Astha Gupta

Interests **Robot Locomotion, Machine Learning, Neurorobotics**

Education

European Master in Advanced Robotics Plus (EMARO+) **Sep 2018 - Aug 2020**
Ecole Centrale de Nantes, France GPA: 91/100
University of Genoa, Italy GPA: 97.64/100

Master of Science (Technology) in Information Systems **Aug 2012 - Jul 2016**
Birla Institute of Technology and Science, Pilani, India CGPA: 8.27/10

All India Senior School Certificate Examination (Class XII) **2012**
Modern Vidya Niketan Sector-17, Faridabad, India Percentage: 94.6%

Publications

- Zapf, M. P., **Gupta, A.**, Saiki, L. Y. M., & Kawanabe, M. (2018, August). Data-Driven, 3-D Classification of Person-Object Relationships and Semantic Context Clustering for Robotics and AI Applications. In 2018 27th IEEE International Symposium on Robot and Human Interactive Communication (RO-MAN) (pp. 180-187). IEEE.
- **Gupta, A.**, & Goel, L. (2016, September). Heuristic Approach for Face Recognition using Artificial Bee Colony Optimization. In The International Symposium on Intelligent Systems Technologies and Applications (pp. 209-223). Springer, Cham.

Work Experience

Biorobotics Labratory, Ecole Polytechnique Fédérale de Lausanne, Switzerland
Assistant Researcher (affiliated with NCCR) **Sep 20 - Feb 21**

- Integrated Krock, bio-inspired amphibious robot, with PyBullet, simulation platform
- Adapted Krock's low level controllers to be easily used and developed upon in python or cpp, and enabled it to be used with webots PyBullet
- Implemented simulation-to-real transfer feature to validate learnt Central Pattern Generator (CPG) based locomotion strategies, and demonstrated Krock walking as proof of concept
- Implemented real-to-simulation feature to identify system parameters such as drag coefficients for swimming

Von Reventlow Robotics, Munich, Germany
Robotics Intern **Jul 2019 - Aug 19**

- Evaluated the viability and adapted Octomap and Moveit for trajectory planning on a novel omni-drive service robot
- Worked on implementation of a pick-and-place routine following Object detection, Object extraction, Grasp prediction and Action execution

Advanced Telecommunications Research Institute International, Japan
Research Engineer, Dynamic Brain Imaging (DBI) **Oct 2017 - Aug 2018**
Artificial Consciousness towards Human Actions

- Implemented 3D framework for spatio-temporal analysis of person-object interaction using Point cloud extraction from images via RGB-Depth co-registration
- Modelled data into time-series occupancy map and person-object co-localization maps
- Clustered correlation patterns using K-means to obtain human-object interaction context
- Implemented Autoencoder and LSTM to predict changes in the environment in near future

VMware, Bangalore, India
Member of Technical Staff, VMware Cloud Foundation (VCF) **Jul 2016 - Sep 2017**

- Leveraged ITIL practices with the help of Servicenow APIs for efficient data center management
- Responsible for Configuration Management integration point between VCF and Servicenow
- Backup and Recovery: Written a python script to back-up data from Cassandra and ESXi host
- Photon Controller: Worked towards providing containers as Infrastructure as a part of VCF

Inria, Lille - Nord Europe, France
Research Intern, MOdels for Data Analysis and Learning (MODAL) **May 2016 - Jul 2016**
PAC Bayesian Non-Negative Matrix Factorisation using Block Gradient Descent

- Implemented Probably Approximately Correct (PAC) Bayesian algorithm with optimised search for Non-Negative Matrix Factors using Block Gradient Descent
- Applied the algorithm to Handwriting Recognition and contributed to open source (PACbayesian-NMF) as a result of internship

iLabs [24]7 Inc., Bangalore, India
Data Science Intern, Data Science Group (DSG) **Jul 2015 - Dec 2015**

- Worked on Advertisement Re-Targeting and Product Recommendation system
- Created product end to end for one of the customers using feature engineering and purchase propensity models

