

# CHAYAN BHAWAL

## PERSONAL DATA

---

PLACE AND DATE OF BIRTH: Palasbari, Assam — 11th March 1986.  
ADDRESS: Max Planck Institute for Dynamics of Complex Technical Systems.  
Room - S1.08, Sandtorstrasse-1, 39106, Magdeburg, Germany.  
PHONE: +49 176 747 79245  
EMAIL: [bhawal@mpi-magdeburg.mpg.de](mailto:bhawal@mpi-magdeburg.mpg.de), [chayanbhawal.phd@gmail.com](mailto:chayanbhawal.phd@gmail.com)  
WEBPAGE: [chayanbhawal.github.io](http://chayanbhawal.github.io)

## EDUCATION

---

2013 – 2019 Ph.D. in ELECTRICAL ENGINEERING.  
Indian Institute of Technology Bombay, Mumbai.  
Specialization – Control and Computing (CGPA – 9.25 out of 10).  
Thesis title – Generalized Riccati theory: A Hamiltonian system approach.

2004 – 2008 BACHELOR OF ENGINEERING.  
Specialization – Electronics and Telecommunication.  
Assam Engineering College, Jalukbari.  
Grade – First class 2nd position with Honours (Percentage – 78.56%).

2002 – 2004 HIGHER SECONDARY EXAMINATION (10+2).  
Cotton College, Guwahati, AHSEC (Percentage – 84.20%).

1990 – 2002 HIGH SCHOOL LEAVING CERTIFICATE.  
Arunodaya English Medium High School, Mirza, SEBA (Percentage – 83.17%).

## WORK EXPERIENCE

---

JUNE 2019 - ONGOING Post-doctoral Research Fellow  
Max Planck Institute for Dynamics of Complex Technical Systems,  
Computational Methods in Systems and Control theory, Magdeburg.

OCT 2010 - JUNE 2013 Assistant Professor, Electronics and Communication Engineering,  
NETES Institute of Technology & Science Mirza (NITSM), Assam.

JULY 2008 - SEPTEMBER 2010 Executive in Network Operations Department,  
Vodafone Spacetel Limited, Assam & NE circle.

## PUBLICATIONS

---

### Journal papers: published

- J1. Chayan Bhawal and Debasattam Pal, “Almost every single-input LQR optimal control problem admits a PD feedback solution”, *IEEE Control Systems Letters*, vol. 3, no. 2, pages 452 - 457, 2019.
- J2. Chayan Bhawal, Imrul Qais, and Debasattam Pal, “Constrained generalized continuous algebraic Riccati equations (CGCAREs) are generically unsolvable”, *IEEE Control Systems Letters*, vol. 3, no. 1, pages 192–197, 2019.
- J3. Chayan Bhawal, Debasattam Pal, and Madhu N Belur, “Closed form solutions of a singular case of KYP lemma: strongly passive systems, and fast lossless trajectories”, Early access, Digital Object Identifier: 10.1080/00207179.2018.1500039, *International Journal of Control*, 2018.
- J4. Chayan Bhawal, Debasattam Pal, Sandeep Kumar, and Madhu N Belur, “New results and techniques for computation of stored energy in lossless/all-pass systems”, *IEEE Transactions on Circuits and Systems I: Regular Papers*, vol. 64, no. 1, pages 72–85, 2017.

### Contributed book chapter

- B1. Chayan Bhawal, Sandeep Kumar, Debasattam Pal, and Madhu N Belur, “New properties of ARE solutions for strictly dissipative and lossless systems”, *Mathematical Control Theory II: Behavioral Systems and Robust Control*, pages 81-99, Springer International Publishing, Cham, 2015.

### Conference papers: peer-reviewed

- C1. Chayan Bhawal, Debasattam Pal, and Madhu N. Belur, “On circulant Lyapunov operators, two-variable polynomials, and DFT”, To be presented in *Proceedings of Indian Control Conference (ICC)*, December 18 - December 20, 2019.

