Jovan Clive Menezes

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Education

Cornell University, Sibley School of Mechanical and Aerospace Engineering Ithaca, NY
M.S., Mechanical Engineering (Minors: Computer Science and Electrical & Computer Engineering) 2021 – 2023
Relevant coursework: Model Based Estimation, Autonomous Mobile Robots, Adaptive & Learning Systems, Computer Vision, Feedback Control Systems, Multivariable Control Theory, Design with Embedded Operating Systems, Robot Perception, Robot Manipulation, Intermediate Dynamics, and Robot Learning.

- Thesis: Human-Robot and Multi-Autonomous Agent Collaborations in Cyber-physical Environments.
- Advisors: Prof. Silvia Ferrari (chair), Prof. Bharath Hariharan (CS), and Prof. Nils Napp (ECE).
- **Relevant course projects:** Localization, mapping & motion planning for autonomous ground robots, Automated Writing (scripting using robot manipulator), Comparative study of localization filters for quadrotors, RpiPiano (piano developed using Raspberry Pi), Vehicle Steering using Model Predictive Control, Modeling and simulation of quick return motion mechanism.

Fr. Conceicao Rodrigues Institute of Technology (FCRIT affiliated to Mumbai University) Mumbai, Maharashtra
Bachelor of Technology, Mechanical Engineering (GPA: 9.08/10.0; 6th in the class; top 8%) 2015 – 2019

- Senior project: Design and Development of an Autonomous Hexapod Robot (Advisor: Prof. Nitesh P. Yelve).
- Published a technical article on 'Net Zero Energy Buildings' in ISHRAE's (Indian Society of Heating, Refrigerating and Air Conditioning Engineers) national newsletter Student Connect, June 2019. (link)
- Academic society memberships: ISHRAE and Society of Automotive Engineers (SAE), India.
- **Relevant course projects:** Color sorting robotic manipulator, Automated Peaucellier mechanism using Bluetooth control, Design and modeling of Gearbox & Internal Combustion Engine for the SAE BAJA competition.

Research Experience

Cornell University, Ithaca *(Laboratory Research Assistant)* **June 2023 – present**

- Creating a cyber-physical system for human-robot autonomy teams in underwater environments. Developing and integrating a hydrodynamic model for a human diver into an Unreal Engine avatar. The avatar replicates the authentic behavior of a diver underwater when controlled using a full-body motion capture system and a VR headset by an operator in the lab.
- Performing full body 3D reconstruction of a human diver using underwater videos from real-world scenarios to verify and validate the hydrodynamic model.
- Developing sensor models for various commonly employed sensors on underwater robots and merging them with virtual robots simulated within the underwater environment in Unreal Engine.
- Additionally, my responsibilities include creating intricate photorealistic underwater environments within Unreal Engine, replicating commonly utilized real-world open-water diving scenarios.

Bhabha Atomic Research Centre, Navi Mumbai *(Summer Research Intern, Electron Beam Centre)* **June 2018 – July 2018**

- Established a correlation between the mechanical properties of Ultimate Tensile Stress (UTS) and Toughness acquired from Uniaxial Tensile Test and Small Punch Test (SPT) for copper and its alloys across varying cryogenic temperatures.
- Performed simulations in ANSYS Workbench by using Finite Element Analysis on a CAD model of SPT created in Autodesk Inventor. Employed regression analysis to establish the correlation between UTS and Toughness derived from both tests.

Industrial Experience

Petrofac Engineering India Pvt. Ltd., Mumbai *(Engineer III, Mechanical Engineering Department)* **July 2019 – May 2021**

- Carried out the detailed engineering activities for Non-API pumps, Workshop Equipment, and Water Treatment Package (collectively valued at approximately $3 million in proposed price) as a rotating equipment design engineer.
- Studied the Front-End Engineering Design (FEED), drafted material requisition, package specification, package datasheet, Technical Bid Evaluation (TBE), and purchase requisition.
- Reviewed equipment design drawings & 3D CAD models, ensured interface alignment between vendor & other discipline designs, oversaw factory tests for the assembled package, and negotiated with vendors & clients to fulfill design requirements.
- Successfully lowered the purchase price for the workshop equipment compared to the proposed price by around 10%.

Oil and Natural Gas Corp. Ltd., Mumbai *(Summer Intern, Offshore Design Engineering Services)* **May 2019 – June 2019**

- Completed a project on the Design of Submarine Pipeline (underwater pipeline) system used for transportation of oil and gas from offshore platforms to onshore refineries.
- Validated vendor calculations for the design of these pipelines and verified their compliance to DNV 1981 standard.

Godrej and Boyce Manufacturing Co. Ltd., Mumbai *(Engineering Intern, Engineering Cell)* **Dec 2018 – Jan 2019**

- Completed project training in Security Solutions on Strong Room Door process improvement.
- Assisted in the R&D sector on the design of semi-automating the manufacturing process of these doors using conveyor system.

Mazagon Dock Shipbuilders Ltd., Mumbai ***(Engineering Intern, Ship building division)*** **Dec 2017 – Jan 2018**

- Completed a short-term industrial training on the equipment & processes involved in shipbuilding at the Plater & Assembly shop.
- Studied the manufacturing processes used in shipbuilding such as mold lofting, plasma cutting, various welding techniques, etc.

Bharat Petroleum Corp. Ltd., Mumbai (*Technical Intern, Central Engineering Workshop)* **June 2017 – July 2017**

- Monitored and reported the progress of maintenance operations conducted on a Multistage Horizontal Centrifugal pump.
- Conducted a comprehensive study on the maintenance procedures performed on both static & rotary equipment in the workshop.

