Aqib Hasnain
United States Citizen

PERSONAL DETAILS

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Github	https://github.com/AqibHasnain
Publications	Google scholar profile

EDUCATION

PhD. Mechanical Engineering 2017-
University of California, Santa Barbara
    Advisor: Enoch Yeung.
    Specialization: Computational Science, Bioengineering, Dynamics and Control

BSc. Mechanical Engineering 2013-2017
University of Houston
    Adviser: Kamran Alba.
    GPA: 3.84

PUBLICATIONS

10. Aqib Hasnain, S. Balakrishnan, D. Joshy, S.B. Haase, E. Yeung. *Learning transcriptome dynamics for discovery of optimal genetic reporters of novel compounds. in revision, Nature Communications.*

9. S. Balakrishnan, **Aqib Hasnain**, R. Egbert, E. Yeung. *The Effect of Sensor Fusion on Data-Driven Learning of Koopman Operators. submitted to Automatica.*

8. S. Balakrishnan, **Aqib Hasnain**, N. Boddupalli, D. Joshy, E. Yeung. *Prediction of Fitness in Bacteria with Causal Jump Dynamic Mode Decomposition.* 2020 IEEE American Control Conference (ACC).

7. Aqib Hasnain, N. Boddupalli, S. Balakrishnan, E. Yeung. *Steady state programming of controlled nonlinear systems via deep dynamic mode decomposition.* 2020 IEEE American Control Conference (ACC).

6. Aqib Hasnain, S. Sinha, Y. Dorfan, A. Borujeni, Y. Park, P. Maschoff, U. Saxena, J. Urrutia, N. Gaffney, D. Becker, A. Siba, N. Maheshri, B. Gordon, C. Voigt, E. Yeung. *A data-driven method for quantifying the impact of a genetic circuit on its host.* 2019 IEEE Biomedical Circuits and Systems Conference (BioCAS).

5. N. Boddupalli **Aqib Hasnain**, S. Nandanoori, E. Yeung. *Koopman Operators for Generalized Persistence of Excitation Conditions for Nonlinear Systems.* 2019 IEEE Conference on Decision and Control (CDC).

4. Aqib Hasnain, N. Boddupalli, E. Yeung. *Optimal reporter placement in sparsely measured genetic networks using the Koopman operator.* 2019 IEEE Conference on Decision

and Control (CDC).

3. O. Oladasu, **Aqib Hasnain**, P. Brown, I. Frigaard, K. Alba. *Density-stable displacement flow of immiscible fluids in inclined pipes.* Physical Review Fluids (2019).

2. Aqib Hasnain, E. Segura, K. Alba. *Buoyant displacement flow of immiscible fluids in inclined pipes.* Journal of Fluid Mechanics (2017).

1. Aqib Hasnain and K. Alba. *Buoyant displacement flow of immiscible fluids in inclined ducts: A theoretical approach.* Physics of Fluids (2017).

CONFERENCE PRESENTATIONS

8. Aqib Hasnain, S. Balakrishnan, D. Joshy, J. Smith, S. B. Haase, E. Yeung. *Data-driven modal analysis of transcriptome dynamics for discovery of genetic reporters.* Southern California Systems Biology Conference, UCLA (2022)

7. Aqib Hasnain, N. Boddupalli, S. Balakrishnan, D. Joshy, E. Yeung. *A generalizable, data-driven design approach for extracting "sensor" promoters in novel organisms.* Darpa Synergistic Discovery and Design, Virtual Meeting (2020)

7. Aqib Hasnain and E. Yeung invited to give talk on: *A data-driven, operator-theoretic approach for understanding genetic circuit burden.* 2020 American Mathematical Society Spring Western Sectional Meeting, California State University (**Canceled due to Covid-19.**)

6. Aqib Hasnain, S. Balakrishnan, D. Joshy, E. Yeung. *Towards engineering a microbiome malathion sensor using a data-driven approach.* 2nd International Conference on Microbiome Engineering (ICME 2019), Boston, Massachusetts

5. Aqib Hasnain, S. Sinha, Y. Dorfan, A. Borujeni, Y. Park, P. Maschoff, U. Saxena, J. Urrutia, N. Gaffney, D. Becker, N. Maheshri, B. Gordon, C. Voigt, E. Yeung. *Structured dynamic mode decomposition to quantify the impact of a genetic circuit on its host.* IEEE Biomedical Circuits and Systems Conference (BioCAS 2019), Nara, Japan

4. Aqib Hasnain, S. Sinha, Y. Dorfan, A. Borujeni, Y. Park, P. Maschoff, U. Saxena, J. Urrutia, N. Gaffney, D. Becker, N. Maheshri, B. Gordon, C. Voigt, E. Yeung. *Structured dynamic mode decomposition to quantify the impact of a genetic circuit on its host.* Darpa Synergistic Discovery and Design (2019), Washington D.C.

