Anushree Sabnis

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Domains : Data Science, ML, Signal Processing, DL, Robotics, Mechanical Engineering

Education

Veermata Jijabai Technological Institute (VJTI Mumbai) **August. 2019 – May 2023**
Bachelor of Technology in Mechanical Engineering *Mumbai, Maharashtra*

Publications

* denotes equal contribution

Journal Papers

- *Investigating the roles of reflexes and central pattern generators in the control and modulation of human locomotion using a physiologically plausible neuromechanical model.* **Submitted (January 2023)**
  Andrea Di Russo*, Dimitar Stanev*, **Anushree Sabnis**, Simon M. Danner, Jessica Ausborn, Stéphane Armand, Auke Ijspeert
  Journal of Neural Engineering. [Preprint]

Research Experience

Ijspeert Laboratory, Ecole Polytechnique Fédérale de Lausanne **March 2023 - Present**
EPFL SRP Research Intern Supervised by Prof. Auke J. Ijspeert Ptera, Python, Matlab, Bayesian Optimisation

- Awarded the competitive EPFL Summer Research Program fellowship.
- Extended the feedforward simulation of ornithopters by including structural effects due to wing flexibility.
- Modelled Aero-elastic effects of flapping wings in Ptera aerdynamic simulator using Matlab and Python and extracted crucial design parameters.
- Performed signal processing on experimentally obtained Force Sensor data as well as Image processing on wing deformation data to validate mathematical model.
- Performed design optimisation using Bayesian Optimisation algorithms to determine optimal design for Aeroelasticity.

BioRobotics Laboratory, Ecole Polytechnique Fédérale de Lausanne **March 2022 - Present**
Research Intern Supervised by Prof. Auke J. Ijspeert ML, Signal Processing, BioMechanics, SCONE

- Developed signal processing application to pre-process (using filters such as Savitzky-Golay) biomedical data (sensory feedback) for ML mode and verification using statistical methods.
- Developed estimation methods using PCA and PLSR for metabolic cost of transport based on sensory feedback response during human gait with 95% accuracy.
- Formulated a unique 'virtual sensor' approach to cost of transport estimation based on significant sensory gains and feedback signals. Project Presentation Link

Research Intern at Stochastic Robotics Lab, IISC Bangalore **December 2021 - March 2022**
Research Intern Supervised by Prof. Shishir Kolathaya Time-Series Analysis, ROS

- Developed novel Position-Velocity-Effort hardware interface for Stoch3, a quadruped robot.
- Implemented Time-Series Analysis for foot contact estimation algorithm in the absence of force sensors for Quadruped Robots capable of performing calculations at 100 Hz. Project Report Link

Multi-Robot Autonomy Lab, IISER-Bhopal **November 2021 - May 2022**
Research Intern Supervised by Prof. Sujit P.B. CV, DL, Multirobot coordination (U.A.V.)

- Team leader participating in The MBZIRC Maritime Grand Challenge.
- Implemented transfer learning to detect images of USVs from limited dataset.
- Implemented Collective Lifting using the multiple dog single sheep model from the non-cooperative shepherding swarm model. (Link to white paper)

Industrial Experience

Linux Foundation Fall Term Intern **September 2021 – November 2021**
Open Horizon Edge Computing, Github Actions, Bash, Scala, Go, Docker, Kubernetes

- Enhanced a service to automatically perform a set of unit tests daily on a product in development in order to decrease time needed for team members to identify and fix bugs/issues.
- Enhancing end-to-end tests for Open Horizon anax, an agent(node) control system for deployment of over 40,000 nodes.

Open Source Developer and Mentee with ROS 2 **July 2021 – September 2021**
Open Source Promotion Plan C++, ROS2, Navigation2

- Implemented a new action server in Navigation2 stack that provided more control to user over existing Recovery Server.
- Added Assisted Teleop feature to Navigation2 stack which improves upon Joystick teleoperation of Mobile and Telepresence robots.

Projects

Mobile Manipulator | *Python, ROS, Gazebo, CoppeliaSim, Mechanical Design, Hardware* **November 2020**

- Designed a 5 DoF Mobile Manipulator to perform dexterous tasks for industrial purposes, using Solidworks and simulated it in CoppeliaSim and Gazebo.
- Perform Pick and place operations, implemented object detection and classification using YOLO, enable localisation with sensors and use SLAM for mobile manipulator.

Robot Execution Failure Classification | *ML*

- Developed an ML-based classification model for robot failure detection.
- Performed comparitive analysis of KMeans, SVM and Random Forest Classifier.

Technical Skills and Certificates

Programming Languages: Python, C++, C, Scala, Go, Matlab
Technologies/Frameworks: ROS, ROS 2, SCONE, OpenSim, Kubernetes, GitHub, Docker, Github Actions
Hardware: Catia, Creo, Fusion360, Ansys, Rapid Hardware Prototyping (3D Printing)
Certifications: Solidworks (CSWA certified)

Leadership / Extracurricular

Society of Robotics and Automation **July 2020 - June 2022**
Joint General Secretary *VJTI, Mumbai*

- Led chapter of 30+ members, Managed and co-conducted Wall-E-2.1(Self-Balancing Robot), MARIO(3 DOF Robotic arm) Workshops and Pixels(Image Processing, Git, Python and Computer Vision) Seminar for over 200 freshmen students for each.

Awards and Fellowships

- EPFL Life Sciences Summer Research Program Research Scholar 2023 - Received a 2 month fellowship to conduct cutting-edge research at EPFL.
- Semi-finalist in Mohamed Bin Zayed International Robotics Challenge (MBZIRC), 2021-2024, from 52 qualified entries from roboticists at undergraduate to professional level spanning across 30 countries.
- EPFL Excellence in Engineering (E3) Research Scholar 2022 - Received a 2 month fellowship to conduct cutting-edge research at EPFL.
- Linux Foundation (LFX) Fellowship 2021 - Awarded a three month fellowship as part of the LFX Mentorship program organized by the Linux Foundation.