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DIVYA SHAH

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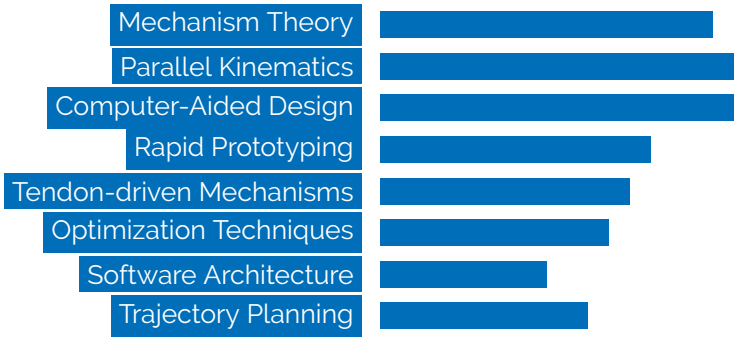
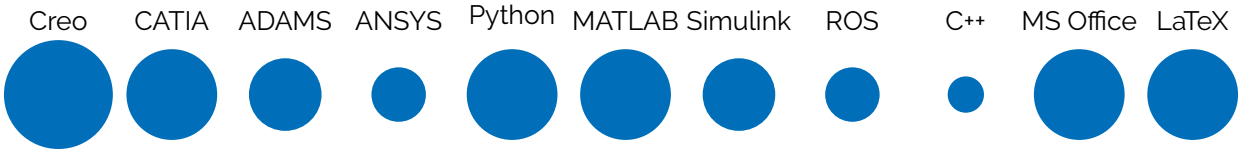
Roboticist | Post-Doctoral Researcher

BIO

I am an Indian, born and brought up in Mumbai. I developed a passion for designing and building robots during my involvement with the undergrad collegiate robotics club. I then moved to Europe to pursue higher education in robotics and graduated with double degree from EMARO+ in 2017. I then got my Ph.D. in 2021 with the iCubTech Facility at IIT in Genoa focusing on mechanism design for wrist and forearm dexterity. I am currently continuing as a postdoc working on design and development of high power humanoid joint modules.





RESEARCH EXPERIENCE

06/2021 – Present
Towards Design & Development of ergoCub — **PostDoc**
The postdoctoral research activity mainly focuses on mechatronic design and development of compact and high power humanoid joint modules for the new *ergoCub* project aiming towards human-robot collaboration in warehouse and hospital scenarios.
`Creo Parametric / MATLAB / Simulink / Prototyping / Testing / MS Ofice`
Advisors: **Marco Maggiali**, *Facility Coordinator*, iCubTech Facility, Italian Institute of Technology

11/2017 – 06/2021
Doctoral thesis
Design of Wrist & Forearm Mechanisms for Enhanced Humanoid Dexterity — **Ph.D. Student**
The Ph.D. project aims towards design and development of a 2-DOF mechanism for wrist application on humanoids such as *iCub*. It focuses on employing parallel orientational mechanisms for increasing the range of motion, payload-to-weight ratio and mechanism isotropy thus enhancing the manipulation dexterity [J2, B1, C2].
`Creo Parametric / Python / ADAMS / MATLAB / Prototyping / RaspberryPi / MS Ofice / LaTeX`
Advisors: **Alberto Parmiggiani**, *Technologist-Facility Coordinator*, Italian Institute of Technology
Giorgio Metta, *Scientific Director*, Italian Institute of Technology

07/2019 – 10/2019
Period abroad
Design of Tendon Routing Mechanism through Pronation/ Supination Joint for Decoupled Motions — **Visiting Researcher**
Collaborative project for idea generation, concept design and prototyping for a novel tendon routing mechanism through the pronation/supination (forearm) joint for multiple wrist actuating tendons in order to allow decoupled motions between the wrist and the forearm [C3].
`Creo Parameteric / Seimens NX / Prototyping`
Advisor: **Yong-Jae Kim**, *Assisstant Professor*, Interactive Robotics & Innovative Mechanism (IRIM) Lab at Korea University of Technology and Education (KOREATECH)

02/2017 – 08/2017
Master thesis

Increased Productivity of an Automated Tape Winding System - SPIDE TP Platfrom **Master Thesis Intern**

Collaborated on increasing the productivity of a kinematically redundant industrial platform for automated tape winding process. Focused on developing robust collision detection within workcell components and implementing time-optimal trajectories previously developed using dynamic programming principle. The simulations promised to reduced the overall processing time to one-third [C1].

`CATIA / DELMIA / MATLAB / MS Office / LaTeX`

Advisors: **Benoît Courtemanche**, *Engineer*, Centre Technique des Industries Mécaniques (CETIM)
Stéphane Caro, *Researcher-HDR*, Centre National de la Recherche Scientifique (CNRS)
Anatol Pashkevich, *Professor*, Institut Mines-Télécom Atlantique

05/2016 – 08/2016
Group project

Development of a Flight Control Software Architecture for a Quadrotor **Graduate Student**

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

`ROS / C++ / MS Office`

Advisor: **Marco Baglietto**, *Professor*, DIBRIS, University of Genova

12/2015 – 04/2016
Group project

Modelling of Bi-manual Human Gestures with Wearable Inertial Sensors **Graduate Student**

Modelled several common human motion primitives involving concurrent or synchronous use of both hands with inertial data from wearable sensors. Compared different classification techniques and analyzed the recognition performance achieving 80% accuracy [J1].

