Dr. Shivesh Kumar

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Shivesh Kumar is the team leader of the “Mechanics and Control” team at the DFKI Robotics Innovation Center, Bremen. He obtained his doctorate degree (Dr. rer. nat.) from the Faculty of Mathematics and Computer Science at the University of Bremen in 2019. He obtained his Master degree in Control Engineering, Robotics, and Applied Informatics with specialization in Advanced Robotics from Ecole Centrale de Nantes, France in 2015. He was also an Erasmus Mundus HERITAGE scholar there. Priorly, he holds a Bachelor in Technology degree in Mechanical Engineering from National Institute of Technology Karnataka, India in 2013. His research interests spans kinematics, dynamics and control of serial, parallel and hybrid robots with applications in the fields of exoskeletons, humanoids, rehabilitation and industrial automation. During September 2017 and June 2019, he was a visiting researcher with Prof. Andreas Mueller at Institute of Robotics, Johannes Kepler University, Linz, Austria. He also spent a short research stay with Dr. Abhinandan Jain at NASA Jet Propulsion Laboratory in September 2019.

CURRICULUM VITAE

Dr. Shivesh Kumar

1. General Information

Address	German Research Center for Artificial Intelligence (DFKI)
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2. Academic Education and Degrees

2019	Doctorate in Natural Sciences (Dr. rer. nat.), Faculty of Mathematics and Computer Science, University of Bremen (summa cum laude)
2013 - 2015	Master of Science in Control Engineering, Robotics and Applied Informatics (Advanced Robotics Track), Ecole Centrale de Nantes, France
2009 - 2013	Bachelor of Technology in Mechanical Engineering, National Institute of Technology Karnataka, Surathkal, India
2009	All India Senior School Certificate Examination, CBSE Delhi, India
2007	All India Secondary School Examination, CBSE Delhi, India

3. Occupational Career since Graduation

2015 - 2018	Researcher, Robotics Innovation Center, DFKI GmbH
2019 – Present	Team Leader “Mechanics and Control”, Robotics Innovation Center, DFKI GmbH

4. Awards and Honors

- 2nd prize in Best Oral Presentations at AIR 2017 conference sponsored by Springer.
- Erasmus Mundus HERITAGE scholarship for pursuing M.Sc. in Advanced Robotics degree at Ecole Centrale de Nantes, France during 2013-2015.
- Conference grant from Function Dynamics India Pvt. Ltd. for presenting my paper in Asian Conference on Multi-body Dynamics (ACMD) 2012 in Shanghai, China.
- DAAD-IAESTE scholarship for research stay at Institute of Mechatronics and Dynamics, University of Paderborn during May to July 2012.
- CBSE Central Sector Scholarship for pursuing B. Tech. degree in Mechanical Engineering at NITK Surathkal, India during 2009-2013.

5. Invited Talks/Lectures

- Overview of Robotics Activities at DFKI-RIC and A Software Architecture for Solving Kinematics and Dynamics of Series-Parallel Hybrid Robots, 13 December 2019 at Amrita School of Engineering (ASE), Bengaluru, India.

- Overview of Robotics Activities at DFKI-RIC and A Software Architecture for Solving Kinematics and Dynamics of Series-Parallel Hybrid Robots, 05 September 2019 at NASA Jet Propulsion Laboratory, Pasadena, United States.

- A modular approach for kinematic and dynamic modeling of complex robotic systems using algebraic geometry, 13th July 2019 at the mini-symposium on Algebraic geometry for kinematics and dynamics in robotics at SIAM Conference on Applied Algebraic Geometry, Bern, Switzerland (upcoming, co-authored with Prof. Andreas Mueller).

- A Modular Software Workbench for Kinematic and Dynamic Modeling of Complex Series-Parallel Hybrid Robots, 26 June 2019 at Institute of Robotics (ROBIN), Johannes Kepler University, Linz, Austria.

- Modular and Distributable approach towards Kinematic and Dynamic modeling of series-parallel Hybrid robots, 11th September 2018 at Institut für Robotik und Prozessinformatik, TU Braunschweig, Germany.

