Rahul Shankar

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Objective

I am an early career academic with an interest in nuclear physics, particularly in the experimental domain. I would love an opportunity to do a research as a member of a team dedicated to unlocking the biggest mysteries of the Universe, and to take my skills and knowledge further through an exciting physics study.

Skills & Abilities

Computer Languages and Platforms known

- Languages Known with high Proficiency: **C and C++, Java, MATLAB, Linux (shell)**
- Software Packages Known with high Proficiency: **ROOT, Geant4, OpenCV, Origin**
- Additional Languages Used at a Basic Level: **SQL, Python, VB, JavaScript, cpp-netlib**

Experimental Skills

- Experienced with operation, calibration and data acquisition using HPGe, Scintillator and Gas Filled radiation detectors.
- Familiar with analogue and digital electronics associated with detectors including diagnostics using oscilloscopes.
- Ability to work with coincidence/anti-coincidence systems set up using logic gates.

Data Analysis

- Completed a certified online course on 'Addressing Large Hadron Collider Challenges through Machine Learning'.
- Extensive experience in working with radiation detector data and deduction of signal from gaussian error distributions and system noise.
- Good at applied math and demonstrated proficiency with application of mathematical and statistical techniques for data analysis and refinement.
- Experience in computational techniques specific to colliding beam experiments such as four-vectors, phase space analysis, rapidity curves, reconstruction of the primary interaction and estimation of the mass of virtual particles.

Programming Competencies

- Expertise in Object Oriented Programming and Algorithm Development in C++ developed from working on curricular research activities as well as numerous independent projects on Avionics and Robotics.
- Experience in creation and implementation of simulation algorithms using Monte-Carlo event generators and associated functions in ROOT, Geant4 and MATLAB.
- Able to learn new languages and interfaces quickly (within a week or two) from standard user documentation and practice.
- Ability to work self-reliantly without supervision and develop programs for simulation and analysis from scratch.

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Research Experience

Defence Research and Development Organization, Research Fellow
Dec 2017 - Present

- Working on development of Lightweight Radiation Shielding for applications in Nuclear Defence.
- Currently responsible for creation of a Geant4 simulation environment to characterize shielding against Galactic Cosmic Rays and Van-Allen Belt protons.
- Successfully incorporated the MIRD Human Phantom and BON GCR model to estimate expected dose-rates to astronauts inside an Orbital Re-entry Vehicle.

University of Glasgow, Postgraduate Researcher
June 2016 - Aug 2016

- Worked on Exotic mesons and glue ball searches at a future Electron Ion Collider, to be built at Jefferson Labs.
- Created an algorithm in ROOT to Generate Monte-Carlo meson production events according to a theorized e-p interaction model, and simulate its detection based on the design parameters of the MEIC ultra-forward detection systems.
- Performed analysis of the simulation results and suggested expected yields and required improvements in the current detector design to increase chances of discovery.

Bhabha Atomic Research Centre, Project Trainee
Feb 2015 - June 2015

- Worked on the Simultaneous Determination of diffusion coefficients of hydrogen and deuterium in $Zr - 2.5\% \ Nb$ alloy using Hot Vacuum Extraction - Quadrupole Mass Spectrometry (HVE-QMS).
- Performed device operation, data collection and organization, calculation of results (using MATLAB) as well as routine and maintenance activities

Bhabha Atomic Research Centre, Project Trainee
June 2014 - Aug 2014

- Worked on the Non-destructive determination of isotopic composition of uranium samples through passive gamma spectrometry.
- Created a streamlined algorithm in MATLAB to accept spectral data from the MCA and produce the estimated value of isotopic composition, possibly saving many hours of manual calculation.
- Also worked on an additional project on Quantitative assay of rare-earth elements in samples of fly-ash using neutron activated gamma spectrometry.

Variable Energy Cyclotron Centre, Project Trainee
July 2013 - Aug 2013

- Worked on the Gamma spectrometric study of iodine isotopes obtained in alpha induced fission of uranium.
- Performed irradiation of a Uranium sample with a 40MeV alpha beam and measured high resolution spectra from the short-lived fission isotopes using a HPGe 'Clover' detector and coincidence circuits.

