

# XAVIER BELTRAN URBANO

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## EDUCATION

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Sept. 2022 – July 2024

### Joint MSc in Medical Imaging and Applications

University of Girona (UdG), Girona, Spain - <https://maiamaster.udg.edu/>

Partner Universities: University of Bourgogne, France, and University of Cassino, Italy

Current Grade: 9.02/10 (Spanish Grading System)

Relevant Courses: Machine and Deep Learning, Advance Image Analysis, Image Segmentation, Image Registration, Applied Mathematics, Computer Aided Surgery and Medical Robotics

Sept. 2018 – June. 2022

### BEng in Biomedical Engineering

University of Girona (UdG), Girona, Spain - <https://www.udg.edu/en/>

Relevant Courses: Image Analysis and Processing, Biomedical Signals and Images, Medical Image Analysis for Diagnosis, Computer Vision, Neuroscience and Neuroimaging, Computer Assisted Intervention, Functional Anatomy and Biomechanics, and Artificial Intelligence

## RESEARCH EXPERIENCE

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Jan. 2024 – July 2024

### Master Thesis Project

[detrelab](#), University of Pennsylvania, Philadelphia

Project Title: Deep learning-based automatic quality evaluation index for ASL CBF.

Lead Researchers: John A. Detre and Sudipto Dolui

#### Duties:

- Explore the fundamental physiological parameter of cerebral blood flow (CBF) and its importance in assessing cerebrovascular integrity and brain function.
- Analyze Arterial Spin Labeled (ASL) perfusion magnetic resonance imaging (MRI) as a non-invasive method for imaging regional CBF.
- Develop an approach based on deep learning to generate automated indices for evaluating the quality of CBF maps.

Skills required: TensorFlow, Keras and MATLAB

July 2023 – Present

### Research Engineer Intern

[icometrix](#), Leuven, Belgium

Project Title: A Deep Learning post-processing approach for stroke perfusion maps artifacts.

Lead Researchers: Ezequiel de la Rosa and David Robben

#### Duties:

- Analyzed stroke brain imaging data, focusing on challenging aspects like segmentation techniques applied to perfusion imaging.
- Developed and implemented innovative deep learning-based methods to enhance the comprehension and analysis of stroke-related brain images.
- Collaborated closely with a team of medical imaging researchers and professionals to contribute to the development of cutting-edge solutions for stroke imaging analysis.

Skills required: Tensorflow, Keras, OpenCV and 3DSlicer.

Jan. 2022 – June 2022

### Undergraduate Thesis Project

*Institut de Recerca en Visió per Computador i Robtòtica (ViCOROB), Girona, Spain*

Thesis Title: Brain tumour segmentation for their subsequent digitization and 3D printing.

Lead Researchers: Dr. Xavier Lladó and Dr. Robert Martí

#### Duties:

- Collaborated with the ViCOROB research group on a project to improve preoperative brain surgery using MRI data.

- Developed methods for more personalized and comprehensive preoperative brain surgery, with a specific focus on tumor segmentation.
- Utilized both unsupervised algorithms and Convolutional Neural Networks (CNN) for tumor segmentation from MRI data.
- Successfully created a 3D model representing the patient's skull and tumor through a comprehensive process involving 3D reconstruction, digitization, and 3D printing.

Skills required: Tensorflow, Keras, OpenCV, 3DSlicer, CURA and ITK-SNAP.

Oct. 2019 – July 2021

### **Biomedical Engineer Intern**

*Institut de Recerca en Visió per Computador i Robòtica ([ViCOROB](#)), Girona, Spain*

Lead Researchers: Dr. Rafael García

#### Duties:

- Engaged in various machine learning and deep learning projects during the internship, with a primary focus on computer vision.
- Successfully developed a melanoma detector through the application of a range of machine learning algorithms.

Skills required: Tensorflow, Keras and MATLAB

## **PUBLICATIONS**

T.A.Suleiman, D.T. Anyimadu, **X.B.Urbano**, M.Pooyan, M.Z. Amin, M. I. Hossain, “Functional Neuroimaging with Machine Learning for Presurgical Planning, Intraoperative Mapping, and Postoperative Monitoring in Brain Tumor Patients: An Overview of Techniques, Applications, and Future Directions.” **Ongoing review paper**

D.T. Anyimadu, T.A.Suleiman, **X.B.Urbano**, F. Hartmann, “Enhancing Multiclass Skin Lesion Classification: A Deep Learning vs. Hybrid Deep Learning-Machine Learning Comparison on ISIC-2017 and HAM10000 Datasets”. **Ongoing research**

**X.B.Urbano**, E. De la Rosa, D. Robben, “A Deep Learning post-processing approach for stroke perfusion maps.” *Manuscript being prepared for Frontiers Journal.*

*Bachelor thesis*, “A customized preoperative for brain tumour from MRI data”, By **X.B.Urbano**, Department of computer vision and robotics (VICOROB), University of Girona, June 2022

## **PROJECT DEVELOPED**

Feb. 2023 – June 2023

### **Alzheimer's Disease Classification with MRI and Gene Expression Data | Python and R Implementation:**

- Designed a feature selection framework (filter, wrapper, embedded) for dataset analysis.
- Employed various classifiers (e.g., decision trees, SVMs) for model evaluation.
- Conducted systematic experiments to optimize feature-subset and classifier pairings.
- Identified best-performing features and models for future use.

