Majid Hameed Koul

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Education

- **PhD (Haptics, Multi-body Dynamics)** **2010 – 2015**
  Mechanical Engineering Department, IIT Delhi *New Delhi, India*
  - Thesis: Dynamics of closed-loop multi-body systems and their application to haptic interfaces.
  - CGPA: 9.25 on a scale of 10.
- **B. Tech (Honors)(Mechanical Engineering)** **2002 – 2006**
  Mechanical Engineering Department, National Institute of Technology *Srinagar, J&K, India*
  - 83%
- **12th (Non-Medical with Computer Sciences)** **2002**
  Gyan Bharati School, Saket *New Delhi, India*
  - 79.6%
- **10th - Matriculation** **2000**
  Gyan Bharati School, Saket *New Delhi, India*
  - 81%

Experience

- **Assistant Professor** **December 30, 2020 – Present**
  Department of Mechanical Engineering, Islamic University of Science and Technology *J& K, India*

- **Assistant Professor (*On lien from IUST, Awantipora*)** **November 2018 – December 2020**
  Department of Mechanical Engineering, National Institute of Technology, Srinagar *J& K, India*

  During my tenure, I taught Machine Drawing, CAD and Solid Modelling, Introduction to Mechatronics, and Measurements and Instrumentation at the undergraduate level, and Robotics: Mechanics and Control at the postgraduate level in the Mechanical Engineering Department of NIT Srinagar.
- **Assistant Professor & I/C Head** **June 2016 – October 2018**
  Department of Mechanical Engineering, Islamic University of Science and Technology *J& K, India*

- **Assistant Professor** **August 2007 – May 2016**
  School of Technology, Islamic University of Science and Technology *J& K, India*

  I have taught several courses at the undergraduate levels, including Process Control and Instrumentation, Microcontroller based system design, Engineering Mechanics, Engineering Graphics, and Hydraulics and Hydraulic Machines, with a basic Mechanical Engineering Course at the graduate level. I was intensively involved in curriculum development and setting up Central Workshop and laboratories related to the engineering program. I have served as an in-charge of the College of Engineering from November 2007 till May 2008. My responsibilities as in-charge included planning, infrastructural development, coordination and general administration. I was also the member secretary of all faculty meets at the university level.
- **Research consultant** **2013 – 2015**
  IIT Delhi *Delhi, India*

  During my PhD programme at IIT Delhi, I was working as a consultant for BARC (Baba Atomic Research Centre) sponsored project titled "Adaptive Force Control of an Industrial Robot (KUKA) equipped with

Force/Torque sensor". My responsibilities were into simulation of the Impedance and Admittance based force control algorithms for the KUKA KR-5 Robot using Simulink/SimMechanics and in-house dynamics algorithm (ReDySim).

- **Research student** **September 2010 – August 2012**
  TOUCH lab, IIT Madras *Chennai, Tamil Nadu, India*

  As a part of my PhD work, I was working on a DST (Department of Science and Technology, Government of India) sponsored project titled "Development of a 2-D haptic device for virtual reality based medical simulation with haptics feedback". The project was a joint work between Mechatronics lab at IIT Delhi and Touch lab at IIT Madras. As a part of this project, I spent nearly two years at the Touch lab. I credited a course on haptics and worked on development of haptic controllers using FPGA (Field Programmable Gate Arrays). I also developed an interface protocol for communication of a haptic device with the PC.

- **Lecturer** **March 2007 – July 2007**
  Mechanical Engineering Department, NIT Srinagar. *J& K, India.*

  Prior to my appointment at IUST J&K, I taught Solid Mechanics and Engineering Drawing courses at the undergraduate level of the Mechanical Engineering Department, NIT Sgr.

