

Arun Dayal Udai, Ph.D.

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🌐 <https://www.aduza.in/>

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Employment History

- 5th October, 2021 – till date **Director:** ADUZA Robotics & Automation Private Limited, Incubated at Indian Institute of Technology (Indian School of Mines), Dhanbad, Jharkhand, India.
- 13th January, 2020 – till date **Assistant Professor:** Department of Mechanical Engineering, Indian Institute of Technology (Indian School of Mines), Dhanbad, Jharkhand, India.
- 1st July, 2008 – 8th January, 2020 **Assistant Professor:** Department of Mechanical Engineering, Birla Institute of Technology, Mesra, Ranchi, Jharkhand, India. (On study leave during July, 2010 – April, 2015)
- July, 2010 – April, 2015 **Research Assistant:** BRNS/BARC sponsored project “Adaptive Force Control of KUKA KR6 Robot using Force Torque Sensor” at Indian Institute of Technology Delhi, New Delhi, India
- June, 2005 – Oct., 2007 **Junior Research Fellow:** under Department of Science and Technology, Govt. of India project “Development of CAD Model for Artificial Human Limb, using Reverse Engineering Method”.
- Feb., 2003 – April, 2004 **Project Leader:** Dayal Software Solutions, Jamshedpur/ Bangalore.
- Nov., 1999 – Jan., 2003 **Mercantile Marine Engineer:** Anglo Eastern Ship Management Ltd. Hong Kong. Signed off as *Fourth Engineer*

Education

- 2010 – 2016 **Ph.D., Indian Institute of Technology Delhi, New Delhi**
Thesis title: *Force Control of Industrial Robots*.
Complete Thesis at http://www.dayalsoft.com/files/adu_thesis.pdf
- 2004 – 2006 **M.E., Mechanical Engineering, Birla Institute of Technology, Mesra, Ranchi** in Biped Robots.
Specialization: *Design of Mechanical Equipment*
Thesis title: *Design and Development of a Microcontroller Based Robot*.
First Class with 89.5%
- 1995 – 1999 **B.E. Marine Engineering, Marine Engineering and Research Institute, Kolkata, India.**
Final year project on “Ship Automation” was awarded as 2nd in automation category at National Level Model Exhibition (TECHNEX - 1999) held at IIT-BHU, Varanasi, India

Research Publications

Journal Articles

- 1 Prakashbhai, P. M., Ghoshal, S. K., & Udai, A. D. (2022). A Novel Comprehensive Learning Rao Algorithm for Engineering Optimization Problems. *Journal of the Brazilian Society of Mechanical Sciences and Engineering*, 47(45), 1–16.
- 2 Xiong, X., Chu, Y., Udai, A. D., Kamal, S., Jin, S., & Lou, Y. (2021). Implicit Discrete-Time Terminal Sliding Mode Control for Second-Order Systems. *IEEE Transactions on Circuits and Systems II: Express Briefs*, 14(8), 1–5.
- 3 Dutta, A., Salunkhe, D. H., Kumar, S., Udai, A. D., & Suril, V. S. (2019). Sensorless Full Body Active Compliance in a 6 DOF Parallel Manipulator. *Robotics and Computer-Integrated Manufacturing*, 59, 278–290.
- 4 Udai, A. D. & Saha, S. K. (2018). Dynamic Simulation of Serial Robots under Force Control. *Int. Journal of Intelligent Machines and Robotics*, 1(1), 79–108.
- 5 Udai, A. D., Saha, S. K., & Dayal, A. (2018). Overlaid Orthogonal Force Oscillations for Robot Assisted Localization and Assembly. *ISME Journal of Mechanics and Design*, 2(1), 9–25.

