Jovan Clive Menezes

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Education

Cornell University, Sibley School of Mechanical and Aerospace Engineering Ithaca, NY
PhD, Mechanical Engineering Fall 2024 onwards

Cornell University, Sibley School of Mechanical and Aerospace Engineering Ithaca, NY
M.S., Mechanical Engineering (Minors: Computer Science, Electrical & Computer Engineering) 2021 – 2023

- 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 projects:** Localization, mapping & motion planning for autonomous mobile robots, Handwritten text recreation using a robot manipulator, Vehicle steering using Model Predictive Control, Comparison of localization filters for quadrotors, RpiPiano (mini-piano developed using Raspberry Pi), 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 (6^{th} in the class) 2015 – 2019

- Senior Thesis: 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 projects:** Color sorting robotic manipulator, Automated Peaucellier mechanism using Bluetooth control, Analysis of Gearbox & I.C. Engine for the SAE BAJA competition.

Research Experience

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

- Designing cyber-physical systems for human-robot teams collaborating in underwater and industrial warehouse environment.
- Developed a state-of-the-art framework to simulate sensor models within Unreal Engine for various sonar-based sensors such as Forward-Looking Sonar, Profiling Sonar, Echosounder, Side-Scan Sonar, etc.
- Created intricate photorealistic underwater environments, integrated wearable sensors such as heart-rate & breath-rate monitor into virtual environments, and deployed dynamic models & PID controllers for simulated underwater robots in Unreal Engine.
- Formulating and integrating a hydrodynamic model for a human diver into a virtual avatar in Unreal Engine. The avatar emulates true underwater dynamics when controlled by an operator in the lab via a full-body motion capture system and a VR headset.

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.
- Examined the Front-End Engineering Design (FEED, from which I drafted material requisition, package specification, package datasheet, Technical Bid Evaluation (TBE), and purchase requisition.
- Evaluated 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. (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. (Editor's Choice Award) (link) (*Highly Cited Paper*)

Conference Proceedings

1. S. Surve, **J. C. Menezes**, C. Tate, J. Guo, J. Jin, J. Walker, and S. Ferrari, "UnRealTHASC -- A Cyber-Physical XR Testbed for Underwater Real-Time Human Autonomous Systems Collaboration," *2024 33rd IEEE International Conference on Robot and Human Interactive Communication (RO-MAN)*, Pasadena, CA, USA, 2024. (under review)

2. **Jovan Clive Menezes**. 2024. MuModaR: Multi-modal Framework for Human-Robot Collaboration in Cyber-physical Systems. In *Companion of the 2024 ACM/IEEE International Conference on Human-Robot Interaction (HRI '24 Companion), March 11–14, 2024, Boulder, CO, USA*. (link)

3. 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)

4. **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. Sushrut Surve, **J. C. Menezes**, J. Jin, C. Tate, J. Guo, J. Walker, and S. Ferrari, 'Human-centric Cyber-Physical XR Testbed for Underwater Human-Robot Teaming', *ICRA'24: Workshop on Advancing Wearable Devices and Applications through Novel Design, Sensing, Actuation, and AI*, Yokohama, Japan, 2024. (link)

2. **J. Menezes**, 'Multi-Modal Human Multi-Robot Collaboration in Cyber-Physical Environment', *IROS'23: Workshop on Human Multi-Robot Interaction*, Detroit, MI, USA, 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 provide tutoring support for **freshmen courses** on Applied Physics, Applied Chemistry, Applied Mathematics, Engineering Mechanics, and Basic Electrical & Electronics Engineering for **Fall 2015** and **Spring 2016** to students requiring special assistance.

Awards

- Awarded **Cornell Fellowship** by the Sibley School of Mechanical & Aerospace Engineering for Fall '24.
- Awarded a **Graduate Research Assistantship** by the Sibley School of Mechanical & Aerospace Engineering for Summer '22.
- Won the **best senior thesis** 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.
- Honored by ISHRAE for achieving the highest marks in Thermodynamics course (Fall 2016) within the College Chapter.
- Awarded by St. Joseph's High School for securing the highest marks in English course in SSC (Grade X) board exam.

Invited Talks

- Guest Speaker; RealTHASC: A cyber-physical XR testbed for Real-Time Human Autonomous Systems Collaborations; XR Monthly Meeting (organized by the XR Collaboratory, Cornell Tech); March 2024.
- Guest Lecturer; Role of a Mechanical Design Engineer in the EPCC Oil and Gas Industry; Department of Mechanical Engineering, FCRIT; May 2021.
- Guest Lecturer; Use of Computer Aided Engineering Tools for Analysis of a Mechanical System; Department of Mechanical Engineering, FCRIT; August 2020.
- Guest Lecturer; Design and Development of an Autonomous Hexapod Robot; Department of Mechanical Engineering, FCRIT; March 2019.

Technical Tools

- **Programming**: C, C++, Python, MATLAB, GNU Octave.
- **Software**: AutoCAD, Autodesk Inventor, Autodesk Fusion 360, SolidWorks, ANSYS (APDL & Workbench), Unreal Engine, MoveIt, Gazebo, ROS/ROS2, Linux.
- **Hardware**: Arduino, Raspberry Pi, Intel NUC, OptiTrack & Xsens motion capture system, Meta Quest Pro, Varjo XR-4 headset.
- **Documentation**: Microsoft Word, Excel & PowerPoint, Origin (Data Analysis & Graphing Software), LaTeX.

Service and Outreach

- Research Mentorship: Jerry Jin (M. Eng., Electrical & Computer Engineering)
  Justin Walker (B.S., Mechanical Engineering)
  Ella Johnson (B.S., Mechanical Engineering)
- Reviewer: 2024 19th ACM/IEEE International Conference on Human-Robot Interaction (HRI '24)
  2024 33rd IEEE International Conference on Robot and Human Interactive Communication (RO-MAN '24)
  Springer's Journal on Advances in Space Research
- Keyboardist (certified by Trinity College London) for church choirs for over 13 years.

Administrative Experience

- 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 hosted at FCRIT.
- Organized a summer camp in 2015 for elementary and kindergarten children, featuring activities, music, and entertainment.

References

1. Prof. Silvia Ferrari (M.S. thesis advisor & current supervisor)
   Associate Dean for Cross-campus Engineering Research
   John Brancaccio Professor
   Sibley School of Mechanical and Aerospace Engineering
   Cornell University
   543 Upson Hall, Ithaca, NY 14853
   Tel: (607)280-2886; Fax: 607/255-1222; ferrari@cornell.edu

2. Prof. Mark Campbell (Course instructor & research mentor)
   John A. Mellowes '60 Professor
   Sibley School of Mechanical and Aerospace Engineering
   Cornell University
   547 Upson Hall, Ithaca NY 14853
   Tel: (607)255-4268; mark.campbell@cornell.edu

3. Prof. Timothy Sands (Course instructor & coauthor)
   Professor of Practice in Space Systems
   Sibley School of Mechanical and Aerospace Engineering
   Cornell University
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