Journal Publications

1. Paradise A, Surve S, **Menezes JC**, et. al. (2023), RealTHASC—A Cyber-Physical XR Testbed for AI-Supported Real-Time Human Autonomous Systems Collaborations, Front. Virtual Real. 4:1210211, doi: 10.3389/frvir.2023.1210211. (link)

2. **Menezes, Jovan**, and Sands, Timothy. 2023. "Discerning Discretization for Unmanned Underwater Vehicles DC Motor Control" Journal of Marine Science and Engineering 11, no. 2: 436. (link) (*Highly Cited Paper*)

Conference Proceedings

1. **Jovan Menezes**. 2024. MuModaR: A Multi-modal Cyber-physical World to Enhance Sim2Real Transfer in HRC. In Companion of the 2024 ACM/IEEE International Conference on Human-Robot Interaction (HRI '24). (under peer review)

2. N. P. Yelve, **J. C. Menezes**, S. B. Das, and B. M. Panchal, 'Augmentation of Mapping and Autonomous Navigation for Hexapod Robots by using a Visual Inertial System', Journal of Physics: Conference Series, vol. 1969, no. 1, p. 012005, Jul. 2021. (link)

3. **Menezes, J.**, Das, S., Panchal, B., Yelve, N.P., Kumar, P. (2022). Mapping, Trajectory Planning, and Navigation for Hexapod Robots Using ROS. In: Govindan, K., Kumar, H., Yadav, S. (eds) Advances in Mechanical and Materials Technology. EMSME 2020. Lecture Notes in Mechanical Engineering. Springer, Singapore. (link)

Workshop Contributions

1. **J. Menezes**, 'Multi-Modal Human Multi-Robot Collaboration in Cyber-Physical Environment', IROS'23: Workshop on Human Multi-Robot Interaction, 2023. (link)

Teaching Experience

1. Graduate Teaching Assistant for the mandatory junior year course **MAE 3260: System Dynamics for Spring 2023**. Conducted experiments, supervised lab sessions, provided office hours, evaluated submissions, and supported various logistical tasks.

2. Tutor for the freshman course **MATH 1110: Calculus I for Fall 2022**. Conducted personalized tutoring sessions, aided in assignments, provided guidance on course content, and facilitated the learning process.

3. Selected based on merit to tutor multiple **first-year courses** to students requiring special assistance for the semesters of **Fall 2015** and **Spring 2016**.

Awards/Competitions

- Awarded a **Graduate Research Assistantship** by the Sibley School of Mechanical & Aerospace Engineering for Summer '22.
- Won the **best senior project** in the institute for the 2018-19 academic year, awarded by TATA Consultancy Services and FCRIT.
- Awarded total funding of **Rs. 50,000** under the University of Mumbai's Research Grant for undergraduate research.
- Secured **3rd position** (2020) and **2nd position** (2019) at Aakash–National Symposium on Nascent Technologies in Aerospace Engineering & Aviation Systems organized by IIT Bombay & FCRIT.
- Won the **3rd position** in National Level Technical Paper Presentation and **1st position** in National Level Technical Project-based Poster competition at Calibre 2k19 hosted by The Institution of Engineers (India) and FCRIT.
- Achieved **3rd position** at XhibiTech'19 – National Level Project Exhibition & Competition.
- Secured **2nd position** under the Software category at the IEEE Inter-Collegiate Technical Project competition.
- Recipient of the Academic Achievement Award by Larsen & Toubro for securing **3rd rank** in the department in Sophomore year.
- Awarded by ISHRAE for securing highest marks in Thermodynamics course (Fall 2016) amongst ISHRAE College Student Chapter.
- Awarded by St. Joseph's High School for securing the highest marks in English course in SSC (Grade X) board exam.

Technical Tools

- **Software**: AutoCAD, Autodesk Inventor, Autodesk Fusion 360, ANSYS, Unreal Engine (Blueprints & C++), MoveIt, Gazebo, Robot Operating System (ROS), Linux.
- **Languages**: C, C++, Python, OpenCV, PyTorch, MATLAB, GNU Octave.

- **Hardware**: Dynamixel DC servo motors, Microsoft Kinect, ZED stereo camera, Intel RealSense Depth Camera, Arduino, Raspberry Pi, Intel NUC, WidowX 250s robot manipulator, OptiTrack motion capture system.
- **Documentation**: Microsoft Word, Excel & PowerPoint, Origin (Data Analysis and Graphing Software), LaTeX.

Technical Talks/Lectures

- **Title:** Role of a Mechanical Engineer in the EPCC Oil and Gas Sector; **Audience:** Senior year mechanical engineering students at FCRIT; **Date:** May 2021.
- **Title:** Use of Computer Aided Engineering Tools for Analysis of a Mechanical System; **Audience:** Senior year mechanical engineering students at FCRIT; **Date:** August 2020.
- **Title:** Design and Development of an Autonomous Hexapod Robot; **Audience:** Junior year mechanical engineering students at FCRIT; **Date:** March 2019.

Service and Outreach

- Research Mentorship: Jerry Jin (M. Eng. major in Electrical & Computer Engineering)
  Ella Johnson (B.S. major in Mechanical Engineering)
- Reviewer: In Companion of the 2024 ACM/IEEE International Conference on Human-Robot Interaction (HRI '24)
  Springer's Journal on Advances in Space Research
- Library Student Assistant at the Olin-Kroch-Uris Libraries at Cornell University (May 2022 – August 2022).
- Member of the student organizing committee for the 2nd Biennial International Conference on Nascent Technologies in Engineering (ICNTE) 2017 held at FCRIT.
- Organized a summer camp in 2015 for elementary and kindergarten children, featuring activities, music, and entertainment.