Conference Proceedings

- 1 Udai, A. D., Siddharth, A., & Khemka, S. (2022, October). Design and Control of All Pneumatic Virtual Motion Simulator. In *The 6th Joint International Conference on Multibody System Dynamics and The 10th Asian Conference on Multibody Dynamics (IMSD-ACMD)*. New Delhi, India.
- 2 Udai, A. D., Biswas, S., & Penisetty, S. A. (2019, October). Synthesizing Unnatural Grasping in Humanoid Robots using Fuzzy Logic. In *28th IEEE International Conference on Robot and Human Interactive Communication*. New Delhi, India.
- 3 Udai, A. D., Biswas, S., & Kumar, G. (2018, December). A Hardware-in-a-Loop Setup for Benchmarking Robot Controllers. In *Int. Conf. on Computational Intelligence (ICCI 2018)*. BIT Mesra, Ranchi, India.
- 4 Udai, A. D., Salunkhe, D. H., Dutta, A., & Mukherjee, S. (2017, June). Force/Position Control of 3-DoF Delta Manipulator with Voice Coil Actuator. In *Advances in Robotics (AIR 2017)*. IIT Delhi, New Delhi, India.
- 5 Ranjan, A., Kumar, U., Laxmi, V., & Udai, A. D. (2017, February). Identification and Control of NAO Humanoid Robot to Grasp an Object using Monocular Vision. In *2nd. IEEE Int. Conf. on Electrical, Computer and Communication Technologies (IEEE ICECCT 2017)* (pp. 1–5). Coimbatore, Tamil Nadu, India.
- 6 Udai, A. D. & Saha, S. K. (2016, December). A Framework for CAD-Based Offline Depth-Map Preparation for Automated Assembly Tasks. In *Int. Conf. on Robotics and Automation for Humanitarian Applications (RAHA 2016)* (pp. 244–249). Kerala, India.
- 7 Udai, A. D., Saha, S. K., Joshi, R. P., & Sadanand, R. (2016, November). Force Control of Robot Manipulator using Industrial Servo Drives. In *Int. Conf. on Evolution in Manufacturing (ICEM 2016)* (pp. 313–318). Ranchi, India.
- 8 Hayat, A. A., Udai, A. D., & Saha, S. K. (2016a, January). Identifying and Updating the Kinematics of KUKA iiwa R800 in CAD for Accurate Simulation. In *28th Int. Conf. on CAD/CAM, Robotics and Factories of the Future (CARS & FoF 2016)* (pp. 115–126). Kolaghat, West Bengal, India.

- 9 **Udai, A. D. & Sinha, A. N.** (2015a, December). A Quantitative Error Map Generation for Modification of Manual Socket for Below Knee Amputee. In *1st. Int. Conf. on Computational Intelligence (ICCI 2015)* (pp. 383–391). BIT Mesra, Ranchi, India.
- 10 **Udai, A. D., Joshi, R. P., & Saha, S. K.** (2015, September). Depth-based Localization for Robotic Peg-in-Tube Assembly. In *IEEE/RSJ Int. Conf. on Intelligent Robots and Systems (IROS 2015)* (pp. 3538–3543). Hamburg, Germany.
- 11 **Udai, A. D., Hayat, A. A., & Saha, S. K.** (2014, September). Parallel Active/Passive Force Control of Industrial Robots with Joint Compliance. In *IEEE/RSJ Int. Conf. on Intelligent Robots and Systems (IROS 2014)* (pp. 4511–4516). Chicago, Illinois.
- 12 **Abhishek, V., Hayat, A. A., Udai, A. D., & Saha, S. K.** (2014, June). Experimental Identification of an Industrial Manipulator Dynamic Parameters. In *The 3rd Joint Int. Conf. on Multibody System Dynamics (IMSD 2014) and The 7th Asian Conf. on Multibody Dynamics (ACMD 2014)*. Busan, Korea.
- 13 **Hayat, A. A., Udai, A. D., & Saha, S. K.** (2013, December). Kinematic-Chain of an Industrial Robot and Its Torque Identification for Gravity Compensation. In *1st Int. and 16th National Conf. on Machines and Mechanisms (iNaCoMM 2013)*. IIT Roorkee.
- 14 **Udai, A. D. & Saha, S. K.** (2013, October). A Current-Sensing based Controller for Brushed DC Motors for Robotic Applications. In *The 3rd IFToMM Int. Symposium on Robotics and Mechatronics, (ISRM 2013)* (pp. 230–239). Singapore.
- 15 **Hayat, A. A., Chittawadigi, R., Udai, A. D., & Saha, S. K.** (2013, July). Identification of Denavit-Hartenberg Parameters of an Industrial Robot. In *Advances in Robotics, Int. Conf. of Robotics Society of India, (AiR 2013)* (pp. 1–6). R & DE (Engrs.), Pune.
- 16 **Udai, A. D. & Saha, S. K.** (2012, December). Simulation of Force Control Algorithms. In *IEEE/SICE Int. Symposium on System Integration (SII 2012)* (pp. 481–486). Fukuoka, Japan.
- 17 **Udai, A. D. & Sinha, A. N.** (2008, December). Processing Magnetic Resonance Images for CAD Model development of Prosthetic Limbs Socket. In *IEEE Region 10 and the 3rd. Int. Conf. on Industrial and Information Systems (ICIIS 2008)* (pp. 1–5). IIT Kharagpur.
- 18 **Udai, A. D.** (2008a, July). Optimum Hip Trajectory Generation of a Biped Robot During Single Support Phase Using Genetic Algorithm. In *1st IEEE Int. Conf. on Emerging Trends in Engg. and Tech. (ICETET 2008)* (pp. 739–744). Nagpur.
- 19 **Udai, A. D. & Sinha, A. N.** (2007a, January). Development Of Artificial Limb Surface Using Reverse Engineering Method. In *Int. Conf. on Advances in Machine Design & Industry Automation (ICAMDIA 2007)* (pp. 519–522). Pune.
- 20 **Udai, A. D. & Sinha, A. N.** (2006, July). A Serial Port Interface Circuit for Robotic Control Applications Involving Multiple Stepper Motors. In *22nd Int. Conf. on CAD/CAM Robotics and Factories of the Future*. VIT Vellore.