Teaching and Additional Work Experience

The Great Eastern Institute of Maritime Studies, Faculty of Physics   Oct 2017 - Dec 2017

- Worked as a visiting faculty to teach Trainee Navigating Officer Course (TNOC) students intermediate level concepts in physics.
- Responsible for creating a lesson plan with presentations and student notes, conducting continuous assessments and designing the mid-term exam question paper for the students based on the pattern prescribed by the International Maritime Organization.

Voyage Aerospace, Software Developer   July 2014 - Jan 2016

- Worked on the Design and development of essential software components for autonomous Unmanned Aerial Vehicles.
- Created a 'flight-panel' GUI for continuous monitoring of remote-controlled as well as autonomous aerial robots using OpenCV.
- Created an integrated three-dimensional path planning algorithm in C++ which determines the most efficient and low-cost path to traverse a given geographical terrain.

Education

University of Glasgow, MSc Physics: Nuclear Technology   2017

Thesis: Exotic mesons and glue ball searches at a future Electron Ion Collider

Honours: Degree passed with Merit (GPA: 15.77 of 22)

Amity University, BTech Nuclear Science and Technology   2017

Thesis: Simultaneous determination of diffusion coefficients of hydrogen and deuterium in Zr-2.5% Nb alloy using hot vacuum extraction

Honours: Degree passed in First Division (GPA: 7.56 of 10)

Communication

- Delivered a presentation to the Nuclear Radiation Management and Applications Division of the DLJ (and subsequently to the Indian Space Research Organization) on the verified results and potential capabilities of the Geant4 based Galactic Cosmic Ray simulator.
- Presented papers on my independent work at the Symposium on Nuclear and Radiochemistry (NUCAR 2015) as well as at the International Conferences on Signal Processing and Integrated Networks (SPIN) on three separate occasions.
- Delivered numerous professional reports and presentations on scientific ideas and projects during my coursework and internships.
- Excellent ability to deliver creative PowerPoint presentations and to communicate scientific and technical ideas to non-technical audiences.
- Achieved an overall score of 8 in the International English Language Testing Scheme.

Management

- Co-organized the TEDx University of Glasgow 'One Step Further' Innovation Conference in March 2017.
- Maintained and managed the cash registry and takeout orders as a Cashier at Akbar's Restaurant in Glasgow and facilitated the upgradation of the process to a paperless one in April 2017.
- Worked as a support worker at Clear Links UK, alongside my MSc studies, to provide support to disabled or dyslexic students through notetaking, typing or study assistance services and facilitate equal access to education.

List of Publications

"Three-dimensional D* algorithm for incremental path planning in uncooperative environment"
IEEE Conference Publications: 431-435 (DOI: 10.1109/SPIN.2016.7566733)   2016

"Obstacle Size and Proximity Detection Using Stereo Images for Agile Aerial Robots"
IEEE Conference Publications: 437-442 (DOI: 10.1109/SPIN.2015.7095261)   2015

"Non-destructive determination of isotopic composition of uranium"
IAEA INIS (Reference No: 46089721)   2015

"Navigation Error Reduction in Swarm of UAV's"
IJDIWC 4(4): 493-498 (DOI: 10.17781/P001346)   2014

"Moving object tracking from moving platforms"
IEEE Conference Publications: 85-89 (DOI: 10.1109/SPIN.2014.6776927)   2014

Online Profiles

Research Gate – https://www.researchgate.net/profile/Rahul_Shankar6

Hobbies and Interests

- I love to play the piano and have performed in college cultural festivals as well as the Inter-University Battle of the Bands.
- A recent interest of mine is playing the bamboo flute. My public performances consist of one at my college farewell party and at weddings.
- I love to travel and am a survivor of three 'off-the-beaten-track' hikes up the Himalayas.
- I am also an amateur photographer and love to capture animal portraits, eye-catching natural colours and beautiful landscape.

References

Dr. Derek Glazier
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Dr. S S Barala
Scientist (RSU/NRMA, Defence Laboratory, Jodhpur)
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