Thesis Project Offer

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

Thesis type*

☐ BSc	☒ MSc	☐ PhD	Intended starting date (approx.): August 2023

Contact details of supervisor/responsible host at Forschungszentrum Jülich

Title*	Degree	First name*	Surname*
Title	Dr.	Maik	Boltes

Phone*	E-mail*
02461 61 6557	m.boltes@fz-juelich.de

Function*	Institute and homepage of institute*
Head of the division 'Pedestrian Dynamics – Empiricism'	Institute for Advanced Simulation: Civil Safety Research (IAS-7), https://www.fz-juelich.de/en/ias/ias-7

University affiliation in Germany*
University of Wuppertal

Co-Supervisor at Palestinian university (if applicable)

Title	Degree	First name	Surname
Mr.	Prof.	Anas	Toma

Phone	E-mail
	anas.toma@najah.edu

University/institution	Department/faculty/institute
An-Najah National University	Department of Electrical and Computer Engineering

Project description*

Behavior Analysis in Crowds based on Pose Estimation of the Upper Body

Early detection of abnormal people's behavior at crowded events can play an important role to avoid dangerous accidents. It can help event organizers to intervene and prevent any serious consequences. However, the abnormal behavior should be detected immediately to notify the organizers in time. This can be achieved by analyzing people's behavior using computer vision techniques. Many abnormal behaviors are typically done through shoulders such as pushing. Therefore, this project will study the pose of the human upper body in crowds which can be identified by detecting the head and shoulders and their orientation. However, this is challenging due to the fact that the available images in such situations with minimal occlusion are from the top view, where the head and the shoulders are nearly the only visible parts of the body. Furthermore, the variations in the form and the appearance of the head and the hair among people should be considered to provide

accurate detection. The following are the main tasks that can be performed to realize the objective of the project:

- Collecting and annotating images and videos for crowds form open datasets.
- Exploring and choosing the most appropriate techniques used to detect the head and the shoulders such as texture analysis, image matching, deep learning, etc.
- Building and evaluating a model to analyze the behavior based on the detection of the head and the shoulders, and the identification of their orientation.
- Creating an open source repository for the project.

Requirements:

- MSc. in computer engineering, computer science or related fields.
- Good programming skills (Python is preferred).
- Knowledge of the main concepts of computer vision and machine learning.
- Familiar with the related libraries such as OpenCV, scikit-learn, Keras, TensorFlow, etc.
- Very good communication skills.

Date*	Signature*
27.01.2023	Maik Boltes

* required field