Publications

Reverse chronological order

- **International Journal**
  1. Majid Koul, M Manivannan, Subir K Saha, "Effect of Dual-rate Sampling on the Stability of a Haptic Interface", Journal of Intelligent and Robotic Systems, Springer, September 2017.
  2. Majid Koul, Suril V Shah, Subir K Saha, M Manivannan, "Reduced-order forward dynamics of multiclosed-loop systems", Multibody System Dynamics, Volume 30, Issue 1, June 2013.
- **International Conferences**
  1. Khosa, S., Koul, M., Ahmed, B., (2019) Stability Analysis of a Dual-rate Haptics Controller using Discrete-time Root-locus Method. In *Proc. of the* 4^{th} *International and* 19^{th} *National Conference on Machines and Mechanisms (iNaCoMM2019), IIT Mandi, India. AMM, IFToMM.*
  2. Khosa, S., Koul, M., Ahmed, B., (2019) Stability Analysis of Dual-rate Haptics Controller using Two Control Architectures. Journal of Physics: Conference Series, NIT Kurukshetra, India.
  3. Showkat, A., Rafiq, D., Majeed, S., Ahmed, V., Koul, M. and Nahvi , S. A. (2018) Disturbance Rejection of a Single-Axis of a Quadcopter Using Lead Compensation. In *Proc. of the Third IFAC International Conference on Advances in Control and Optimization of Dynamical Systems, Hyderabad, India.* ACODS.
  4. Zulqarnain, Koul, M., and Shahdad, I. (2017) Towards an open source haptic kit to teach basic STEM concepts. In *Proc. of the* 3^{rd} *International Conference on Advances in Robotics (AIR2017), IIT Delhi, India.* ACM.
  5. Koul, M., Saha, S. K., and Manivannan, M. (2015) Teaching Mechanism Dynamics using a Haptic Device - II. In *Proc. of the* 2^{nd} *International and* 17^{th} *National Conference on Machines and Mechanisms (iNaCoMM 2015), IIT Kanpur, India.* (pp. 1-9) AMM.
  6. Gupta, V., Koul, M., Saha, S. K. (2015) Issues in Modelling a Stewart Platform in a Multibody Dynamics Software. In *Proc. ECCOMAS thematic conference on multi-body dynamics (ECCOMAS 2015), Barcelona, Spain.* (pp. 872-878)
  7. Kakoty, N., Koul, M., Hazarika, S., Saha, S. K. (2014) Model Predictive Control for Finger Joint Trajectory of TU Biomimetic Hand. In *Proc. IEEE International Conference on Mechatronics and Automation (ICMA 2014), China*
  8. Koul, M., Saha, S. K., and Manivannan, M. (2013) Simulation of Haptics Force Law using SimMechanics and Simulink. In *Proc. of the* I^{st} *International and* 16^{th} *National Conference on Machines and Mechanisms (iNaCoMM 2013), IIT Roorkee, India.* (pp. 641-648) AMM.

9. Koul, M., Saha, S. K., and Manivannan, M. (2013) Teaching Mechanism Dynamics using a Haptic Device. In *Proc. of the I^{st} International and 16^{th} National Conference on Machines and Mechanisms (iNaCoMM 2013), IIT Roorkee, India.* (pp. 649-656) AMM.
10. Koul, M., Manivannan, M., and Saha, S.K. (2013). Enhancing the Z-width of Haptics Interfaces through Dual-rate Sampling. In *Proc. International Conference on Advances In Robotics (AIR '13), Pune, India.* (pp. 1-6) ACM.
11. Khadagi, M., Koul, M., Manivannan, M. (2011) An adaptive-method for velocity estimation using time-to-digital converter. In *Proc. IEEE International Conference on Field Programmable Technology (FPT-11), New Delhi, India.*
12. Koul, M., Rabinowitz, D., Saha, S.K., and Manivannan, M. (2011). Synthesis and design of a 2-DOF haptic device for simulating epidural injection. In *Proc. 13th World Congress in Mechanism and Machine Science, Guanajuato, Mexico.* (pp. 1-7) IFToMM.
13. Koul, M., Kumar, P., Singh, P.K., Manivannan, M., and Saha, S.K. (2010). Gravity compensation for Phantom Omni Haptic Interface. In *Proc. of the 1st Joint International Conference on Multibody System Dynamics (IMSD 2010), Lappeenranta, Finland.* (pp. 1-10).

Workshops

- Conducted a one-day workshop on Virtual Reality based Medical Simulation with Touch feedback (VR-MiST-12). Senior doctors from MMC, Stanley, Kilpacuk, DME, Cancer Institute, Apollo Hospitals in Chennai and Hyderabad, with faculty and students from IIT Madras and IIT Delhi participated.
- Conducted a one day Workshop on Haptics - The Science of Touch, at IIT Kanpur, as part of iNaCoMM 2015 International Conference.

Short Term Courses (Attended)

