

Software Lab:

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| Modeling: | <div style="width: 100%; height: 10px; background-color: #005596;"></div> |
| Mathematics: | <div style="width: 100%; height: 10px; background-color: #005596;"></div> |
| Programming: | <div style="width: 100%; height: 10px; background-color: #005596;"></div> |
| Science: | <div style="width: 100%; height: 10px; background-color: #005596;"></div> |

Indoor Path Planning

Description

The task of navigation and path planning through indoor environments has intensively been researched in literature. One of the methods developed is the navigation graph by Kneidel et al. [1]. They have found a solution for navigating agents by generating a visibility graph consisting of nodes placed on the vertices in the 2-dimensional space. This methodology shows promising results concerning single-floor buildings. However, the method has its restrictions when it comes to floors being connected over two storeys. [2] has suggested a methodology that connects multiple storeys. Your task will be to implement a methodology merging the Kneidl-graph with the multi-storey connectivity of the path planning module proposed by [2]. The task is conducted in cooperation with the **EU Horizon 2020 INTREPID Project** and **NavigaTUM**, and results will be used in NavigaTUMs open source code.

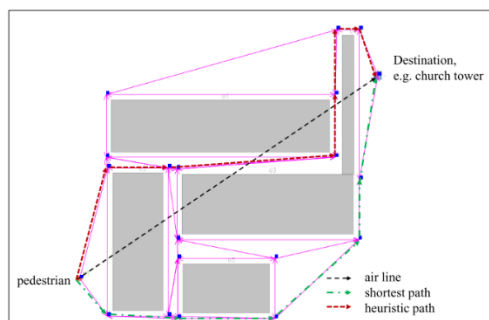


Figure 1 An example 2D Navigation graph by Kneidel et. al. [1]

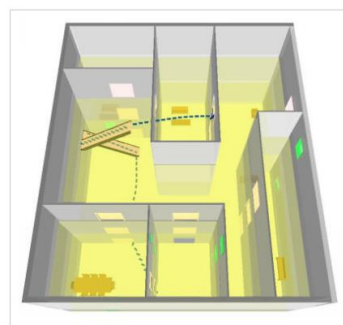


Figure 2 3D connectivity of multi-storey-buildings by Lin et. Al. [2]

Task

- Get yourself familiar
 - with the scientific methodologies
 - with the tools being provided
- Implement the two methods together
- Test the implementation on five provided BIM Models
- Extra task: test the limitations of this methodology for various agents

Supervisor

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References

- [1] Kneidl, A.; Borrmann, A.; Hartmann, D.: Generation and use of sparse navigation graphs for microscopic pedestrian simulation models. *Advanced Engineering Informatics* 26 (4), 2012, 669-680
- [2] Ya-Hong Lin, Yu-Shen Liu, Ge Gao, Xiao-Guang Han, Cheng-Yuan Lai, Ming Gu. The IFC-based path planning for 3D indoor spaces. *Advanced Engineering Informatics*, 2013; 27(2): 189-205. (SCI, 2013 Impact factor: 2.068)