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.): January 2018

Contact details of supervisor/responsible host at Forschungszentrum Jülich

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Project description*

Human-based Architectural Design of Buildings

In the past, several models for pedestrian dynamics were developed and used for various purposes, e.g. safe planning, organization of mass events, and evacuation management, etc. However, in the common architectural and urban planning practice they are rather rarely used or only considered in a post-evaluation of the performance of the building with respect to a safe evacuation process in case of emergency. Recently, analyzing pedestrian flow dynamics in indoor and outdoor areas becomes an important facet of architecture and urban design.

The design process typically includes the simulation of several aspects at different levels, such as load-bearing structure, energy consumption as well as light simulation. A still under-represented aspect of simulation in building design is concerned with space utilization and especially the dynamic behavior of people inside the building. Therefore, the motivation for this work is to develop an intuitive environment for designers, in which they can comfortably perform crowd simulations and consider the characteristics of the crowd behavior as an integral part of their design process.

In recent years, the use of digital fabrication, computational technologies and automated systems has grown enormously in the field of architecture. By using these parametric design tools, an automatic framework to human-based and safe design of buildings should be developed. This will assist designers in considering human behavior and needs in early stages of design process in...
order to achieve a healthy environment for end-users, and in making improvements of the proposed designs in accordance with the regulations but also with respect to comfort and ease of use. In this case, the simulated users test things we’ve designed to see how they will perform in a variety of contexts and suggest improvements, before anything is even built.