- Four weeks 70th General Orientation Course at UGC-HRDC University of Kashmir, J&K - 11.01.2016 to 06.02.2016.
- One week GIAN Course on Advanced Sliding Mode Control and Estimation for Real Complex Systems of the 21st Century at IIT Roorkee - 24.10.2017 to 27.10.2017.
- Three weeks Special Summer School Refresher Course in Sciences at University of Kashmir, J&K - August 09, 2018 to September 07, 2018.
- One Week TEQIP Sponsored Faculty Development Programme on Pedagogy, 01.04.2019 to 05.04.2019, NIT Srinagar.
- One Week TEQIP Sponsored Faculty Development Programme on Outcome Based Education, 18.05.2019 to 22.05.2019, NIT Srinagar.
- One Week TEQIP Sponsored Short Term Course on Renewable Energy in Science, Engineering and Technology, 01.07.2019 to 05.07.2019, NIT Srinagar.
- One Week TEQIP Sponsored Short Term Course on Biomedical Signal and Image Processing: Contemporary Methods and Applications, 29.07.2019 to 02.08.2019, NIT Srinagar.
- One Week Online TEQIP Sponsored Short term training program on Computational Fluid Dynamics, August 17-22, 2020, NIT Srinagar.
- One Week Online TEQIP Sponsored Short term training program on Additive Manufacturing, September 01-05, 2020, NIT Srinagar.
- One Week Online TEQIP Sponsored Short term training course on Advanced Manufacturing Technology, 21.12.2020 to 25.12.2020, IIT Guwahati.

Research Interests

- Development of haptic interfaces with hybrid control strategies (active and passive actuation).
- Using haptics as a technology to enhance pedagogy to K-12 students.
- Robotic Surgery with haptics feedback (Complementing Teleoperation).
- Robotics and haptics for rehabilitation and physically challenged people.
- Efficient electro-mechanical simulation of closed-loop multi-body systems with application to robotics and haptic interfaces.

Teaching Interests

- **Graduate-level Courses and Labs in Mechanical Engineering**
  - Kinematics and Dynamics of Multi-body Systems, Robotics, Haptics, Instrumentation and Control, Mechanical Vibrations, Optimization.
- **Undergraduate-level Courses and Labs in Mechanical Engineering**
  - Mechatronics, Mechanical Vibrations, Mechanisms and Machines, Control Systems, Measurement and Instrumentation, Engineering Mechanics (Statics and Dynamics), CAD, MATLAB.

Projects

- **Development of a Haptic Device for Enhancing Pedagogy for K-12 Students, 2017**
  - Internally Funded by Design Innovation Centre, IUST Awantipora

Administrative Responsibilities

- **Nodal Officer, NIRF2021** **January 2020**
  SoET, IUST, Awantipora
- **Convener** **15.02.2019 - 29.12.2020**
  Departmental Undergraduate Committee (DUGC), Department of Mechanical Engineering *NIT Srinagar*
- **Officer In-charge** **27.11.2018 - 29.12.2020**
  Mechatronics Lab, Department of Mechanical Engineering *NIT Srinagar*
- **Head of the Department** **2016-18**
  Department of Mechanical Engineering *IUST, Awantipora*
- **Project Coordinator, TEQIP-III** **2017-18**
  An MHRD-NPIU World Bank Funded Project *IUST, Awantipora*
- **Nodal Officer Planning, TEQIP-III** **2018**
  An MHRD-NPIU World Bank Funded Project *IUST, Awantipora*
- **Coordinating Officer** **2015-17**
  AICTE approvals for Engineering Programmes *IUST, Awantipora*
- **Coordinator** **2015-17**
  Central Time Table Committee *IUST, Awantipora*
- **Management Committee Member** **2015-18**
  Design Innovation Centre *IUST, Awantipora*

Awards

- **HAPTIC KIT** 09.10.2019 THE PATENT OFFICE, 308949, GOVERNMENT OF INDIA, Design Registration.
- **Special Mention Award** at the International Conference on Advances in Robotics (Air2013), R&DE Pune, India, for the paper entitled "*Enhancing the Z-width of haptic interfaces through dual-rate sampling*".

- Qualified In Graduate Aptitude Test for Engineers (**GATE-07**) conducted by the Indian Institutes of Technology with an All-India-Rank 650.
- Awards during B.Tech. programme for **distinctive academic performance**.
- Awarded **half tuition fee waiver** for a period of two years during 11^{th} and 12^{th} standard for distinction in Class 10^{th} by Gyan Bharati School, Saket, New Delhi.

Outreach Activities and Lectures Delivered

- Several visits to Voluntary Medicare Society, Bemina and Zeba Aapa School for Inclusive Education, Bijbehera, for working on various projects for physically challenged people.
- Delivered a lecture on role of science towards multiple challenged persons at Voluntary Medicare Society, Bemina, Srinagar, 2017.
- Invited Lectures at UGC-HRDC, Kashmir University, 25 January 2019.

Reviewer

- IEEE Transactions on Control System Technology.
- IEEE/ASME Transactions on Mechatronics.
- ASME Transactions on Applied Mechanics.
- Multibody System Dynamics, Springer.

Software Skills

Languages: C, C^{++} Assembly Language programming, VHDL programming for FPGA, LaTeX.

Softwares: RecurDyn, Autodesk Inventor, Flow code for PIC micro-controller programming, MATLAB.

Last Updated: 31/01/2021