# Bharat KUNWAR
## Research Software Engineer

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I consider myself to be an experienced problem solver in a cross section of technical domains. In my current role at StackHPC, I have been involved in developing and benchmarking platforms which integrate High Performance Computing environments with cloud technologies such as Kubernetes and OpenStack. In my former role at Airbus, I trained a deep reinforcement learning algorithm to automatically learn and adapt globally optimal rules of interaction when a fleet of connected autonomous vehicles engage with other vehicles on the road in a multi-agent micro-simulation environment. Earlier during my doctoral training, I built a large scale agent-based simulation environment to measure city evacuation time by leveraging big open geospatial datasets like OpenStreetMap and used this to subsequently mine topological features from network graph representation of cities to understand metrics that make some cities easier to evacuate than others. For my next role, I want to continue collaborating on stimulating projects solving real world problems that people and business entities are facing using state-of-the-art techniques.

## Technical Competencies

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| **Languages** | Python, Matlab, Golang, C++, Bash, Javascript, Solidity |
| **Data** | Scikit-learn, Scipy, PIL, Numpy, NetworkX, Pandas, Jupyter, FastAI, PyTorch, Keras, Tensorflow, OpenAI Gym, Shapely |
| **Infrastructure** | Kubernetes, Helm, Docker, Kata Containers, Ansible, Terraform, CephFS, BeeGFS, GlusterFS |
| **Workflow** | Git, SVN, Vim, Sublime Text, Visual Studio Code, LaTeX |
| **Database suites** | PostgreSQL (with PostGIS plugin), MariaDB (MySQL), InfluxDB, MongoDB |
| **Cloud Providers** | OpenStack, Google Cloud Platform, Amazon Web Services, Microsoft Azure |
| **Web Frameworks** | Python (Django, Flask, Jinja), Javascript (React), PHP, Leaflet.js, HTML, CSS |
| **Operating Systems** | Ubuntu, CentOS, Fedora, MacOS, Windows |

## Spoken Languages

English ●●●●●
Nepalese ●●●●○
Hindi ●●●○○

## Soft Skills

- Analytical and creatively minded problem solver
- Confident speaker who equally values listening
- Comfortable in positions of responsibility
- Inclusive of others, thrives in diverse teams

## Education

2017 **University of Bristol**
Ph.D. thesis titled 'Mass Evacuation and Crisis Readiness of Cities using Open Geo-spatial Data and Agent-based Modelling'.
- I built a framework to run large scale agent-based simulation of city evacuation to measure evacuation time and evacuation-friendly topological metrics from crowd-sourced datasets like OpenStreetMap and ORNL LandScan population data.
- I created a website (https://massevac.github.io) to make some of the findings accessible to the public which shows how cities across the UK perform compared to one another in terms of evacuation time.
- I published several publications on peer-reviewed journals and proceedings and had opportunities to present my work at several academic and non-academic conferences.

2012 **University of Bath**
M.Eng. (upper second class honours) in Civil and Architectural Engineering.
- I was a course representative in my final year.
- I was active on the committee for Engineers Without Borders, Visual Arts Society and People and Planet student societies and helped organise various related workshops.

2008 **Harvey Grammar School**
A levels in Mathematics, Art, Computing, Chemistry (As).
- Recipient of a second prize for Folkestone Young Artist Award.

2005 **Carr Hill High School**
GCSEs in Science, Mathematics, ICT, Art (As), English, Graphics Design, P.E. (Bs).
- Additionally, I was involved in setting up an online shop through the Young Enterprise scheme.

## Professional Experience

**Present – February 2018** | **Software Engineer, StackHPC, Bristol**

- Core contributor to Magnum, an OpenStack project for managing the lifecycle of Kubernetes clusters.
- Working as part of a team to automate deployment of OpenStack and applications to High Performance Computing infrastructure for clients in various research organisations.

Kubernetes | OpenStack | Jupyter | Ansible | Terraform | Python

**March 2017 – June 2016** | **Research Engineer, Airbus Group Innovations, Newport**

- Developed an AI driver for Connected and Autonomous Vehicles (CAVs) which uses past simulated driving experiences to automatically learn a behaviour that optimises global flow using deep reinforcement learning. This was part of a work package for FLOURISH consortium, a three-year project that started in June 2016 which aims to make CAVs accessible to the elderly population.
- Integrated Keras and OpenAI Gym with Aimsun (a widely used traffic microsimulation software) API to deliver the final model which made use of reinforcement learning to present an overall more desirable behaviour over the built-in simulation rules.

Tensorflow | Keras | OpenAI Gym | Python

**June 2016 – December 2013** | **Teaching Assistant, University of Bristol, Bristol**

- Co-supervised undergraduates with my supervisor for their dissertation projects.
- Guided undergraduates think about questions related to mathematics, engineering and programming in problem solving tutorial classes.
- Supported undergraduates with special needs during lectures and exams.

MATLAB | C++ | Java | Python

**December 2013 – August 2012** | **Placement Candidate and Manager , Shelter Associates, Pune, India**

*Volunteer*, Engineers Without Borders

- Co-developed a web application over 3 months to digitise the process of mapping and analysing slum survey data for an EWB partner organisation (Shelter Associates, Pune, India) which aims to raise the standard of living of slum dwellers through consultation and rehabilitation.
- Identified the gap to develop a mobile application to complement the web application following the placement and wrote a proposal to this end for EWB funding.
- Interviewed, recruited and supported 2 volunteers to fill in their roles after the funding for the proposal was approved to develop the mobile application during their 3-month long placements.

Python | Django | PostgreSQL+PostGIS | OpenStreetMap

## Interests

- I enjoy attending meetups and hackathons to get to know people who share my love of learning new things.
- I enjoy spending my time being creative with food, various forms of art and photography.
- I value playing an active role in my community and have been a member of various local groups.

## References

Available on request.