

# Mishal Assif P K | Resume

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 Scholar

 LinkedIn

## EDUCATION

**University of Illinois Urbana-Champaign**

*Ph.D in Electrical Engineering, CPI: 4.00/4.00*

**Urbana-Champaign, USA**

*Present*

**Indian Institute of Technology Bombay**

*B.Tech + M.Tech in Mechanical Engineering, CPI: 8.63/10.00*

**Bombay, India**

*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:** L<sup>A</sup>T<sub>E</sub>X, 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.