

Mayank Shekhar JHA

Associate Professor in Control Engineering

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Short Biography

Dr. Mayank Shekhar Jha received his Ph.D. in Automatic Control and Signal Processing from Ecole Centrale de Lille, France, in 2015. Since 2017, he has been an Associate Professor at Université de Lorraine within the Centre de Recherche en Automatique de Nancy (CRAN). He has previously held post-doctoral research position at the Institut National des Sciences Appliquées de Toulouse (INSA Toulouse) France and Research Associate position at Rolls Royce Technology Centre at University of Sheffield, United Kingdom in 2017. Dr. Jha has authored around 30 publications in prestigious international conferences and journals, leads a Work package (WP) in a project of National Agency for Research (ANR) in France titled “Self-Organizing, Smart and Safe heterogeneous Robots Fleet by collective emergence for a mission (SOS)”, has been **Co-PI** of 3 industrially funded scientific projects with French National Space Agency (CNES) and Dassault Aviation (securing total approx. funding of 350K Euros) in last 5 years. His research interests include reinforcement learning for safe learning of dynamical systems, and deep learning for health monitoring and prognostics of systems.

Research Interests

- Safe Reinforcement Learning
- Deep Learning for Health Monitoring and Prognostics (Model-based and AI techniques)
- Learning enabled systems
- Health aware control, Prognostics oriented Control

Education

- **Ph.D.** in Automatic Control and Signal Processing, Ecole Centrale de Lille, France, 2015
- **Masters** in Automatic Control, École Centrale de Lille, France, 2012
- **Bachelors of Technology** in Mechanical Engineering, National Institute of Technology Jalandhar (NIT J), India.

Academic Positions

- **Associate Professor**, Université de Lorraine, CRAN, France, 2017 – Present
- **Research Associate**, Rolls Royce UTC, University of Sheffield, UK, 2017
- **Researcher and Assistant Professor**, Ecole Centrale de Lille, France, 2016–2017
- **Post-Doctoral Researcher**, INSA Toulouse, France, 2016

Distinctions

Recipient of Individual Premium RIPEC between 2023-2026.

Research Supervision

Ph.D. Supervision (2 Ongoing)

- Satya MARTHI (2024 -): Design of a safe control system through reinforcement learning - Application to autonomous mobile systems. Funding: ANR (French National Project) SOS Project (Self-Organizing, Smart, and Safe Heterogeneous Robots Fleet by Collective Emergence).
- Theo Rutschke (2023-...), Physics-driven identification of nonlinear systems for reinforcement learning. Funding by University of Lorraine and French Govt. Ministry.

Ph.D. Supervision (2 Completed)

- Soha KANSO (Oct 2021- Dec 2024), Safe Reinforcement Learning for dynamical systems under degradation". Funded by CRAN, Université de Lorraine. See associated papers [here](#), [here](#), [here](#), [here](#).
- Martin Herve de Beaulieu (Nov 2020- Dec 2023). Subject: "Identification and prognosis of state of health of non-linear systems through deep learning, Application to predictive maintenance of business aircraft " In collaboration with **Dassault Aviation**. See **PhD Thesis and associated papers**: [here](#), [here](#), [here](#).

Postdoctoral Supervision

- Dr. Julien Thuillier,, "Health-Aware Control Design of Liquid Propulsion Rocket Engines" in collaboration with **CNES** (2021-2023).

University Collaboration

- 2023-2027: Member and a Work-Package Leader of a French ANR Project Self-Organizing, Smart and Safe heterogeneous robots fleet by collective emergence for a mission (SOS) managed by CRISTAL Lab (Lille, France)
- Member of ECOS-Sud Program 2021-2024 in collaboration with Federico Santa María Technical University, [Valparaíso, Chile](#).

Industrial Collaborations

On-going

2023-2025: Co-PI (Co-principle Investigator) Research Collaboration with CNES, "Design of Learning approaches for Health aware control of Reusable liquid rocket engine".

