Divya SHAH

Curriculum Vitae, November 2019

Doctoral Study

2017–Present **Università degli Studi di Genova**, *Genova, Italy*.

Affiliation **iCub Tech., Fondazione Istituto Italiano di Tecnologia**, *Genova, Italy*.

Research Area

Robot Design for Dexterous Manipulation.

2017–Present The PhD project aims at mechanism design and development of a wrist with increased range of motions and enhanced dexterity, primarily for the iCub humanoid. Currently, exploiting various classes of Spherical Parallel Mechanisms through CAD modelling & simulations for analyzing their behaviour within the workspace [1], [2] and studying the effect of geometric parameters [3] to optimize the same.

Supervisors: **Giorgio METTA**, *Senior Researcher Tenured- Scientific Director*, Fondazione Istituto Italiano di Tecnologia, Genova.

Alberto PARMIGGIANI, *Technologist - Facility Coordinator*, Mechanical Workshop, Fondazione Istituto Italiano di Tecnologia, Genova.

Visting Researcher

Affiliation **Interactive Robotics & Innovative Mechanism Lab, Korea University of Technology and Education**, *Cheonan, South Korea*.

Jul. 2019 - Oct. 2019 **Pronation-Supination Joint with Tendon Decoupling**.
Collaborated on concept design and development of a pronation-supination (elbow) joint mechanism wth multiple tendon routing and decoupled motions.

Invitor: **Yong-Jae KIM**, *Assistant Professor*, Korea University of Technology and Education, Cheonan.

Graduate Study

Degree **Erasmus+ 'European Masters on Advanced Robotics' (EMARO+)**.

2016-2017 **École Centrale de Nantes**, *Nantes, France*, (2^{nd} year).
Master in Control and Robotics - Advanced Robotics; Academic Year Average: **86.70%**

2015-2016 **Università degli Studi di Genova**, *Genova, Italy*, (1^{st} year).
Master in Robotics Engineering; Academic Year Average: **92.41%**

Master Thesis

Increased Productivity of an Automated Tape Winding Process: SPIDE-TP Platform, *CNRS/CETIM*.

9, Via Milano 58/D – Genova: 16126 – Italy
+393394143772 • *divya.shah@iit.it* • *divyashah.github.io*
divyashah-2801 • *divyashah*
Nationality: Indian – Date of Birth: 28/01/1993

Feb. 2017 - Aug. 2017 Collaborated on increasing the productivity of a kinematically redundant industrial platform for automated tape winding by computer-aided design and optimization of the joint motions [4]. Focused on developing robust collision detection within workcell components and implementing time-optimal trajectories previously developed using dynamic programming principle.

Supervisors: **Stéphane CARO**, *Researcher - HDR*, Centre National de la Recherche Scientifique (CNRS), Nantes.

Anatol PASHKEVICH, *Professor*, Institut Mines-Télécom Atlantique, Nantes.

Benoît COUTERMANCHE, *Ingénierie Polymères & Composites*, Centre Technique des Industries Mécaniques (CETIM), Nantes.

Other Graduate Projects

1. Modeling of Bi-manual Human Gestures with Wearable Inertial Sensors

Dec. 2015 - Apr. 2016 Compared different modelling & classification techniques for common human motion primitives with concurrent or synchronous use of both hands and analyzed gesture recognition [5].

Supervisor: **Fulvio MASTROGIOVANNI**, *Assistant Professor*, Università degli Studi di Genova.

2. Development of a Flight Control Software Architecture for a Quadrotor

May. 2016 - Jul. 2016 Developed and implemented a modular flight control software architecture for autonomous tracking and landing of a quadrotor on a mobile platform using feedback from motion capture system.

Supervisor: **Marco BAGLIETTO**, *Associate Professor*, Università degli Studi di Genova.

Undergraduate Study

Degree **Bachelor of Technology (Mechanical Engineering Branch)**.

2011-2015 **Sardar Patel College of Engineering [Autonomous], University of Mumbai**, *Mumbai, India.*
Cummulative Performance Index: **8.17/10.00**

Final Year Project

Design, Fabrication & Control of an Articulated Robotic Arm.

Sep. 2014 - Apr. 2015 Studied mechanical design, fabrication, kinematic control and performance analysis for a 6-axis articulated serial robot and developed a prototype to demonstrate pick and place of objects.

Supervisor **Rajesh BUKTAR**, *Professor*, Sardar Patel College of Engineering, Mumbai.

Co-Curricular Activity

ABU Robocon-India Team *(Annual National Robotics Competition)*

Jun. 2012 - Mar. 2014 As a team member of the collegiate robotics club participating at ABU Robocon-India, contributed towards the conceptual design and fabrication of mechanisms for the robots required to perform a specified set of time-bound tasks. Also, as the team leader, managed the work schedules and channeled the in-hand funds & resources.

Supervisor **Dattatray JADHAV**, *Associate Professor*, Sardar Patel College of Engineering.

Technical Skills

Creo Parametric ; CATIA ; DELMIA ; ADAMS ; ANSYS ; AutoCAD *CAD/CAM*

MATLAB & Simulink ; Python ; C/C++ ; ROS *Computation & Programming*

LaTeX ; Microsoft Office *Documenting*

Languages

English *Full Professional Proficiency*

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Italian ; French — *Elementary Proficiency*

Gujarati ; Hindi — *Native Proficiency*

Hobbies/ Interests

Lindy Hop, Solo Jazz, Indian Folk (Garba), Bollywood Freestlye — *Dance*

Cricket, Table Tennis, Football — *Sports*

Publications

1 D. Shah, Y. Wu, A. Scalzo, G. Metta, and A. Parmiggiani, "A comparison of robot wrist implementations for the iCub humanoid," *Robotics*, vol. 8, no. 1, p. 11, Feb. 2019. [Online]. Available: https://www.mdpi.com/2218-6581/8/1/11

2 D. Shah, G. Metta, and A. Parmiggiani, "Comparison of workspace analysis for different spherical parallel mechanisms," in *IFToMM Symposium on Mechanism Design for Robots MEDER*, ser. Mechanisms and Machine Science, A. Gasparetto and M. Ceccarelli, Eds. Udine, Italy: Springer International Publishing, Sept. 2018, vol. 66, pp. 193–201. [Online]. Available: https://link.springer.com/chapter/10.1007/978-3-030-00365-4_23

3 ——, "Workspace analysis and the effect of geometric parameters for parallel mechanisms of the N-UU class," in *International Design Engineering Technical Conferences and Computers and Information in Engineering Conference*, vol. 5A: 42nd Mechanisms and Robotics Conference, American Society of Mechanical Engineers. Quebec City, Canada: ASME, Aug. 2018, pp. V05AT07A029–V05AT07A029. [Online]. Available: http://proceedings.asmedigitalcollection.asme.org/proceeding.aspx?articleid=2713440

4 D. Shah, J. Gao, A. Pashkevich, S. Caro, and B. Courtemanche, "Computer-aided design and optimization of a redundant robotic system for automated fiber placement process," vol. 1983, no. 1. Surabaya, Indonesia: American Institute of Physics (AIP), July 2018, pp. 0 400 011–0 400 019. [Online]. Available: https://aip.scitation.org/doi/abs/10.1063/1.5046258

5 D. Shah, E. Denicia, T. Pimentel, B. Bruno, and F. Mastrogiovanni, "Detection of bimanual gestures everywhere: why it matters, what we need and what is missing," *Robotics and Autonomous Systems*, vol. 99, pp. 30–49, Jan. 2018. [Online]. Available: https://www.sciencedirect.com/science/article/pii/S0921889016303773

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