

Clash Detection and Resolution Optimization for Building Designs

A method to improve the precision of clash detection and optimize clash resolutions in regards to building design and components.

Inventors at Georgia Tech have developed a method to improve the clash management process through a holistic view that considers the dependency between building components. The project aims to construct dependency structures among building components and uses a component dependency network to improve clash detection by cleaning out irrelevant clashes, grouping related clashes, identifying central components, and analyzing the surrounding environment of clashes. To improve the clash resolution process, the project constructs clash dependency network based on the dependency structures among building components, and then optimizations algorithms are designed to minimize subsequent resolution changes (for example, the number of components that need to be changed). In addition, the project team designs an algorithm for searching the optimal sequence based on the clash dependency network to minimize feedback dependency. Feedback means that post-corrected clashes will impact the pre-corrected clashes, which may cause design rework and iterative adjustments in project practice.

Summary Bullets

- **Simpler**- minimizes component changes and saves time for design changes
- **Efficient**- improves the efficiency of design coordination
- **Increased precision**- reduces 17% of irrelevant clashes and automatically groups relevant clashes, thereby decreasing more than 50% of the clashes initially reported

Solution Advantages

- **Simpler**- minimizes component changes and saves time for design changes
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Potential Commercial Applications

- Construction management- prevent design errors and re-works
 - Clash detection

- Clash resolutions
- Plug-in for current clash detection software

Background and More Information

A building consists of thousands of components that spatially depend on each other. One of the key activities during design is to coordinate the layout of these components. Building information modeling (BIM) has been increasingly used for design coordination, and clash detection is one important application. A clash describes spatial relations between building components, and clash detection consists of discovering potential problems or interferences in the building model. Current BIM-enabled clash detection detects many irrelevant cases that have no significant effect on design or construction work. In addition, the process to solve these clashes is still manual and time-consuming.

Inventors

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IP Status

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Publications

[Holistic clash detection improvement using a component dependent network in BIM projects](#), -

Images

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<https://s3.sandbox.research.gatech.edu/print/pdf/node/3444>