3. Aqib Hasnain, N. Boddupalli, E. Yeung. *Optimal reporter placement in sparsely measured networks: A Koopman operator approach.* Darpa Synergistic Discovery and Design (2019), Berkeley, California.

2. Aqib Hasnain, G. Sivakumar, K. Alba. *Fluid dynamics and scale-up of pharmaceutical molecule.* 4th International Bioprocessing and Bio-therapeutics Conference (2016), Houston, Texas (Poster).

1. Aqib Hasnain, K. Alba. *Buoyant displacement flow of immiscible fluids in inclined ducts.* iMECE Conference (2016), Houston, Texas (Poster).

AWARDS

Acquired funding from Institute of Collaborative Biotechnologies to develop genetic temporal encoders (150k/yr for two years)	2021 - 2023
Recieved UCSB GSA travel grant to present at CDC 2019	2019
Recieved NSF funding to present at ICME 2019	2019
William A. Brookshire Impact Scholarship	2016, 2017

Roy and Lillie Cullen Scholarship	2016, 2017
UH Houston Scholar (nominated by research adviser)	Spring 2016
BP Engineers of the Future Scholarship	2015, 2016
Summer Undergraduate Research Fellowship	2015, 2016
American Bureau of Shipping Scholarship	2015
Provost's Undergraduate Research Scholarship	Fall 2015

RESEARCH/PROFESSIONAL EXPERIENCE

Machine Learning Intern, Perturbation Biology   Summer 2022
Cellarity – A Flagship Pioneering Company

Developed single-cell dynamic mode decomposition (scDMD) to identify properties of cell states that can be mapped to diseased or healthy phenotypes. Trained and tested myriad of models on large single-cell datasets to improve the drug discovery pipeline. Part of a team of data scientists who analyzed large-scale single-cell multi-modal 'omics datasets for the Open Problems in Single-Cell Analysis Kaggle competition.

Graduate Student Researcher   Winter 2018-
University of California, Santa Barbara

Research has two threads: i) develop data-driven tools to understand mechanisms of adaptation in bacteria, and ii) study the computational expressivity of a panel bacterial reporters for analog computing applications.

Teaching Assistant   2017-2019
University of California, Santa Barbara

Biological Control, Thermosciences I, II, III
Gave two lectures on modern data-driven methods for reconstructing and analyzing gene regulatory networks. Gave two lectures on introductory concepts in thermodynamics and heat transfer. Graded exams/hw and held weekly office hours.

Thermal Design Intern   Spring 2016
NASA Johnson Space Center, Houston, Texas

Modeled and simulated novel, passive thermal systems under varying thermal loads to understand suitability on future lunar landers.

Undergraduate Student Researcher   2016-2017
Complex Fluids Lab, University of Houston

Built a flow loop and established an experimental procedure for studying displacement flows using high speed imaging and ultrasonic doppler velocimetry. Involved in numerically studying the same displacement flows.

Engineering Intern   Spring 2015
Lockheed Martin, Webster, Texas

Designed and conducted strength tests for bungees and carabiners to determine suitability of use aboard the ISS. Created 2D/3D CAD models for various inventory items.

Various Jobs Before and During Undergrad   2010-2017
Houston, Texas

Lowe's Home Improvement, Cheesecake Factory, Shell Convenient Store, H-E-B Groceries, Varsity Tutors.

MENTORSHIP AND COMMUNITY WORK

Trained several undergraduates in or in a combination of machine learning, numerical methods, and genetic engineering.
Reviewed papers for IEEE Conference on Decision and Control

Reviewed papers for IEEE American Control Conference
Reviewed papers for Journal of Fluid Mechanics

SKILLS

Software: Proficient in Python, PyTorch, Tensorflow, Matlab, Fortran 95, LaTeX, R, Git, Saturn Cloud

Synthetic Biology and Bioengineering: Synthetic Gene Circuit Design – RNA-sequencing (experimental design and execution, library preparation, modeling) – Cloning – Flow cytometry – Spectrophotometry – Microscopy – Cell-free systems – Proteomics

Modeling, Optimization, and Data Science: Dimensionality Reduction, Representation Learning, Control and Dynamical Systems, Deep Learning, Graph-based approaches for single-cell measurements

Languages: Fluent in English, Hindi, and Urdu. Ability to read Arabic.