Books and Chapters

- 1 **Hayat, A. A., Chaudhary, S., Bobby, R. A., Udai, A. D., Roy, S. D., Saha, S. K., & Chaudhury, S.** (2021). *Vision based identification and force control of industrial robots*. Series: Studies in Systems, Decision and Control. Springer Nature, Germany.
- 2 **Biswas, S., Udai, A. D., & Kumar, G.** (2018). *Advances in Computational Intelligence. Advances in Intelligent Systems and Computing: A Hardware-in-a-Loop Setup for Benchmarking Robot Controllers* (S. K. Sahana & V. Bhattacharjee, Eds.). Lecture Notes in Mechanical Engineering. Springer, Singapore.

- 3 Hayat, A. A., **Udai, A. D.**, & Saha, S. K. (2016b). *CAD/CAM, Robotics and Factories of the Future: Identifying and Updating the Kinematics of KUKA iiwa R800 in CAD for Accurate Simulation* (D. K. Mandal & C. S. Syan, Eds.). Lecture Notes in Mechanical Engineering. Springer, India.
- 4 **Udai, A. D.** & Sinha, A. N. (2015b). *Advances in Computational Intelligence. Advances in Intelligent Systems and Computing: A Quantitative Error Map Generation for Modification of Manual Socket for Below Knee Amputee* (S. K. Sahana & S. K. Saha, Eds.). Lecture Notes in Mechanical Engineering. Springer, Singapore.
- 5 Sinha, A. N. & **Udai, A. D.** (2008). *Computer Graphics*. Tata McGraw Hill Publishing Co. Ltd., New Delhi, India.