- Design, analysis and control of a novel almost spherical mechanism Active Ankle, In Kinematics, Dynamics and Mechatronics in Motion Technology - Seminar RWTH Aachen, 06th December 2017 at Institut für Getriebetechnik, Maschinendynamik und Robotik, RWTH Aachen, Germany.

6. Additional Information

Peer review

Journals: Elsevier's Robotics and Autonomous Systems, Springer Journal of Intelligent and Robotic Systems, MDPI Applied Sciences

Conferences: IROS 2016, Asian Mechanism and Machine Science (MMS) 2018, ICRA 2019, ASME IDETC 2019, RSS 2019

References:

Prof. Dr. Dr. h.c. Frank Kirchner
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Fachbereich Mathematik und Informatik
AG Robotik
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Univ.-Prof. Dr.-Ing. habil. Andreas Müller
Johannes Kepler University
Leader, Institute of Robotics
Linz, Austria
Email: a.mueller@jku.at

7. Publications

Journals:

[1] Shivesh Kumar, Hendrik Wöhrle, Jose de Gea Fernandez, Andreas Mueller, Frank Kirchner, A Survey on Modularity and Distributivity in Series-Parallel Hybrid Robots, In: Mechatronics – The Science of Intelligent Machines, Elsevier (under review)

[2] Shivesh Kumar, Kai Alexander von Szadkowski; Andreas Müller; Frank Kirchner, An Analytical And Modular Software Workbench for Solving Kinematics and Dynamics of Series-Parallel Hybrid Robots In: Journal of Mechanisms and Robotics, ASME, 2020 (Special Issue: selected papers from IDETC 2019).

[3] Anirvan Dutta, Durgesh Salunkhe, Shivesh Kumar, Arun Dayal Udai, Suril V. Shah, Sensorless Full Body Active Compliance in a 6 DOF Parallel Manipulator, In: Robotics and Computer Integrated Manufacturing (RCIM), Elsevier, Volume 59, pages 278-290, 2019.

[4] Shivesh Kumar, Hendrik Wöhrle, Mathias Trampler, Marc Simnofske, Heiner Peters, Martin Mallwitz, Elsa Andrea Kirchner, Frank Kirchner, Modular Design and Decentralized Control of the Recupera Exoskeleton for Stroke Rehabilitation, In: Applied Sciences, MDPI, volume 9, number 4, pages o.A., 2019.

[5] Shivesh Kumar, Bertold Bongardt, Marc Simnofske, Frank Kirchner, Design and Kinematic Analysis of the Novel Almost Spherical Parallel Mechanism Active Ankle, In Journal of Intelligent & Robotic Systems, Springer Netherlands, 2018.

Conferences:

[6] Shivesh Kumar, Julius Martensen, Andreas Mueller, Frank Kirchner, Model Simplification in Dynamic Control of Series-Parallel Hybrid Robots – A Representative Study of the Neglected Dynamics, In: IEEE/RSJ International Conference on Intelligent Robots and Systems 2019, Macau.

[7] Shivesh Kumar, Andreas Mueller, An Analytical And Modular Software Workbench for Solving Kinematics and Dynamics of Series-Parallel Hybrid Robots In: 43rd Mechanisms and Robotics Conference (MR), ASME IDETC/CIE 2019, Anaheim, California.

[8] Christoph Stoeffler, Shivesh Kumar, Heiner Peters, Olivier Bruels, Andreas Mueller, Frank Kirchner, Conceptual Design of a Variable Stiffness Mechanism in a Humanoid Ankle using Parallel Redundant Actuation, IEEE Humanoids 2018, 06.11.-09.11.2018, Beijing, China.

[9] Shivesh Kumar; Kai Alexander von Szadkowski; Andreas Müller; Frank Kirchner, HyRoDyn: A Modular Software Framework for Solving Analytical Kinematics and Dynamics of Series-Parallel Hybrid Robots, In IEEE/RSJ International Conference on Intelligent Robots and Systems, (IROS-2018), 01.10.-05.10.2018, Madrid, IEEE/RSJ, Late Breaking Poster, pages 1-1, Oct/2018.