- C2. Chayan Bhawal and Debasattam Pal, “On solvability of CGCARE for LQR problems with zero input-cost”, To be presented in *Proceedings of 58<sup>th</sup> IEEE Conference on Decision and Control (CDC)*, Nice, France, December 11 - December 13, 2019.
- C3. Ashish Kothiyari, Chayan Bhawal, Madhu N Belur, and Debasattam Pal, “Defective Hamiltonian matrix imaginary eigenvalues and losslessness”, In *Proceedings of Indian Control Conference (ICC)*, Delhi, India, January 9 - January 11, 2019.
- C4. Chayan Bhawal, Debasattam Pal, and Madhu N Belur, “On solutions of bounded-real LMI for singularly bounded-real systems”, In *Proceedings of European Control Conference (ECC)*, Limassol, Cyprus, June 12 - June 15, 2018.
- C5. Chayan Bhawal, Debasattam Pal, and Madhu N Belur, “On the link between storage functions of allpass systems and Gramians”, In *Proceedings of 56<sup>th</sup> IEEE Conference on Decision and Control (CDC)*, Melbourne, Australia, December 12 - December 15, 2017.
- C6. Chayan Bhawal, Debasattam Pal, and Madhu N Belur, “A 2D-DFT based method to compute the Bezoutian and a link to Lyapunov equations”, In *Proceedings of Indian Control Conference (ICC)*, Guwahati, India, January 4 - January 6, 2017.
- C7. Sandeep Kumar, Chayan Bhawal, Debasattam Pal, and Madhu N Belur, “New results and algorithms for computing storage functions: The lossless/allpass cases”, In *Proceedings of European Control Conference (ECC)*, Aalborg, Denmark, June 29 - July 1, 2016.

### Preprint: under-review/to be submitted

- P1. Chayan Bhawal, Jan Heiland, and Peter Benner, PD controllers to solve single-input, index-1 DAE based LQR problems.
- P2. Chayan Bhawal, Imrul Qais, Debasattam Pal, and Jan Heiland, The optimal cost of the singular LQR problem, and fast/slow subspaces of the Hamiltonian system.
- P3. Chayan Bhawal and Debasattam Pal, On the computation of rank-minimizing and extremal solutions of KYP LMI.
- P4. Imrul Qais, Chayan Bhawal, and Debasattam Pal, Optimal trajectories of singular LQR problems and their relation with solutions of the LQR LMI.
- P5. Chayan Bhawal and Debasattam Pal, Controllers for optimal charging and discharging of passive systems.
- P6. Ashish Kothiyari, Chayan Bhawal, Madhu N Belur, and Debasattam Pal, Imaginary eigenvalues of Hamiltonian matrix: controllability, defectiveness and the  $\epsilon$ -characteristic.

### WORKSHOPS/SESSIONS CONDUCTED

- Basics of Scilab, Dr. Ambedkar Institute of Technology, Bangalore under TEQIP, 2018.
- Robotics using AVR and PIC Microcontrollers, NITSM Labs, Guwahati and Bangalore, 2011.

### OTHER ACTIVITIES

- Reviewer for IEEE Transactions on Circuits and Systems-I: Regular Papers and Indian Control Conference.
- Student co-ordinator of Electrical Engineering Students’ Reading Group (SRG), IIT Bombay, 2015-2016.
- Co-ordinator for conducting examination of 4 year BE course of Gauhati University at NITSM, 2011-2013.
- Faculty co-ordinator of Sastricas’11, the first annual technical festival of NITSM, 2011.

### REFEREES

Referee	Email-ID	Association	Affiliation
Prof. Debasattam Pal	<a href="mailto:debasattam@ee.iitb.ac.in">debasattam@ee.iitb.ac.in</a>	Supervisor	Department of Electrical Engineering, IIT Bombay
Prof. Madhu N. Belur	<a href="mailto:belur@ee.iitb.ac.in">belur@ee.iitb.ac.in</a>	Co-supervisor	
Prof. Debraj Chakraborty	<a href="mailto:dc@ee.iitb.ac.in">dc@ee.iitb.ac.in</a>	Research progress committee member	
Prof. Harish K. Pillai	<a href="mailto:hp@ee.iitb.ac.in">hp@ee.iitb.ac.in</a>		
Dr. Jan Heiland	<a href="mailto:heiland@mpi-magdeburg.mpg.de">heiland@mpi-magdeburg.mpg.de</a>	Post-doc Supervisor	MPI Magdeburg