Technical Publications

Magazine Articles

- 1 **Udai, A. D.** & Kumar, S. (2013, October). Make your own USB Data Acquisition System. In S. Theo (Ed.), *Electronics For You*. New Delhi, India.
- 2 **Udai, A. D.** (2012, September). AVR Bootloader Circuit for Trouble-free Programming. In S. Kumar (Ed.), *Electronics For You*. New Delhi, India.
- 3 **Udai, A. D.** (2011a, August). Interfacing Sensor with ADC of AVR Microcontroller. In S. Kumar (Ed.), *Electronics For You*. New Delhi, India.
- 4 **Udai, A. D.** (2011b, July). Serial Communications with AVR Microcontroller. In S. Kumar (Ed.), *Electronics For You*. New Delhi, India.
- 5 **Udai, A. D.** & Mohan, B. (2011, June). AVR Programming using AVR 910 Protocol. In S. Kumar (Ed.), *Electronics For You*. New Delhi, India.
- 6 **Udai, A. D.** (2011c, March). Storing Data on I2C EEPROM using AVR microcontroller. In S. Theo (Ed.), *Electronics For You*. New Delhi, India.
- 7 **Udai, A. D.** (2011d, February). Interfacing Nokia Colour LCD With AVR Microcontroller. In S. V. N. Harish (Ed.), *Electronics For You*. New Delhi, India.
- 8 **Udai, A. D.** (2011e, January). A Beginners' Guide to ATMEL AVR Development. In S. Kumar (Ed.), *Electronics For You*. New Delhi, India.
- 9 **Udai, A. D.** (2010, November). Creating Professional Circuit Designs Using NI Circuit Design Suite. In *Electronics For You*. New Delhi, India.
- 10 **Udai, A. D.** (1999, June). Advanced QuickBasic Drawing Tool. In *Electronics For You*. New Delhi, India.

Application Journals

- 1 **Udai, A. D.** (2008b). An Inexpensive AVR Controlled 16-Channel Serial Servo Motor Controller Design for Robotic Applications. Vol. 10. Summer 2008.
- 2 **Udai, A. D.** & Sinha, A. N. (2007b). Constructing 16 Channel Bluetooth wireless Servo Motor Controller. Vol. 9. Fall 2007.

Selected Certifications/Courses

- 1 NPTEL Online Certified Course of 8 weeks on "Automatic Control (noc19-me05)" by *Indian Institute of Technology Roorkee*, Jan – March, 2019.

- 2 Short Term Course under Continuing Education Programme on “3rd SERB Summer School on Robotics” at *Indian Institute of Technology Delhi, New Delhi*, during 23rd – 28th June 2017.
- 3 “CAD-CAM Application in CNC Machining” at *Indian Institute of Technology, Kharagpur* during 29th of August – 2nd of September 2016.
- 4 “Robot Modeling and Control, and Applications to Aerial Robots (151009L03)”, as credit course at *Indian Institute of Technology, Jodhpur* under GIAN program, MHRD, Govt. of India, during 22nd – 28th of December 2015.
- 5 “Industrial Automation and Robotics” at *Indian Institute of Technology Delhi, New Delhi* as TEQIP-II program during 8 – 12th of December 2014.
- 6 “Advanced Robot Programming” for KUKA Industrial Robots by *KUKA Robotics (India) Pvt. Ltd., Gurgaon* during 14 – 17th of May 2012.
- 7 “Robotics (MEL 739)”, “Non-Linear Systems (EEL 824)” and “Communication Skills (HUL 810)”, as full-time credit courses in Monsoon 2010 session at *Indian Institute of Technology Delhi, New Delhi*
- 8 Certificate of Competency as Marine Engineer Officer, Class IV (Motor), *Issued under the provisions of Merchant Shipping Act. 1958*, Government of India in August 2001.

Awards and Honours

- 2022 **Guest Talk:** “Parallel Robot: Insights of an Academic Project to a Startup!,” in IEEE International Conference on Service Operations and Logistics, and Informatics (IEEE SOLI 2022), Organized by *ITSS Chapter, Delhi*, 2nd December 2022.
- Guest Talk:** “Recent Innovation and Advancements in Robotics & Skills Needed to Become a Robotics Engineer,”. Organized by Institution’s Innovation Council, MHRD, Govt. of India, and Entrepreneurship Development Cell, *Birla Institute of Technology, Mesra, Deoghar Campus*, 10th September 2022.
- Online Invited Talk:** “COBOTS: Technological Difference and Special Features” at School of Advanced Sciences *Department of Mathematics, Vellore Institute of Technology, Vellore*, 22nd June 2022.
- Online Invited Talk:** “Overview of Robotic Applications: Special Highlight to CO-BOTS Design,” Faculty Development Program (FDP) on “Automation & Smart Manufacturing,” Organized by *Anna University, Chennai and Janatics India Private Limited, Coimbatore*, 27th April 2022.
- 2021 **Online Invited Talk:** “Passive Orthotic Limbs for Lower-Leg Amputee using Reverse Engineering,” Short Term Course on “Development of Electric Wheelchairs for Disabilities,” sponsored by Technology Innovation Hub on *Interdisciplinary Data Analytics and Predictive Technology, IIT (BHU) Varanasi*, 3rd December 2021.
- Online Invited Talk:** “Using Parallel Robot for Pedagogy in Robotics,” AICTE Training and Learning (ATAL) Academy, “Application of Robotics in Enhancing Learning Contents,” Faculty Development Program organized by *Computer Science Engineering, National Institute of Technology, Agartala*, 6th July 2021.
- Online Invited Talk:** “COBOTS: Everything you need to know about!,” AICTE Training and Learning (ATAL) Academy, “Application of Robotics in Enhancing Learning Contents,” Faculty Development Program organized by *Computer Science Engineering, National Institute of Technology, Agartala*, 7th July 2021.
- Online Invited Talk:** “COBOTS: And its Distinguishing Features,” Webinar by IIC 3.0, *Birla Institute of Technology, Deoghar*, 29th June 2021.