`MATLAB / C++ / LaTeX`

Advisor: **Fulvio Mastrogiovanni**, *Associate Professor*, DIBRIS, Univeristy of Genova

09/2014 – 04/2015
Bachelor thesis

Design, fabrication and Control of an Articulated Robotic Arm **Undergraduate Student**

Studied mechanical design, fabrication, kinematic control and performance analysis for a 6-axis articulated serial robot and developed a prototype to demonstrate basic manipulation (pick and place) of objects.

`CATIA / ANSYS / MATLAB / Prototyping / MS Office`

Advisor: **Rajesh Buktar**, *Professor*, SPCE, University of Mumbai

06/2012 – 04/2014
Co-curricular Activity

Team SPCE Robocon for ABU Robocon India **Undergraduate Student**

Actively involved with the collegiate robotics club competing at the ABU Robocon- India; national leg of the international undergraduate robotics competition. Contributed towards the conceptual design and fabrication of the robots required to perform a specified set of time-bound tasks. Also, lead the team for the year 2013-14 with additional responsibilities of organizing work schedules and managing in-hand funds and resources.

`CATIA / Fabrication / Arduino`

Advisor: **Dattatray Jadhav**, *Assosciate Professor*, SPCE, University of Mumbai

EDUCATION

2017 – 2021

Doctorate of Philosophy in Bioengineering and Robotics
Curriculum: Advanced and Humanoid Robotics
- Department of Informatics, Bioengineering, Robotics and Systems Engineering (DIBRIS), University of Genoa &
- iCub Tech Facility, Italian Institute of Technology (IIT), Italy

2015 – 2017

Erasmus+ European Masters on Advanced Robotics (EMARO+)
-Master in Robotics Engineering, University of Genoa, Italy (1^{st} year) **Avg.: 92.41%**
-Master of Science in Control and Robotics: Advanced Robotics, École Centrale de Nantes, France (2^{nd} year) **Avg.: 86.70%**

2011 – 2015 **Bachelor of Technology in Mechanical Engineering** **CPI: 8.18/10.00**
Sardar Patel College of Engineering (SPCE), University of Mumbai, India

JOURNAL ARTICLES

2019 [J2] Divya Shah, Yuanqing Wu, Alessandro Scalzo, Giorgio Metta and Alberto Parmiggiani;
A Comparison of Robot Wrist Implementations for the iCub Humanoid;
Multidisciplinary Digital Publishing Institute (MDPI) **Robotics**, 8(1), 11. DOI

2018 [J1] Divya Shah, Ernesto Denicia, Tiago Pimentel, Barbara Bruno and Fulvio Mastrogiovanni;
Detection of Bimanual Gestures Everywhere: Why it matters, What we need and What is missing;
Elsevier **Robotics and Autonomous Systems**, 99, 30 - 49. DOI

BOOK CHAPTERS

2018 [B1] Divya Shah, Giorgio Metta and Alberto Parmiggiani;
Comparison of Workspace Analysis for Different Spherical Parallel Mechanisms;
Springer **Mechanisms and Machine Science**, 66, 193-201, for IFToMM Symposium on Mechanism Design for Robotics (MEDER), *Udine, Italy*. DOI

CONFERENCE PROCEEDINGS

2020 [C3] Divya Shah, Alberto Parmiggiani and Yong-Jae Kim;
Constant Length Tendon Routing Mechanism through Axial Joint [In Press];
IEEE/ASME International Conference on Advanced Intelligent Mechatronics (AIM), ~~*Boston, USA*~~ *Virtual* DOI

2018 [C2] Divya Shah, Giorgio Metta and Alberto Parmiggiani;
Workspace Analysis and the Effect of Geometric Parameters for Parallel Mechanisms of the N-UU Class;
ASME International Design Engineering Technical and Conferences/Computers and Information in Engineering Conference (IDETC/CIE), *Quebec City, Canada* DOI

2017 [C1] Divya Shah, Jiuchun Gao, Anatol Pashkevich, Stéphane Caro and Benoît Courtemanche;
Computer-Aided Design and Optimization of a Redundant Robotic System for Automated Fiber Placement Process;
AIP Proceedings for the International Conference on Mechanical Engineering (ICOME), *Surabaya, Indonesia* DOI

SCHOOLS/WORKSHOPS ATTENDED

06/2021 **ICRA Workshop: Parallel Robots or not Parallel Robots? New Frontiers in Parallel Robotics**
Virtual

01/2020 **IFToMM International Winter School on Mechanism Design and Motion Planning (ROBOzen)**
Bolzano-Bozen, Italy

09/2018 **LIRMM/ LS2N International Summer School on Parallel Kinematic Manipulators (PKM)**
Montpelier, France

PEER-REVIEWING

2021 **IEEE Robotics Automation Letters (RA-L)**
IEEE International Conference on Robotics and Automation (ICRA)

2020 **ASME International Design Engineering Technical Conferences Computers and Information in Engineering Conference (IDETC-CIE)**
RSS Pioneers Workshop

2018 **IEEE-RAS International Conference on Humanoid Robots**

LANGUAGES

English - proficient
Italian - rudimentary
French - introductory
Gujarati, Hindi - native

HOBBIES/INTERESTS

Swing Dancing
Hiking
Cricket
Ukulele

PLACES LIVED

Genova, Italy
Cheonan, South Korea
Nantes, France
Mumbai, India