Mishal Assif P K | Resume

CSL 164, 1308 W Main St – Urbana, IL 61801
mishalassif.github.io mishal2@illinois.edu Google scholar

EDUCATION

University of Illinois Urbana-Champaign — **Urbana-Champaign, USA**
Ph.D in Electrical Engineering, CPI: 4.00/4.00 — *Present*

Indian Institute of Technology Bombay — **Bombay, India**
B.Tech + M.Tech in Mechanical Engineering, CPI: 8.63/10.00 — *August 2019*

RESEARCH

RESEARCH INTERESTS

I am broadly interested in the theory and applications of control, optimization and learning. I mostly use topological/geometric and stochastic tools in my research, mainly focusing on:

- Topological data analysis; Biparametric persistent homology, Stochastic differential topology.
- Control and Optimization; Geometric nonlinear control, Robust optimization.

PUBLICATIONS

Expectation of biparametric singularities of (n, 2) Gaussian random fields
M. Assif P K *2021*
In preparation.

Biparametric persistence for smooth filtrations
M. Assif P K, *Y. Baryshnikov* *2021*
Submitted to Computational Geometry. [arXiv preprint]

Measure of quality of finite-dimensional linear systems: A frame-theoretic view
M. Assif P K, *M. R. Sheriff, D. Chatterjee* *2021*
Systems and Control Letters, Vol.151, 2021. [doi], [arXiv preprint]

Scenario approach for minmax optimization in the nonconvex setting
M. Assif P K, *D. Chatterjee, R. Banavar* *2020*
SIAM Journal on Optimization, Vol.30(2), 2020. [doi], [arXiv preprint]

A simple proof of the discrete time geometric Pontryagin maximum principle
M. Assif P K, *D. Chatterjee, R. Banavar* *2020*
Automatica, Vol.114, 2020. [doi], [arXiv preprint]

Variational collision avoidance on Riemannian manifolds
M. Assif, *R. Banavar, A. M. Bloch, M. Camarinha, L. Colombo* *2018*
Proceedings of the IEEE Conference on Decision and Control, 2018. [doi], [arXiv preprint]

PRESENTATIONS

Geometric Pontryagin Maximum Principle for discrete time optimal control problems
12th International ICMAT Summer School on Geometry, Mechanics and Control, Spain. *2018*

REVIEW DUTIES

Reviewed articles for Journal of Computational Geometry, IEEE L-CSS, Automatica. *2021*

TECHNICAL EXPERIENCE

INTERNSHIPS

Corteva Agriscience, Insect Resistance Modeling
Summer Intern *Summer 2020*

- Created mathematical models for the onset of insect resistance in a variety of seeds under different chemical scenarios.
- Generated software tools that describe insect resistance predictions and various management practices used to influence resistance behavior.
- Studied the effect of a combination of insect resistance management tactics and their economic and environmental impact.

PROJECTS

AUV-IITB, Autonomous Underwater Vehicle Team
Software developer *2015 - 2016*

- Worked as part of a team in the development of algorithms to enable an AUV to autonomously localize and perform realistic missions based on feedback from visual, inertial and acoustic sensors.
- Secured second place at the International AUVSI Robosub competition 2016.
- Maintained a modular software stack written in C++ and Python, using ROS for integration of various subsystems.
- Implemented a finite state machine for planning the execution flow of the AUV.
- Developed and tuned a PID controller for controlling the 5 degrees of freedom of the AUV.
- Created various ancillary tools such as drivers for sensors, simulators and runtime debug interfaces.

SOFTWARE SKILLS

Programming Languages: C++, Python, Matlab, Basic Shell scripting.

Other tools: LaTeX, ROS, Gazebo, OpenCV, Git.

COURSEWORK

TEACHING ASSISTANTSHIPS

- ECE 486 Control Systems, UIUC. *Fall 2020/Spring 2021*
- ME 311 Microprocessors and Automatic Control Lab, IITB. *Spring 2019*
- ME 310 Microprocessors and Automatic Control, IITB. *Fall 2018*
- SC 624 Differential Geometric Methods in Control, IITB. *Spring 2018*

RELEVANT COURSES

- Probability and Random Processes
- High Dimensional Geometric Data Analysis
- Introduction to Stochastic models (Markov chains)
- Optimization
- Algebraic Topology I, II
- Quantum Information Processing Theory
- Statistical Learning Theory
- Information Theory
- Pattern recognition
- Adaptive and Nonlinear Control
- Differentiable Manifolds I, II

STANDARDIZED TEST SCORES

GRE: Quantitative: 160, Verbal: 152, Writing: 4.5

TOEFL: Reading: 30, Listening: 30, Speaking: 27, Writing: 28, Total: 115

REFERENCES

- Yuliy Baryshnikov (ymb@illinois.edu), Professor, Electrical and Computer Engineering, UIUC.
- Debasish Chatterjee (dchatter@iitb.ac.in) , Professor, Systems and Control Engineering, IIT Bombay.
- Ravi Banavar (banavar@iitb.ac.in) , Professor, Systems and Control Engineering, IIT Bombay.