Awards and Honours (continued)

- Online Invited Talk:** “Strategies for Force Control of Industrial Robots,” AICTE Short Term Course on Control System Design - Classical & Modern with Hands-on, *College of Engineering Pune*, 27th March 2021.
- Online Invited Talk:** “Automated Assembly Task using Compliant Industrial Robots,” e-Workshop on Condition Monitoring and Industrial Automation (CMIA-2021), *National Institute of Technology, Hamirpur, Himachal Pradesh*, 26th March 2021.
- Online Invited Talk:** “All Pneumatic Car Simulators - A Complete Mechatronic Pathway,” Refresher Course in Information Technology, *UGC-Human Resource Development Center, Ranchi*, 18th January 2021.
- 2020 **Invited Talk:** “Inverse Kinematics and Control of 6-DoF Parallel Manipulators: 6-UPS Gough-Stewart and 6-RSS Zamanov Type,” MHRD Summer School on Robotics and Automation (March 2-14, 2020), *IIT Delhi, New Delhi*, 13th March 2020.
- Online Expert Lecture:** “Indigence of Inter-Disciplinary Skills in Robotics: Consternation or Motivation,” TEQIP-3 Sponsored Program at Department of Mechanical Engineering, *Institute of Engineering and Technology, Lucknow*, 23rd April 2020.
- Online Expert Lecture:** “Basics of Parallel Robots with Examples,” AICTE Training and Learning (ATAL) Academics Faculty Development Programme on Robotics, (May 25-29, 2020) *National Institute of Technology, Jamshedpur*, 26th May 2020.
- Online Expert Lectures:** “Force Control Algorithms”, “Inverse Kinematics of Parallel Robots”, “MATLAB based simulation on serial robots”, and “Special Topics on Industrial Robots”, Faculty Development Program on Theory and Simulations in Robotics (TheSiR 2020), Organized by Electronics and ICT Academy, (June 1-7, 2020), *National Institute of Technology Patna*, 4th, 6th and 7th June 2020.
- Online Expert Lecture:** “Importance of Inter-disciplinary skills in Robotics,” Department of Mechanical Engineering, *IEC College of Engineering and Technology, Greater Noida*, 17th June 2020.
- Online Expert Lecture:** “All Pneumatic Car Simulators: A Complete Mechatronic Pathway,” Five days online FDP on Mechatronics, Automation and Robotics, Department Of Mechanical Engineering, *O P Jindal University, Chhattisgarh*, 7th August 2020.
- Online Expert Lecture:** “Indigence of Inter-Disciplinary Skills in Robotics: Consternation or Motivation,” One week online AICTE sponsored STTP on Emerging Research Trends on Robotics and its Applications - Phase I, Department Of Electronics and Communication Engineering, *Mepco Schlenk Engineering College, Sivakasi, Tamil Nadu*, 8th August 2020.
- Online Expert Lecture:** “Parallel Robots in Biomedical Applications: Venturing with inherent capabilities and associated challenges,” TEQIP III sponsored online webinar, Mechanical Engineering Solutions to Biomedical Problems (September 24-27, 2020), *Department of Mechanical Engineering, IIT (ISM) Dhanbad*, 27th September 2020.
- Online Expert Lecture:** “Approaches of Teaching Robotics to Novice Learners: Myths and Facts,” One week AICTE Training and Learning (ATAL) FDP Programme for CBSE Teachers on Robotics (October 19-23, 2020), *Gurukula Kangri, Haridwar*, 23th October 2020.
- 2019 **Invited Speaker:** “Kinematics of Serial Robots,” AICTE Training and Learning (ATAL) Academics Programme On Robotics, *Central University of Jharkhand, Brame, Ranchi*, 16–20th December 2019.
- Invited Talk:** “Robotics for Beginneers”, Concetto 2019, *Indian Institute of Technology (ISM) Dhanbad*, 19th October 2019.

