

## Thesis Project Offer

*Joint Research and Education Programme "Palestinian-German Science Bridge PGSB"  
Forschungszentrum Jülich GmbH & Palestine Academy for Science and Technology*

### Thesis type\*

<input checked="" type="checkbox"/> BSc	<input checked="" type="checkbox"/> Internship	<input type="checkbox"/> Msc	Intended starting date (approx.): Summer 2023
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### Contact details of supervisor/responsible host at Forschungszentrum Jülich

Title*	Degree	First name*	Surname*
Mr. Mr.	Degree Dr.	Mohcine Ahmed	Chraibi Alia

Phone*	E-mail*
	M.chraibi@fz-juelich.de a.alia@fz-juelich.de

Function*	Institute and homepage of institute*
Head of Pedestrian Modelling Division Researcher at Institute for Advanced Simulation	<a href="https://www.fz-juelich.de/profile/chraibi_m">https://www.fz-juelich.de/profile/chraibi_m</a> <a href="https://www.fz-juelich.de/profile/alia_a">https://www.fz-juelich.de/profile/alia_a</a>

University affiliation in Germany*
Wuppertal University Juelich Research Center

### Co-Supervisor at Palestinian university (if applicable)

Title	Degree	First name	Surname
Mr.	Degree Dr.	Hamed	Abdelhaq

Phone	E-mail
	hamed@najah.edu

University/institution	Department/faculty/institute
An-Najah National University	Information Technology Department

### Project description\*

**Project Title:** Performance Analysis of YOLO and RetinaNet Algorithms for Human Head Detection in Highly Dense Crowds

Pedestrian detection in video streams has tremendous significance in human crowd analysis, with several applications, such as crowd counting, crowd density estimation, and anomaly detection. Pedestrian identification in highly dense crowds is a challenging task due to partial or complete occlusions of the pedestrians. In such cases, human heads are the only visible parts of their body. Therefore, head detection has become an important research area in crowd analysis. However, head detection is not easy due to the variations in the appearance of heads and the diversity in head scales. From a computer vision perspective, head detection is considered a special type of object detection domain. In recent years, deep learning-based approaches, in particular, You Only Look Once (YOLO) and RetinaNet algorithms, achieved remarkable success in object detection. In contrast, the amount

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of work reported in the literature to detect heads in highly dense crowds is limited. Thus, this project aims to study the performance of several YOLO architectures (v3-v7) and RetinaNet for identifying heads in high-density crowds. To achieve the goal of the project, the following tasks are expected to be carried out by the student:

- Define the object detection models.
- Creating a new dataset from images or videos of highly dense crowds and using some of the existing public datasets for training and evaluation purposes.
- Conducting a comparative analysis of the trained models for head detection in dense crowds.
- Creating a GitHub repository for the project, including the source code used, the new dataset, trained models, and the evaluation results.

**Requirements**

- BSc. student in computer science or related fields.
- Good programming skills (Python is preferred).
- Knowledge of machine learning concepts.
- Knowledge of deep learning-based object detection algorithms is preferred.
- Very good communication skills.

**Date\***                      **Signature\***

18.01.2023 Mohcine Chraibi	
18.01.2023 Ahmed Alia	

\* required field