Elizabeth Vargas

CONTACT INFORMATION

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PROFESSIONAL EXPERIENCE

Sense Photonics Dec. 2020 - Present
Software Engineer Edinburgh, United Kingdom

- Develop algorithms for processing low- to mid-level data from a LiDAR system.
- Create a simulation environment to match real world measurements, and numerically refine and validate the developed algorithms (MATLAB, C++).
- Define and conduct experiments, and analyse data to test performance boundaries of the developed algorithms.
- Work with hardware and software teams to propose improvements to existent system, in order to deliver high fidelity 3D point clouds.

ORCA Hub Jan. 2019 - Nov. 2020
Research Associate Edinburgh, United Kingdom

- Deployed a real-time computer vision system on a remotely operated underwater vehicle for the surveying and inspection of offshore assets (ROS, C++).
- Implemented Visual Simultaneous Localisation And Mapping (SLAM) solution for limited visibility underwater environments, based on data fusion from acoustic and optical sensors.
- Employed stereo cameras for 3D reconstruction of submerged structures, enabling the offshore industry to inspect and certify their integrity.

Toshiba Medical Visualization Systems Jun. 2015 - Sep. 2015
Research Intern Edinburgh, United Kingdom

- Characterised Alzheimer disease using Magnetic Resonance Imaging (MRI), performing texture analysis in the hippocampus tissue enabling the diagnose the disease at various stages.
- Combined brain gyrus segmentation with regional texture metrics (Pandas).
- Applied machine learning to image texture, including feature selection, classification and regression techniques (Python, Scikit-Learn).

EDUCATION

Ph.D. Signal Processing Oct. 2015 - Sep. 2019
Heriot-Watt University, United Kingdom

- Advanced the state-of-the-art in acoustic source localisation in constrained environments through three major contributions (detailed below).
- Reduced computation six fold while maintaining localisation accuracy at state-of-the-art levels (Python, NumPy, SciPy).
- Implemented a signal sampling algorithm to achieve accurate localisation for a signal transmitted at a compression ratio of $40:1$ (MATLAB).
- Applied deep learning techniques to achieve a 20% improvement in localisation accuracy by training a Convolutional Neural Network (CNN) using data augmentation from a Generative Adversarial Network (GAN) (Ptyhon, Keras, TensorFlow).

M.Sc. Computer Vision and Robotics with Distinction Sep. 2013 - Jun. 2015
University of Burgundy, France GPA: 15.3/20

- Joint Erasmus Mundus Master Program with *University of Burgundy* (France), *University of Girona* (Spain) and *Heriot-Watt University* (United Kingdom).
- Basis of signal and image processing, medical image analysis (MATLAB).
- Segmentation, multi-view geometry, object recognition and tracking (OpenCV).
- Robot autonomy and intelligence, including SLAM and motion planning (ROS).

B.Sc. Computer Science Aug. 2006 - Aug. 2012
Universidad del Valle, Colombia GPA: 4.67/5.0

- Courses in algorithms, data structures, compilers and software engineering.
- Projects including image processing (C/C++), search algorithms, optimisation, evolutionary algorithms, software development (Java) and databases (MySQL).

Selected Publications

E. Vargas, R. Scona, J. Scharff Wilners, T. Luczynski, Y. Cao, S. Wang, Y. Petillot, *Robust Underwater Visual SLAM Fusing Acoustic Sensing*, in International Conference on Robotics and Automation **(ICRA)**, Xian, China, June 2021.

E. Vargas, J. R. Hopgood, K. Brown, K. Subr, *On Improved Training of CNN for Acoustic Source Localisation*, accepted in Transactions on Audio, Speech, and Language Processing **(TASLP)**, 2021.

Distinctions

Erasmus Mundus Scholarship, *European Commission* Sep. 2013
Granted to 4 European students for academic and professional achievement to study a Master in Computer Vision and Robotics (ViBot) during the academic year 2013-2015.

Training

International Summer School on Deep Learning Jul. 2018
Research training event aiming at updating participants about the most recent advances in the critical and fast developing area of deep learning.

International Computer Vision Summer School (ICVSS) Jul. 2016
Provided an objective, clear, and in-depth summary of the state-of-the-art research in the areas of Computer Vision, Machine Learning and Artificial Intelligence.

Technical Skills

Operating Systems: Windows, Linux (Ubuntu)
Programming: Python, MATLAB, C/C++
Robotics: Robotics Operating System (ROS)
Computer Vision: OpenCV
Machine Learning: Scikit-Learn
Version Control: Git/Github

Volunteer Experience

Women in Computer Vision (WiCV) Workshop, *Co-Organiser* Aug. 2020
Co-organised the WiCV workshop, designed to raise the visibility of female computer vision researchers, as part of the 16th European Conference in Computer Vision (ECCV).

Edinburgh International Science Festival, *Student Helper* 2017 - 2018
Helped at the *"Marty: Activate!"* workshop that taught children (11+ years) to program a robot to interact with its surroundings using the programming language *Scratch*.

FIRST LEGO League (FLL), *Robot Game Judge* 2016-2018
Assessed teams of young people (9-16 years) while solving a set of missions on a specialised field, using an autonomous robot built and programmed using LEGO MINDSTORMS