Awards and Honours (continued)

- 2018 **Invited Talk:** “Project Based Learning in Science”, Regional Science Congress 2018, *Jawahar Navodaya Vidyalaya, Ranchi*, 19th November 2018.
Invited Talk: “Compliant Robots for Human Environment”, National Workshop on Human Centered Robotics (NWHCR 2018), *Indian Institute of Technology, Jodhpur*, 18th March 2018.
- 2017 **Invited Talk:** “Robotics for Robotics Competition”, *IEC College of Engineering, Greater Noida, UP*, 3rd November 2017.
- 2015 **Invited Keynote:** “Open Source is Hot!”, World Computer Literacy Day, *The Institution of Engineers (India), Jharkhand State Centre, Ranchi*, 12th December 2015.
Invited Talk: “Force Control: An Introduction (Through Case Studies)”, GIAN Course on Robot Modelling and Control, and Applications to Aerial Robots, *Indian Institute of Technology, Jodhpur*, 27th December 2015.
- 2012 **Session Chair:** “Industrial Robot and Control”, in IEEE/SICE International Symposium on System Integration (SII 2012), *Kyushu University, Fukuoka, Japan*, 16th December 2012.
- 2011 **Speaker:** Workshop on “Introduction to Robotics and Embedded Systems” at *Department of Mechanical Engineering, Indian Institute of Technology Delhi, New Delhi* during 2nd - 4th June 2011.
Speaker: Workshop on “Robotics and Embedded Systems” at *Indian Institute of Information Technology, Design and Manufacturing, Jabalpur* during 1st - 3rd April 2011.
- 2010 **Speaker:** Workshop on “Advanced Robotics and Embedded Systems”, organized by IEEE Student chapter at *Birla Institute of Technology, Mesra, Ranchi* during 1st – 11th April 2010.
- 2009 **Speaker:** Workshop on “Basic Robotics using Microcontrollers”, organized by SAE Student chapter at *Birla Institute of Technology, Mesra, Ranchi* during 14th – 16th August 2009.

Projects

Year	Project Title	Budget	Funding Agency
2023	Development of Algorithms for Collaborative Dual-Arm Manipulation and Control	285.0 Lacs	R & DE (DRDO), Pune
2022	Design and Development of Quadraped Robot for Mining Application	45.0 Lacs	TexMin, IIT(ISM) Dhanbad
2022	Design and Development of Hardware for Controls using Ball Screw/Belt Type Linear Actuators	38.44 Lacs	JANATICS India Pvt. Ltd., Coimbatore
2018-2019	Design and Development of a 6 DOF Gough-Stewart Platform for Virtual Simulators with Pneumatic Actuators	15.63 Lacs	SMC Corporation (2.357 CSR + 3.447 EQUIP), BIT Mesra (8.824 Lacs), PG Funding (1.0 Lacs)
2017-2018	Force Control with Omni-directional Wheeled Mobile Robot	1.0 Lacs	PG Funding, BIT Mesra
2017-2018	Design and Manufacturing of an Articulated Arm Coordinate Measuring Machine	0.5 Lacs	UG Funding, BIT Mesra
2016-2017	Design and Control of 6-RSS Parallel Manipulator for Industrial Applications	1.0 Lacs	PG Funding, BIT Mesra
2016-2017	Development of Hardware-in-a-Loop Setup for Benchmarking Robot Controllers	1.0 Lacs	PG Funding, BIT Mesra
2016-2017	Modeling and Control of Omni-Directional Ballbot	0.5	UG Funding, BIT Mesra
2016-2017	Design and Development of a Laser Assisted CNC Machine	0.5	UG Funding, BIT Mesra
2015-2016	Development of 3 DOF Device for Overliad Force Oscillations Based Industrial Robotic Assembly	1.15 Lacs	Seed Money Scheme, BIT Mesra
2010-2014	Development of MEMS Design Center	11.2 Lacs	National Program on Micro and Smart Systems (NPMASS), Govt. of India

