

RESUME

Dr. Gangireddy Sushnigdha

Assistant Professor

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Areas of interest

Control systems, Optimal control theory, Meta-heuristic algorithms, State estimation

Educational qualifications

Qualification	Discipline/Area	Year	Board/Institution
Ph.D.	Pigeon Inspired Optimization based Trajectory Design Strategies for Re-entry Vehicles	2018	Indian Institute of Technology Bombay, Mumbai, India
M.E.	Electrical Engineering (Control Systems)	2012	National Institute of Technology Kurukshetra, Kurukshetra, India
B. Tech.	Electrical and Electronics Engineering	2010	JNT University, Kakinada
Intermediate	Maths, Physics & Chemistry	2006	Board of Intermediate Education, A.P
SSC	Not Applicable	2004	Board of Secondary Education, A.P

Professional Details

Sl. No	Institute/Industry	Position	Duration	
			From	To
1.	NIT Kurukshetra, Kurukshetra	Assistant Professor on contract	November 2012	June 2013
2.	REVA Institute of Technology and Management, Bangalore	Assistant Professor	August 2013	July 2014
3.	SVNIT Surat	Assistant Professor	5 th November 2019	Till date

Skills

Simulation platforms: MATLAB/Simulink®, LabView

Computer languages: C

Doctoral Research

Title: Pigeon Inspired Optimization based Trajectory Design Strategies for Re-entry Vehicles

Supervisor – Prof. Ashok Joshi, IIT Bombay

Basic convergence of Pigeon Inspired Optimization

- The convergence of meta-heuristic pigeon inspired optimization (PIO) algorithm has been established analytically under certain assumptions
- PIO algorithm has exponential convergence to the optimal solution.

Integrated trajectory optimization strategy for re-entry Vehicles

- The PIO algorithm has been employed to generate a good initial guess for the Gauss-Newton algorithm
- This approach has enhanced the performance of GN algorithm by overcoming the issue of non-convergence.

Implementing path constraints into PIO algorithm

- New approaches to satisfy equilibrium glide and load factor constraints using the slopes of constraint limits in altitude-velocity space have been formulated in this thesis.
- For the first time, the proposed approaches have been incorporated in the solution process of PIO algorithm for solving the constrained entry trajectory optimization problem.

Converting path constraints into bounds on angle of attack

- The path constraints have been converted to bounds on angle of attack in this work.
- For the first time, the angle of attack has been modulated according to the obtained bounds.
- This approach has reduced the dimension of entry trajectory design problem as PIO algorithm has been employed to find only bank angle.

Trajectory design using combined Pigeon Inspired Optimization and Orthogonal collocation method

- A smooth bank angle profile has been obtained using the concepts of collocation method by discretizing time at Chebyshev-Lobatto points and the bank angle values at these points have been obtained using PIO algorithm.

Research publications

International Journals:

1. **Gangireddy Sushnigdha** and Ashok Joshi, Evolutionary method based integrated guidance strategy for reentry vehicles, *Engineering Applications of Artificial Intelligence* (Elsevier), vol. 69, pp. 168 - 177, 2018.
2. **Gangireddy Sushnigdha** and Ashok Joshi, Re-entry Trajectory Design with Pigeon Inspired Optimization using derived Angle of Attack profile, *Journal of Aerospace Engineering*, vol. 31, no. 6, pp. 04018104, 2018.
3. **Gangireddy Sushnigdha** and Ashok Joshi, Re-entry Trajectory Optimization using Pigeon Inspired Optimization Based Control Profiles, *Advances in Space Research*, vol. 62, no. 11, pp. 3170-3186, 2018.

International Conferences:

1. **Gangireddy Sushnigdha** and Ashok Joshi, "Evolutionary Method Based Hybrid Entry Guidance Strategy for Reentry Vehicles", IFAC-PapersOnLine, vol. 49, Iss. 5, pp. 339-344, ICONS 2016, Reims, France, 2016.
2. **Gangireddy Sushnigdha** and Ashok Joshi, "Re-entry Trajectory Design using Pigeon Inspired Optimization", Paper No. 2017-4209, AIAA Atmospheric Flight Mechanics Conference, Denver, Colorado, AIAA AVIATION Forum, 2017.

3. **Gangireddy Sushnigdha** and Ashok Joshi. "Trajectory Design of Re-entry Vehicles using combined Pigeon Inspired Optimization and Orthogonal Collocation method", IFAC-PapersOnLine, vol. 51, Iss. 1, pp. 656-662, ACODS 2018, Hyderabad, India, 2018.
4. **G. Sushnigdha** and A. Mahesh, "On Convergence of Pigeon Inspired Optimization Algorithm," 2019 Sixth Indian Control Conference (ICC), Hyderabad, India, 2019, pp. 152-157, doi: 10.1109/ICC47138.2019.9123217.

Short term course/Conference/workshops attended

1. Attended a tutorial workshop on "Nonlinear, Adaptive, Optimal and Embedded Control", conducted at IISC Bangalore, during 18 – 23 July, 2016.
2. Attended a short term course on "Automatic Control Systems Engineering and Design" organized by Department of Avionics, IIST, Thiruvananthapuram, during 27 – 30 December, 2016.

Achievements and other activities

- Received Gold Medal for being the best graduating student in M. Tech (Control Systems) from NIT Kurukshetra.
- Teaching assistant for various courses in IIT Bombay during the period 2014-2018.

Permanent address

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