Past

- 2020-2023 Co-PI (Co-principle Investigator) , Research collaboration with **Dassault Aviation**, Subject: "Identification and prognosis of state of health of non-linear systems through deep learning. Application to predictive maintenance of business aircraft"
- **Co-PI** (Co-principle Investigator) Collaboration with The French National Centre for Space Studies (CNES)
 - 2021-2023, Subject: *Health Aware Control Design of Liquid Propulsion Rocket Engine*.
 - *Master's Research Project Supervision*
 - * (2021) *Remaining useful Life Estimation of Liquid Rocket Engine combustion chamber*
 - * (2020) *Improvement of Remaining useful Life Estimation of Liquid Rocket Engine combustion chamber*

Selected Invited Talks

- NASA Ames Research Center, USA (2022, 2023, 2025).
- Fédération Charles Hermite, France (2020)
- International Conference on Electronics, Information, and Communication, South Korea (2021)
- Korea Institute of Science and Technology Europe (2020)

Editorial and Review Activities

- Editorial Board Member, Scientific Reports, Nature.
- Reviewer for various international journals
 - Elsevier:
 - * CEP, RESS, ISA Transactions, EAAI, Neurocomputing, Neural Networks.
 - IEEE Transactions
 - * Automatic control, System, Man, Cybernetics, Robotics.
- Editorial roles in international conferences (MED, SysTol, ACD)
- Invited Ph.D Thesis Reviewer (External):
 - Dr. Laknath Buddhika Semage, Robust and Efficient Reinforcement Learning for Physics Tasks, Deakin University, Australia.
 - Dr. Armaan Garg, Learning Multi-UAV Policies Using Deep Reinforcement Learning for Flood Area Coverage and Object Tracking, Indian Institute of Technology, Ropar, India.
 - Dr. Périclès COCAUL, Determination of autopilot control laws for launchers with model-free methods: from automatic to safe deep reinforcement learning approaches, Université Paris-Saclay, Ariane Group and ONERA Paris. November 2024.

Administrative Responsibilities

- Elected/Named Member of Council of Laboratory CRAN (Conseil de laboratoire) 2023–2027.
- Head (in Department M3 of Polytech Nancy) :
 - Industrial Internships of 4th year of Engineering Cycle,
 - International Mobility of Students.

Organizational Activities

- Organizer of Invited Session titled "Secure and Learning Enabled Systems" in American Control Conference 2025, Denver, USA.
- Co-Organizer of Invited Session titled "Safe and Fault-Resilient Control Learning and Design" at European Control Conference 2025, Thessaloniki, Greece.

- Co-Leader of French National Group "Health Aware Control Design in Dynamic Systems" under GDR MACS Activity (2022-2024). See here :<https://gdr-macs.fr/node/4286>.
- Co-organizer of Invited session titled "Intelligent data-driven fault diagnosis, prognostics and health aware control" at IFAC World Congress 2023, (IFAC WC 2023), Yokohama, Japan.
- Co-Organiser of Health Aware Control Design in Aerospace Domain Seminar, Polytech Nancy with CNES, France, 17th November 2022. (See Flyer here)
- IPC Chair, 16th European Workshop on Advanced Control and Diagnosis (ACD 2022), Nancy, France. See CFP here.
- Associate Editor for 28th Mediterranean Conference on Control and Automation (MED'2020).
- Workshop and Tutorials Chair for 28th Mediterranean Conference on Control and Automation (MED'2020).
- Publicity chair for 5th International Conference on Control and Fault-Tolerant Systems (SySTOL), 2021.
- IPC Chair, 16th European Workshop on Advanced Control and Diagnosis (ACD 2022), Nancy

