

## Russel Shawn Dsouza

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EDUCATION	Masters, Artificial Intelligence & Machine Learning University of Birmingham, UK <i>Distinction</i> 2022 – 2023 * Received the Northrup Grumman Merit Scholarship for Academic Excellence * Graduated top 4 in the class  Bachelors, Electronics & Communications Engineering National Institute of Technology Karnataka, India 2017 – 2021
RESEARCH INTERESTS	Constrained Neural Networks, Real-time Machine Learning Multi-modal Indexing & Retrieval, Compression & Representation learning
RESEARCH EXPERIENCE	<b>Research Intern</b> CMInDS and CSRE, IIT Bombay, India May 2021 – Mar 2022 <ul style="list-style-type: none"> <li>– Designed and developed model variants for multi-modal, pixel-wise classification of land-use from hyper-spectral and LiDAR satellite imagery with vision transformers and CNNs.</li> <li>– Improved model peak-performance by over 10% through the use of state-of-the-art Bayesian hyper-parameter optimisation.</li> </ul> <b>Winter Research Intern</b> Deep Learning Lab, NIT Karnataka, India Dec 2019 – Mar 2020 <ul style="list-style-type: none"> <li>– Implemented cutting-edge models and established high-performance data pipelines for nuclear segmentation in histopathology images of kidney and liver tissues.</li> <li>– Collaborated on the detection of <i>Urothelial Carcinoma</i> from whole slide images of bladder tissues with an average size of 4 billion pixels.</li> <li>– Created an open-source project to benchmark segmentation models on histopathology datasets, resulting in improved reproducibility and standardisation of results.</li> <li>– Presented a comprehensive report reviewing the state-of-the-art methods for nuclear segmentation in histopathology, providing valuable insights and recommendations for future research.</li> </ul> <b>Summer Research Intern</b> Deep Learning Lab, NIT Karnataka, India May 2019 – Jul 2019 <ul style="list-style-type: none"> <li>– Revamped and maintained high-performance data pipelines for deep learning-based image segmentation and classification models, resulting in improvements in accuracy and processing speed.</li> <li>– Streamlined classical image processing algorithms for large datasets, achieving a 20% reduction in processing time in some cases.</li> <li>– Conducted extensive literature surveys and reproduced state-of-the-art results from seminal papers in automated histopathology, contributing to the lab's cutting-edge research.</li> </ul> Selected as a <b>full-time research intern</b> at the Robert Bosch Center for Cyber-Physical systems, Indian Institute of Science, Bangalore, to work on “Simultaneous Localisation And Mapping - SLAM”. * July 2020  Selected for a <b>funded research internship</b> at the Haute école du paysage, d'ingénierie et d'architecture de Genève, Haute Ecole Spécialisée de Suisse occidentale, Geneva to work on “NavTrack: A portable obstacle tracker for the rehabilitation of spatial neglect”. * Mar 2020
PUBLICATIONS	Lal, S., <b>Dsouza, R.</b> , Maneesh, M., Kanfade, A., Kumar et al. “A Robust Method for Nuclei Segmentation of H&E Stained Histopathology Images.” 2020, 7th International Conference on Signal Processing and Integrated Networks (SPIN) (pp. 453–458). IEEE.

\* Could not undertake due to COVID-19

MASTER'S DISSERTATION	<b>Examining adversarial alignment-subversion in generative language models</b> 80/100 Advisor: <a href="#">Dr Venelin Kovatchev</a> Jun 2023 – Sept 2023 <ul style="list-style-type: none"> <li>– Compared multiple language models fine-tuned on a dataset of adversarial human interactions with LLMs evaluating performance across different training regimes and prediction tasks.</li> <li>– Empirically demonstrated the feasibility of using language models to automatically evaluate adversarial alignment subversion in other language models enabling the detection of misalignment at scale, without reliance on slow and subjective human evaluation.</li> </ul>
BACHELOR'S DISSERTATION	<b>Low-light image enhancement on low-power devices</b> 19/20 Advisor: <a href="#">Dr Ramesh Kini</a> Aug 2020 – May 2021 <ul style="list-style-type: none"> <li>– Designed hardware- and software-optimised algorithms to capture vibrant and detailed low-light photos with inexpensive camera sensors, without using obtrusive flashlights.</li> <li>– Optimised the neural network to have less than 100k parameters and require only about 5 GFlops of compute for a <math>256 \times 256</math> colour image, resulting in a 35% reduction in model size and a 20% improvement in processing speed.</li> <li>– Redesigned the entire image processing pipeline on the edge-device using C++, resulting in a 10% reduction in latency and a 50% reduction in memory usage.</li> </ul>
SKILLS	<b>Languages:</b> Python, Java, C++, C, SQL, JavaScript, Go, Rust, MATLAB <b>Frameworks:</b> PyTorch, Keras, OpenCV, scikit-learn, Numeric & Scientific Python <b>Tools:</b> git, Docker, bash, vim, Linux
WORK EXPERIENCE	<b>Frontend Developer and UI Designer</b> <a href="#">IRIS, NIT Karnataka, India</a> Aug 2018 – Apr 2019 <ul style="list-style-type: none"> <li>– Debugged and maintained critical parts of the front-end code at IRIS, the official student portal with over 10k daily active users</li> <li>– Created a new, streamlined UI system from the ground up in Figma.</li> <li>– Developed the design system in Vue.js and spearheaded the integration of JavaScript with legacy Rails code.</li> </ul>
NOTABLE PROJECTS	<b>Fashion discovery for video commerce</b> Oct 2021 – Mar 2022 <ul style="list-style-type: none"> <li>– Worked on “<a href="#">Exact street-to-shop</a>” i.e. matching products in consumer photos to those in manufacturer catalogues - a cross-domain image-based image retrieval problem.</li> <li>– Pitched the prototype software to a top-3 short-video platform in India.</li> </ul> <b>Multi-lingual speech enhancement</b> Feb 2021 – May 2021 <ul style="list-style-type: none"> <li>– Developed a deep neural network to improve the quality and intelligibility of noisy speech recordings by up to 30%, even in out-of-sample languages.</li> <li>– Conducted extensive experiments on a large dataset of diverse languages and noise types, demonstrating that our approach outperforms state-of-the-art methods in terms of intelligibility without sacrificing quality.</li> </ul> <b>Information extraction from PDFs</b> Apr 2021 <ul style="list-style-type: none"> <li>– Developed a program to extract information embedded in table cells within PDFs with upto 70% accuracy, as part of a system to automate summarising insurance policies.</li> </ul> <b>Muon Physics</b> Mar 2020 – Jun 2020 <ul style="list-style-type: none"> <li>– Conceptualised and programmed a custom model to classify muon momenta trained on monte-carlo simulated data from the Cathode Strip Chambers at the CMS experiment of the Large Hadron Collider at CERN.</li> </ul> <b>Detecting Ponzi schemes in Ethereum Smart Contracts</b> Aug 2019 – Sep 2019 <ul style="list-style-type: none"> <li>– Designed and developed a custom model using CNNs and stacked auto-encoders to accurately classify smart contracts deployed on the Ethereum blockchain into 16 categories, delivering results in under 48 hours for a coding sprint.</li> <li>– Trained the model on raw bytecode of smart contracts extracted from the blockchain using Google BigQuery, publicly available Solidity source code of popular smart contracts, and a dataset of 184 known Ponzi schemes.</li> </ul>