Feb. 2023 – June 2023

### **Skin Lesion Classification | Python, Keras and Tensorflow Implementation:**

- Developed a Python-based pipeline for skin lesion classification, combining deep learning and machine learning techniques.
- Utilized the Challenge ISIC2017 dataset for training and evaluation, ensuring diverse skin lesion images.
- Explored deep learning and transfer learning for feature extraction, leveraging pre-trained models.
- Evaluated and compared the classification methods, analyzing metrics to determine the most effective approach.

Feb. 2023 – June 2023	<b>Mammogram Mass Detection and Classification</b>   <i>Python, Scikit-Learn and OpenCV</i> <u>Implementation:</u> <ul style="list-style-type: none"> <li>Developed a Python-based automated system for mammography mass detection and classification using machine learning.</li> <li>Evaluated and compared detection and classification methods, assessing their effectiveness through quantitative metrics and qualitative graphical results like ROC or fROC curves to identify the optimal approach.</li> </ul>
Feb. 2023 – June 2023	<b>Hospital web development</b>   <i>Java</i> <u>Implementation:</u> <ul style="list-style-type: none"> <li>Designed an intuitive Java-based web app for easy appointment scheduling.</li> <li>Employed MySQL for secure data storage and retrieval, enhancing appointment management.</li> <li>Integrated automated features like reminders to streamline doctor-patient interactions.</li> <li>Set up task scheduling within the app to ensure consistent and timely operations.</li> </ul>
Jan. 2021 – June 2021	<b>SPO2 and Heart rate device</b>   <i>Arduino and LabVIEW</i> <u>Implementation:</u> <ul style="list-style-type: none"> <li>Designed and fabricated a wearable device focused on vital sign monitoring, with a primary emphasis on electronic hardware and software development.</li> <li>Incorporated cutting-edge technology, such as SPO2 and heart rate sensors, into the wearable device to provide accurate and real-time health data.</li> <li>Developed and fine-tuned the device's software components to ensure seamless data collection and processing, enhancing its usability and reliability.</li> </ul>
June. 2021 – Sept. 2021	<b>Machine Learning-based object detector</b>   <i>Python, Keras and Tensorflow</i> <u>Implementation:</u> <ul style="list-style-type: none"> <li>Created a custom dataset by meticulously collecting and labeling a diverse range of images.</li> <li>Utilised both unsupervised and supervised CNN-based methods for object recognition and classification.</li> <li>Implemented an optimisation procedure that led to a remarkable degree of accuracy in identifying and classifying objects, thereby assessing robustness and precision of the developed method.</li> </ul>
June. 2021 – Sept. 2021	<b>Face detector and recognizer software</b>   <i>Python, Keras and Tensorflow</i> <u>Implementation:</u> <ul style="list-style-type: none"> <li>Developed an AI-based program for precise facial detection and recognition to enhance security.</li> <li>Employed deep learning and pre-trained models for accurate user authentication via facial features.</li> <li>Designed a user-friendly interface for seamless integration with software/hardware systems.</li> </ul>

## **PROFESSIONAL DEVELOPMENT & CERTIFICATIONS**

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2023	<b>Course in AI for Medical Diagnosis, DeepLearning.AI, Coursera</b> <ul style="list-style-type: none"> <li>Loss Function, Data Imbalance, CNN, Image segmentation and Model Evaluation.</li> </ul>
2022	<b>Immersion course in English specialized in Health and Life Science, UIMP</b> <ul style="list-style-type: none"> <li>Problem Solving, Research Ethics, Networking and Medical Terminology.</li> </ul>

## **LEADERSHIP RESPONSABILITIES**

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Sept. 2023 – Present

### **Delegate**

*Student representative of the seventh cohort of MAIA students, University of Girona*

Task: Interacted as an intermediary between students and programme administrators, advocating for the interests of their cohort and facilitating communication and programme enhancements.

Sept. 2019 – June 2021

### **Mentorship**

*Mentoring program to fresh biomedical engineering students, University of Girona*

Task: Assisted first year bachelor students in academic-related and non-academic.

## **RELEVANT SKILLS**

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Spoken Languages:

Spanish (Mother tongue), Catalan (Mother tongue) and English

Technology/Software:

Python, Java, R, MATLAB, Qt Designer, 3DSlicer, VS Code, PyCharm, RStudio, SPM and FSL

ML/DL Frameworks:

TensorFlow, Keras and Scikit-Learn

Personal Skills:

Communication skills, Teamwork, Leadership skills, and Time management