Sagar Malhotra

Final year Masters student, Department of Physics, University of Trento
Associate of INFN(National Institute for Nuclear Physics, Italy)
Research Student at Fondezione Bruno Kessler,Trento

90, San Bartalomeo
Via della Malpensada
Trento, Italy-38123
sagar.malhotra@studenti.unitn.it | sagarmalhotra0594@gmail.com
Linkedin : www.linkedin.com/in/sagar-malhotra
Github : github.com/SagarAI
+39-3208412396

Education

University of Trento, Trento, Italy
Masters in Physics, Department of Physics — *sep' 16 - Dec' 18 (Expected)*
Result: NA

- Pursuing a Highly Inter disciplinary degree, having completed 45 credits in Computer Science and Quantitative Biology along with Compulsory credits in Physics.

University of Delhi, Delhi, India
Bachelor in Physics with Honors, SGTB Khalsa College — *Jun' 12 - Jul' 15*
Result: First Class

- A three years Bachelors covering the essentials of fundamental academic topics dealing in different realms of Physics, along with hands on experimental training

Research Interests

Statistical learning Theory, Deep Learning, Artificial Intelligence, Logic, Constraint Reasoning and Optimization

Awards & Achievements

- Awarded the **Opera Universitaria Scholarship** at University of Trento
- Awarded the **JP-UNITN-SISSA Scholarship** for the Joint Masters in Theoretical Physics at University of Trento and SISSA- Trieste (Later Declined)
- Part of the wining team in **Industrial Problem Solving using Physics-2017**
- Awarded fully funded trip to **Innovation Days-Innsbruck** in StartUp Lab, Trento.
- Secured a position in top **5%** candidates in JEST 2016 among 5000 candidates
- Secured a position in top **5 %** candidates in IIT-JAM 2016 among 10000 candidates
- Founder and president of Inter-disciplinary sciences society-**Quark** at SGTB Khalsa College
- Executive member of the Debating Society-**DADS** at SGTB Khlasa College

Thesis Description

Developing Track Reconstruction algorithms using Deep Learning for
Next Generation High Energy Physics Experiments.
Supervisors: Prof. Roberto Iuppa, Dr. Marco Cristoforetti

- Developed a novel deep learning framework for track reconstruction
- Developed a two dimensional particle track simulator for data generation
- Implemented multiple clustering and classical tracking techniques for bench marking and testing
- A major part of the work involved minimizing computational complexity at each step for faster implementation in real run.
- Ongoing work on improving performance in time and extending the model to more complicated datasets.
- Experimented with many Deep Learning architectures like LSTM's, RNN's etc.

Course/ Research Projects

Natural Language Processing and Information retrieval
Supervisor : Prof. Alessandro Moschitti,DISI[1]*,UNITN* [2] *Sep 2018 - Present*

- Developing a project on Crowd behavior prediction using Spatio-Temporal information
- Working on various architectures and datasets, predominantly Spatial-Temporal RNN's and LSTM's

Recognition Systems
Supervisor : Prof. Farid Melgani,DISI, UNITN *Feb' 2018 - Jun' 2018*

- Developed a presentation on GAN's
- Developed a toy model for generating and discriminating Gaussian distributions in Pytorch using GAN's

Machine Learning
Supervisor : Prof. Andrea Passerini, DISI,UNITN *Sep 2017 - Dec' 2017*

- Developed a statistical Model using Bayesian networks
- Developed Naive Bayes based spam detection Algorithm
- Developed handwritten alphabet classifier using Deep Learning in Tensorflow

Biological Networks
Supervisor : Prof. Mario Lauria, COSBI *Feb' 2017 - Jun' 2017*

- We tried to apply different techniques seen in the course to a dataset concerning mid-brain cells gene expression obtained by samples collected from postmortem human brains
- Our aim was to identify the most robust differences in the gene expression between chronic drug users and control subjects

Advanced Electronics Lab
Supervisor : Prof. Leonardo Ricci, Dep. of Physics, UNITN *Feb' 2018 - Jul' 2018*

- Implemented various algorithms and digital filters in Verilog on FPGA
- Developed Electrocardiogram with peak detection algorithm and Heart rate counter using a mix of analog and Digital Filters implemented in FPGA

Computational Physics
Supervisor : Prof. Francesco Pederiva, Dep. of Physics,UNITN *Sep' 2016 - Dec' 2016*

- Numerical Solution of One Dimensional Schrodinger equation
- Numerical Implementation of Local Density Approximation for Finite systems
- Monte Carlo Methods

StartUp Lab
Feb' 2017 - May 2017

- Developed Arduino based trash level sensor in Trash bins for our Start Up proposal
- Integrated the sensors with Ubidots API for real time data feed
- Developed algorithm for route optimization for trash collection trucks

[1] Department of Engineering and Information
[2] University of Trento

Research/ Course Projects

Non-canonical analysis of 4-Dimensional Lotka-Volterra equations
Prof. Sanjeev Kant Soni, University of Delhi *Aug'2015 - Aug' 2016*

- Analyzed the analytical behavior of lotka-Volterra equations in a new non-canonical Hamiltonian structure
- The project involved analyzing the new conserved quantities that naturally emerged in this non-canonical treatment

Role of Nano crystals in Energy Harvesting using SnS thin films
Prof. P. Arun, University of Delhi *Aug' 2013 - Aug' 2014*

- Worked on synthesis and properties of Quantum Dots
- Gave a poster presentation on the Project and Quantum Dots at Antardhvani(University of Delhi's annual fest)

Winter Internship
Prof. Ramesh Chandra, Institute Instrumentation Center, IIT-Roorkee *Dec'2013*

- Worked at the Institute Instrumentation Center at IIT-Roorkee
- Learned important experimental and computational techniques for thin film deposition

Computer Skills

Languages and tools: Python, C++, Bash, Verilog, LaTeX, Git, Mathematica, Plotly,R

High Performance Computing: Working with FBK[3] super computer cluster for performing all computational tasks involved in the Thesis

Extra Interests

Hackethons: Hack UPC: Barcelona, Innovation Days: Innsbruck(Special Mention), IPSP-2017(Winner)
Hobbies: History and Monuments enthusiast,Debating, Logic problems, Project Euler

Languages

English(IELTS[4]) : Speaking: 7.5, Writing: 7, Reading: 8.5, Listening: 8.5
Overall Band score: 8.0

References

Prof. Roberto Iuppa, Department of Physics, University of Trento: **roberto.iuppa@unitn.it**
Dr. Marco Cristoforetti, Fondazione Bruno Kessler, Trento: **mcristofo@fbk.eu**
Prof. Leonardo Ricci, Department of Physics, University of Trento, **leonardo.ricci@unitn.it**

[3] Fondazione Bruno Kessler
[4] IELTS Test score of 2016