Publications

Journal Articles

- **2025** M. Hussonnois, T. George Karimpanal, M. S. Jha and S. Rana, "Human-Informed Skill Discovery: Controlled Diversity with Preference in Reinforcement Learning," to appear in *Expert Systems with Applications*, Elsevier.
- **2024** Mayank Shekhar Jha and Bahare Kiumarsi, "Off-policy safe reinforcement learning for non-linear discrete-time systems," *Neurocomputing*, Elsevier, vol. 611, 2025, Art. 128677. DOI: <https://doi.org/10.1016/j.neucom.2024.128677>.
- **2024** Martin Hervé de Beaulieu, Mayank Shekhar Jha, Hugues Garnier and Farid Cerbah, "Remaining Useful Life prediction based on physics-informed data augmentation," *Reliability Engineering & System Safety*, vol. 252, 2024, Art. 110451.
- **2024** Sungho Suh, Dhruv Aditya Mittal, Hymalai Bello, Bo Zhou, Mayank Shekhar Jha and Paul Lukowicz, "Remaining useful life prediction of Lithium-ion batteries using spatio-temporal multi-modal attention networks," *Heliyon*, vol. 10, no. 16, 2024, Art. e36236. DOI: <https://doi.org/10.1016/j.heliyon.2024.e36236>.
- **2024** Julien Thuillier, Mayank Shekhar Jha, Sebastien Le Martelot and Didier Theilliol, "Prognostics Aware Control Design for Extended Remaining Useful Life: Application to Liquid Propellant Reusable Rocket Engine," *International Journal of Prognostics and Health Management*, vol. 15, no. 1, 2024. DOI: <https://doi.org/10.36001/IJPHM.2024.v15i1.3789>.
- **2023** S. Kanso, M. S. Jha and D. Theilliol, "Off-policy model-based end-to-end safe reinforcement learning," *International Journal of Robust and Nonlinear Control*, 2023, pp. 1–26. DOI: <https://doi.org/10.1002/rnc.7109>.
- **2023** M. S. Jha, D. Theilliol and P. Weber, "Model-free optimal tracking over finite horizon using adaptive dynamic programming," *Optimal Control Applications and Methods*, 2023, pp. 1–25. DOI: <https://doi.org/10.1002/oca.3028>.
- **2023** S. Kanso, M. S. Jha and D. Theilliol, "Degradation Tolerant Optimal Control Design for Stochastic Linear Systems," *International Journal of Applied Mathematics and Computer Science*, vol. 34, no. 1, 2024.
- **2023** Sungho Suh, Dhruv Aditya Mittal, Hymalai Bello, Bo Zhou, Mayank Shekhar Jha and Paul Lukowicz, "Remaining Useful Life Prediction of Lithium-ion Batteries using Spatio-temporal Multi-modal Attention Networks," *arXiv preprint arXiv:2310.18924*, 2023.
- **2023** Two-stage Early Prediction Framework of Remaining Useful Life for Lithium-ion Batteries, 2023.
- **2022** Deepak Kumar, Sahil Kalra and Mayank Shekhar Jha, "A concise review on degradation of gun barrels and its health monitoring techniques," *Engineering Failure Analysis*, 2022, Art. 106791.
- **2020** Sungho Suh, Joel Jang, Seungjae Won, Mayank Shekhar Jha and Yong Oh Lee, "Supervised Health Stage Prediction Using Convolutional Neural Networks for Bearing Wear," *Sensors*, vol. 20, no. 20, 2020, p. 5846.
- **2018** Mayank-Shekhar Jha, Genevieve Dauphin-Tanguy and Belkacem Ould-Bouamama, "Robust fault detection with interval valued uncertainties in bond graph framework," *Control Engineering Practice*, vol. 71, 2018, pp. 61–78.
- **2017** Mayank Shekhar Jha, Nizar Chatti and Philippe Declerck, "Robust fault detection in bond graph framework using interval analysis and Fourier-Motzkin elimination technique," *Mechanical Systems and Signal Processing*, vol. 93, 2017, pp. 494–514.
- **2016** Mayank Shekhar Jha, Geneviève Dauphin-Tanguy and B. Ould-Bouamama, "Particle filter

- based hybrid prognostics for health monitoring of uncertain systems in bond graph framework,” *Mechanical Systems and Signal Processing*, vol. 75, 2016, pp. 301–329.
- **2016** Mayank Shekhar Jha *et al.*, “Particle Filter based hybrid prognostics of proton exchange membrane fuel cell in bond graph framework,” *Computers & Chemical Engineering*, vol. 95, 2016, pp. 216–230.
 - **2016** Mayank Shekhar Jha *et al.*, “Particle Filter Based Prognostics of PEM Fuel Cell Under Constant Load,” *International Journal of Renewable Energy Research*, vol. 6, no. 2, 2016, pp. 644–657.
 - **2017** Mayank S. Jha, Geneviève Dauphin-Tanguy and B. Ould-Bouamama, “Particle Filter Based Integrated Health Monitoring in Bond Graph Framework,” in *Bond Graphs for Modelling, Control and Fault Diagnosis of Engineering Systems*, Springer, Cham, 2017, pp. 233–270.