Project Experience

Salamander Locomotion Analysis (Master thesis) **Mar 2020 - Aug 2020**

- Worked on multimodal controller design and characterization to replicate locomotion of Salamanders using somatosensory feedback with Central Pattern Generators (CPGs)
- Used multi-objective evolutionary algorithms (MOEA) for learning the control parameters
- Evaluated and compared state-of-the-art MOEA algorithms for performance
- Devised generic objective functions for learning and performance evaluations for locomotion
- Explored open loop versus closed loop control architectures for different types of connections between body and limb: body to limb, limb to body, bi-directional, and decoupled

Task Priority Control for Underwater Intervention **Sep 2019 - Jan 2020**

- Worked on Task Priority Control approach for Underwater Vehicle-Manipulator System (UVMS) based on theory presented by Simetti E. et al
- Implemented safe way point navigation, landing, tool-frame manipulation, and safety objectives - horizontal altitude control and minimum altitude control

Modeling and Analysis of CloPeMa Gripper **Sep 2019 - Jan 2020**

- Carried out position and velocity analysis of CloPeMa mechanism using Screw Theory
- Modelled and Simulated the mechanism via Simscape Multibody Matlab Toolbox

Navigation in Social Environment for NAO **Dec 2019 - Jan 2020**

- Compared different approaches for Navigating in Social Environment
- Developed a plugin to integrate the Human Aware Navigation package with NAO framework

Omni-Directional Mobile Robot for Playing Soccer **Dec 2019 - Jan 2020**

- Created an omni-directional mobile robot to play soccer autonomously
- Implemented and tested algorithm in Gazebo with ROS

Nonholonomic Path Planning using A-star Algorithm **May 2019 - Jun 2019**

- Worked on path planning of a (2,0) mobile robot in a maze using A* algorithm
- The approach involved discretization of the control inputs instead of the conventional approach to discretize the environment space
- Implemented multiple variations of the base algorithm to evaluate their effect

Sentiment Analysis for Review Spam Detection **Jan 2016 - May 2016**

- Devised four-step procedure along Semi-Supervised approach for dataset annotating
- Implemented dichotomous classification of spams into definitive and likely categories
- Extracted and analysed effect of Sentiment Features for Review Spams predictions in multiple ML algorithms

Optimizing Join operation on Clusters **Jan 2015 - May 2015**

- Devised strategies and successfully implemented the proposed design using MPI and OpenMP.

Creation of a Keyword Index using Map-Reduce in Hadoop **Jan 2015 - May 2015**

- Implemented TFIDF analysis using Hadoop's Map-Reduce framework

Technical Skills

- **Programming languages:** C, C++, Python, Cython, MATLAB, Java,
- **Libraries:** jMetalPy, Pymoo, Keras, OpenCV, OpenGL, OctoMap, Point Cloud (PCL)
- **Simulation & Frameworks:** Robot Operating System (ROS), Simulink, PyBullet, Gazebo, Keras, Tensorflow, Docker, Git
- **Single-Board Computer & Microcontrollers** RaspberryPi 3 model A+, Odroid-XU4, Arduino Due, Nvidia Jetson xavier

- **Technical Writing** Latex, Microsoft Office
- **Operating Systems** Linux/Ubunutu, Windows

Honors & Awards

- Research Thesis Scholarship'20 by Università degli studi di Genova
- Erasmus Mobility Scholarship'19 by Ecole Centrale de Nantes, France
- Charpak Allocation Mensuelle d'Entretien (AME) Scholarship 2018
- *Bravo Award* for exceptional performance at iLabs[24]7 Inc.
- Finished undergraduate degree within *Top 10%* in class at BITS Pilani
- Ranked within *top 1%* of the *All India Senior School Certificate Examination* (AISSCE)

Leadership & activities

Member, Master Inventors, VMware **Jun 2017 - Sep 2017**

- Facilitating and encouraging research activities with university collaborations and patent filing

Member, Student-Faculty Council, BITS Pilani **Jan 2016 - May 2016**

- Providing feedback and communicating issues regarding academic matters

Professional Assistant, Computer Programming Course **Jan 2016 - May 2016**

- Responsible for conducting labs and evaluation components for Computer Programming Course under Department of Computer Science & Information Systems (CSIS)

Coordinator, Department of Art, Design and Publicity **Aug 2014 - Jul 2015**

- Led 50+ member team for on-campus art, decoration and online publicity of all India inter-college cultural and technical festival

References

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Dr. Fulvio Mastrogiovanni
Associate Professor
University of Genoa
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