Flow Control in Resin Transfer Molding with Switching and Feedback Strategies", in proceedings of the *2000 American Control Conference*, June 28-30, 2000, Chicago.

Invited Conference Publications

1. He Hao†, Timothy Middelkoop, Prabir Barooah and Sean Meyn, "How demand response from commercial buildings will provide the regulation needs of the grid", 50th Annual Allerton Conference on Communication, Control and Computing, October 2012

- **Popular Media**
  1. P. Barooah, "With rooftop solar, it's not just about the carbon reduction", *The Hill*, Oct 8, 2021, `https://tinyurl.com/4c4pd5za`.
  2. P. Barooah, "Low hanging fruit vs. high-minded farce", *The Assam Tribune*, January 1, 2022, `www.assamtribue.com`.

PATENTS/PATENT APPLICATIONS/INVENT. DISCLOSURES.

- **Applied**
  2. Prov. U.S. patent Appl. No. 63/029,806, "Smart energy management systems and methods for power system resiliency", Inventor: Prabir Barooah, filed May 26, 2020. Assignee: University of Florida Research Foundation, Inc.
  1. U.S. Patent Application Publication No. US 2021/0018206 A1, Inventor: Prabir Barooah, "Model Predictive Control-Based Building Climate Controller Incorporating Humidity". Assignee: University of Florida Research Foundation, Inc.
- **Issued**
  5. U. S. Patent US10230240 B2, Prabir Barooah and Sean P. Meyn, "Low frequency ancillary power grid services", issued March 12, 2019. Assignee: University of Florida Research Foundation, Inc.
  4. U. S. Patent no. 10,169,833 B2, Prabir Barooah and Sean P. Meyn, "Using customer premises to provide ancillary services for a power grid", issued Jan 1, 2019. Assignee: University of Florida Research Foundation, Inc.
  3. U. S. Patent no. 10,047,968 Prabir Barooah, Rahul Subramany and Siddharth Goyal, "Comfortable energy-efficient control of an air handling unit for a variable-air-volume system", Issued August 14, 2018. Assignee: University of Florida Research Foundation, Inc.
  2. U.S. Patent no. 9,213,938 B2, "Systems and methods for estimating pose", Siddhartha S. Mehta, Warren E. Dixon, Prabir Barooah, Issued Dec 15, 2015. Assignee: University of Florida Research Foundation, Inc.
  1. U.S. patent no. 6,543,224 B1, "System and method for controlling shape memory alloy actuators", issued April 8, 2003. Assignee: United Technologies, Inc.

SERVICE AT UNIVERSITY OF FLORIDA

- **Departmental service** Group lead of the Dynamics, Systems and Controls group in MAE (Mechanical and aerospace Engineering) at UF (University of Florida) since Dec. 2020. Served in faculty search committees in the MAE and ECE Dept. at the University of Florida in multiple search cycles, in MAE seminar and awards committees for several years, and on MS admissions committee.

- **M**ember, University of Florida Graduate Council (2020-).
- **M**ember, UF Climate Action Plan Working Group on the built environment (2020 -).

NEWS ITEMS

- **UF News** "Energy is supposed to make our lives better", as part of the series "Creating the world to come", Dec. 14, 2018, Available `http://news.ufl.edu/articles/2018/12/creating-the-world-to-come.php`
- **Explore** (UF Research news magazine), "Peak Comfort: The Internet of Things could make the office sweater obsolete" by Cindy Spence, 2018,`http://explore.research.ufl.edu/peak-comfort.html`
- **UF HWCOE news:** "From the Sunshine State to the Solar State; Gator Engineers have a plan", University of Florida, College of Engineering news, 22 April 2014, available `http://www.eng.ufl.edu/news/from-the-sunshine-state-to-the-solar-state-gator-e`
- **Alligator article** "Pugh Hall's UF-designed air control system cuts emissions", *The Alligator*, 7 April 2014, Available `http://www.alligator.org/news/campus/article_0da093ac-be14-11e3-8956-001a4bcf887a.html?mode=story`,