[10] Shivesh Kumar, Abhilash Nayak, Heiner Peters, Christopher Schulz, Andreas Mueller, Frank Kirchner, Kinematic analysis of a novel parallel 2SPRR+1U ankle mechanism in humanoid robot, In: Lenarcic J., Parenti-Castelli V. (eds) Advances in Robot Kinematics 2018. ARK 2018. Springer Proceedings in Advanced Robotics, vol 8. Springer, Cham.

[11] Shivesh Kumar, Marc Simnofske, Bertold Bongardt, Andreas Mueller, Frank Kirchner, Integrating Mimic Joints into Dynamics Algorithms – Exemplified by the Hybrid Recupera Exoskeleton, In Proceedings of the 2017 Conference on Advances In Robotics, (AIR-2017), 28.6.-02.7.2017, New Delhi, ACM-ICPS, 2017.

[12] Shivesh Kumar, Abhilash Nayak, Bertold Bongardt, Andreas Mueller, Frank Kirchner, Kinematic analysis of Active Ankle using computational algebraic geometry, In Computational Kinematics, (CK-2017), 22.5.-24.5.2017, Poitiers, Springer, 2017.

[13] Shivesh Kumar, Bertold Bongardt, Marc Simnofske, Frank Kirchner, Task space controller for the novel Active Ankle mechanism, In International Conference on Robotics and Automation for Humanitarian Applications, (RAHA-16), 18.12.-20.12.2016, Amritapuri, Kerala, IEEE, series RAHA 2016 Poster Proceedings, pages 22, Kerala, India, Dec/2016. Amrita University.

[14] Elsa Andrea Kirchner, Niels Will, Marc Simnofske, Luis Manuel Vaca Benitez, Bertold Bongardt, Mario Michael Krell, Shivesh Kumar, Martin Mallwitz, Anett Seeland, Marc Tabie, Hendrik Wöhrle, Mehmed Yüksel, Anke Heß, Rüdiger Buschfort, Frank Kirchner, “Recupera-Reha – Exoskeleton Technology with Integrated Biosignal Analysis for Sensorimotor Rehabilitation”, In Zweite transdisziplinäre Konferenz zum Thema ”Technische Unterstützungssysteme, die die Menschen wirklich wollen“, (smartASSIST-16), 12.12.-13.12.2016, Hamburg, n.n., 2016.

[15] Shivesh Kumar, Valerie Renaudin, Yannick Aoustin, Eric Le-Carpentier and Christophe Combettes, "Model-based and experimental analysis of the symmetry in human walking in different device carrying modes," 2016 6th IEEE International Conference on Biomedical Robotics and Biomechatronics (BioRob), Singapore, 2016, pp. 1172-1179.

[16] Marc Simnofske, Shivesh Kumar, Bertold Bongardt, and Frank Kirchner, “Active ankle – an almost-spherical parallel mechanism,” in 47th International Symposium on Robotics (ISR), Munich, Germany, 2016.

[17] Shivesh Kumar, Sensor-less Collision Detection and Isolation, series DFKI Documents, volume 16-01, pages 92-93, Mar/2016. DFKI GmbH.

[18] Shivesh Kumar, Raghavendra S, Mihir Bhagat, K V Gangadharan, “Modeling and Dynamic Simulation of SHRIMP rover using RecurDyn”, 12th Symposium on Advanced Space Technologies in Robotics & Automation (ASTRA 2013), European Space Agency (ESA), The Netherlands.

[19] Shivesh Kumar, Rajeev Lochan C.G., Subir Kumar Saha, “Realistic Modeling and Dynamic Simulation of KUKA KR5 Robot using RecurDyn”, 6th Asian Conference on Multi-Body Dynamics, Shanghai, China.

[20] Rajeev Lochan C.G., Subir Kumar Saha, Shivesh Kumar “Automatic Extraction of DH Parameters from Line Geometry”, 2nd Joint International Conference on Multi-Body System Dynamics 2012, Stuttgart, Germany.