Skills

Languages	Reading, writing and speaking competencies for English and Hindi.
Programming	Java, Python, \LaTeX , Visual C#.NET, C, MATLAB, Simulink/SimMechanics, NI LabView, KUKA Robot Language (KRL) with RSI-Ethernet, KUKA Sunrise.OS.
Design and Analysis	AutoCAD, Autodesk Inventor, PTC Creo, CATIA, ANSYS, SolidWorks, Imageware Surfacing tools for Reverse Engineering, Ultimaker Cura with Olivetti S2 3D Printer.
Embedded & Electronics	NI Circuit Design Suite, KICAD Electronic Circuit Design Tool, Arduino, IAR Embedded Workbench, WinAVR GNU C Compilers in Eclipse, AVR Studio, Code Composer Studio, CircuitCAM 5.0, BoardMaster 5.0 (with LPKF Protomat S-100 Circuit board plotter).
Microcontrollers & PLC	Microchip/ATMEL AVR 8-bit, MSP 430 16-bit, ARM on Raspberry PI 32-bit, Allen-Bradley MicroLogix 1100.

Skills (continued)

Industrial Robots	KUKA KR5 Arc, KR-16, and LBR iiwa, Kinova Jaco/Mico Arm, Intel-itek SCORBOT ER9.
Office Tools and OS	L ^A T _E X, Microsoft Office tools, OS: Windows and Ubuntu.

Miscellaneous Activities

Academic

Reviewers	TMH, New Delhi, IEEE Transactions on Mechatronics, IEEE-CAA Journal of Automatica Sinica, Conference: Advances in Robotics (RSI).
Members	The Robotics Society (India), Institution of Engineers (India), Association for Machines and Mechanisms (India).
Courses Taught	UG: Mechatronics (ME 7039), Principles of Mechanical Engineering (ME 2001). PG: Advanced Computer Graphics (MME 1065), Mechanics of Robotic Manipulator (MME 2083), Robotic Manipulator Design (ME 525).
Thesis Guided	UG: 12 groups, PG: 5 students.
Visiting Scholar	Bio-Robotics & Human-Mechatronics Laboratory, at Takafumi Matsumaru Laboratory, Graduate School of Information, Production and Systems (IPS), Waseda University, Kitakyushu Campus, Japan during 4th - 21st of December, 2012.
International Trips	IEEE/RSJ International Conference on Intelligent Robots and Systems- <i>IROS, 2014, Chicago</i> and <i>IROS, 2015, Germany</i> , IEEE/SICE International Symposium on System Integration- <i>SII 2012, Fukuoka, Japan</i> and International Conference on Robotics and Mechatronics - <i>ISRM 2013, Singapore</i> . These included Technical paper & poster presentations, University tours, Robotics exhibition, Tutorials, Workshops and Robotics competitions.
Model Making	Participated in various technical model making competitions and won at national levels.

Sports

Swimming	Proficiency in Survival Craft and Rescue Boats, IIPM, Calcutta (19th – 23rd March 2001). Personal Survival Techniques from Seacom Marine College, Calcutta (21st – 23rd May 1999).
Karate	Diploma: Kolkata Judo Club
Athletics	Participated in Airtel Run-O-Thon, Ranchi, 10km in 2018, 21km in 2019, 2 nd in 800m and 3 rd in 100m race events at 18 th Jharkhand Master Athletic Championship, 2018, Ranchi in 40+ category.

Arts

Tabla	Senior Diploma from Allahabad University
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