Conference Papers

- **2024** D. Rotondo and M. S. Jha, “A weighted linearization approach to gradient descent optimization,” in *2024 European Control Conference (ECC)*, pp. 3606–3611, IEEE, June 2024.
- **2024** M. S. Jha, B. Kiumarsi and D. Theilliol, “Safe Reinforcement Learning Based on Off-Policy Approach for Nonlinear Discrete-Time Systems,” in *2024 American Control Conference (ACC)*, pp. 1574–1579, IEEE, July 2024.
- **2023** M. S. Jha^{*}, H. Garnier and D. Theilliol, “Redundancy-Aware Physics Informed Neural Networks (R-PINNs) based Learning of Nonlinear Algebraic Systems with Non-Measurable States,” in *62nd IEEE Conference on Decision and Control (CDC)*, Singapore, Dec. 13–15, 2023.
- **2022** G. C. Andrei, M. S. Jha and D. Theilliol, “Complementary Reward Function Based Learning Enhancement for Deep Reinforcement Learning,” in *European Workshop on Advanced Control and Diagnosis*, Cham: Springer Nature, pp. 237–247, Nov. 2022.
- **2022** J. Thuillier, M. S. Jha, M. Galeotta and D. Theilliol, “Control reconfiguration strategies for Remaining Useful Life extension,” in *8th IFAC Symposium on System Structure and Control (SSSC)*, vol. 55, no. 34, pp. 114–119, 2022.
- **2022** J. Thuillier, M. Galeotta, M. S. Jha and D. Theilliol, “Impact of control gain design on Remaining Useful Life for a Liquid Propellant Reusable Engine,” in *9th European Conference for Aeronautics and Space Sciences (EUCASS)*, 2022.
- **2022** M. H. de Beaulieu, M. S. Jha, H. Garnier and F. Cerbah, “Unsupervised Remaining Useful Life Estimation Based on Deep Virtual Health Index Long-range Prediction,” to appear in *8th European Conference of the PHM Society*, Turin, Italy, 2022.
- **2022** M. H. de Beaulieu, M. S. Jha, H. Garnier and F. Cerbah, “Unsupervised Remaining Useful Life Prediction through Long Range Health Index Estimation based on Encoders-Decoders,” in *11th IFAC Symposium on Fault Detection, Supervision and Safety for Technical Processes (SAFEPROCESS)*, Pafos, Cyprus, 2022.
- **2022** S. Kanso, M. S. Jha and D. Theilliol, “Degradation tolerant optimal control design for linear discrete-time systems,” in *DPS 2022*, Poland, 2022.
- **2022** S. Kanso, M. S. Jha, M. Galeotta and D. Theilliol, “Remaining Useful Life Prediction with Uncertainty Quantification of Liquid Propulsion Rocket Engine Combustion Chamber,” in *SAFEPROCESS*, Cyprus, 2022.
- **2021** M. Chelouati, M. S. Jha, M. Galeotta and D. Theilliol, “Remaining Useful Life Prediction for Liquid Propulsion Rocket Engine Combustion Chamber,” in *5th International Conference on Control and Fault-Tolerant Systems (SysTol)*, pp. 225–230, 2021.
- **2019** M. S. Jha, P. Weber, D. Theilliol, J. C. Ponsart and D. Maquin, “A Reinforcement Learning Approach to Health Aware Control Strategy,” in *27th Mediterranean Conference on Control and Automation (MED)*, pp. 171–176, IEEE, July 2019.
- **2019** M. S. Jha, D. Theilliol, G. Biswas and P. Weber, “Approximate Q-learning approach for Health Aware Control Design,” in *4th International Conference on Control and Fault-Tolerant Systems (SysTol)*, Casablanca, Morocco, Sept. 2019.
- **2018** B. Liu, P. Do, B. Iung, M. Xie, F. Peysson and M. Jha, “A study on the use of discrete event data for prognostics and health management: discovery of association rules,” in *PHM Society European Conference*, vol. 4, no. 1, 2018.
- **2018** H. C. Vu, P. D. Van, M. S. Jha, D. Theilliol and F. Peysson, “On the use of particle filters for prognostics in industrial applications,” in *PHM Europe Conference*, 2018.
- **2014** M. S. Jha, G. Dauphin-Tanguy and B. Ould-Bouamama, “Robust FDI based on LFT BG and relative activity at junction,” in *European Control Conference (ECC)*, IEEE, 2014.
- **2013** A. Vaz, M. S. Jha, K. Mahajan and A. Parashar, “Experimental Study of Switching Behaviour in the Transmission of Tension to the Joints of the Finger,” in *ASME 11th Biennial Conference on Engineering Systems Design and Analysis*, pp. 321–327, 2013.

- **2012** A. Vaz, M. S. Jha, R. Seth and A. Saxena, “Design and Development of an Instrument for Measurement of Biting Force in Human Beings,” in *ASME 11th Biennial Conference on Engineering Systems Design and Analysis*, pp. 227–232, 2012.

A detailed list of publications can be seen [here](#): .