



### **Science Arts & Métiers (SAM)**

is an open access repository that collects the work of Arts et Métiers Institute of Technology researchers and makes it freely available over the web where possible.

This is an author-deposited version published in: <https://sam.ensam.eu>  
Handle ID: <http://hdl.handle.net/10985/17739>

#### **To cite this version :**

Pierre RAIMBAUD, Mateo BONILLA PALACIOS, Juan Pablo ROMERO CORTES, Pablo FIGUEROA, José Tiberio HERNANDEZ, Frédéric MERIENNE, Florence DANGLADE, Ruding LOU - A Virtual Reality and BIM Approach for Clash Resolution - In: 16th EuroVR International Conference - EuroVR 2019, Estonie, 2019-10-23 - The application track, posters and demos of EuroVR - 2019

Any correspondence concerning this service should be sent to the repository

Administrator : [scienceouverte@ensam.eu](mailto:scienceouverte@ensam.eu)



# A Virtual Reality and BIM Approach for Clash Resolution

Pierre Raimbaud<sup>1,2</sup>, Mateo Bonilla Palacios<sup>2</sup>, Juan Pablo Romero Cortes<sup>2</sup>, Pablo Figueroa<sup>2</sup>, Ruding Lou<sup>1</sup>, Florence Danglade<sup>1</sup>, Frederic Merienne<sup>1</sup> and Jose Tiberio Hernandez<sup>2</sup>

<sup>1</sup>LISPEN, Arts et Metiers, Institut Image, