

# Master's Thesis Project: Energy Efficient Building Design

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The **Geospatial Visualization, Semantic Modelling, and Acquisition Group** at the VRVis Forschungs-GmbH in Vienna, Austria, is looking for support from a student (f/m/d) who would like to experience application oriented research at Austria's leading research center in the field of visual computing and/or aims to give her/his master's thesis an application driven focus with the following topic:

## Visualization of a Building Energy Modelling (BEM) Network

Energy efficient planned buildings are necessary to tackle the impact of human kind on our environment, by reducing energy and material consumption. To develop an efficient energy concept, various material compositions and heating profiles have to be tested. To detect weak points in the planning phase the heat transfer between the rooms can be visualized by an abstract room-network. The network consists of rooms (nodes) with known / calculated temperatures and heat sources. Transfer surfaces (edges) establish connections between rooms and provide information of its material composition, surface temperatures, and various physical parameters.

## Task

The aim of this project is to conceptualize a graph representing energy flows within the room network of a Building Energy Modelling (BEM) application. You will research a web-based interactive visualization of the graph to detect strong / weak points of the current concept. We provide you with the nodes (rooms) and edges (transfer area) necessary to do so.

The following questions should be addressed:

- What graph layout is suitable for room networks? How to sustain spatial embedding? How to distinguish indoor from outdoor rooms?
- How to encode multivariate information into nodes and edges?
- Which questions do energy planners typically have about the data?
- Which interaction techniques support the user to solve these questions?
- How can variations, or different designs, be compared to each other (only attributes change - not the network structure itself)?

## What you will bring to the team

- Strong interest in visualization and user interaction
- Solid programming skills
- Experience with web technologies (JavaScript, d3, Cytoscape.js) is strongly recommended
- Knowledge of graph data structures and graph theory is advised

## What we offer in return

- Very friendly and supportive work atmosphere
- Flexibility, and well-equipped work space
- Excellent professional support by our team
- Opportunity to access our network of university partners (e.g. for thesis supervision)
- Appropriate remuneration upon successful (thesis) completion

## Applications are always welcome!

Please contact Andreas Walch to send in your application or to inquire about additional information.

We especially would like to encourage female students to apply!

## Contact

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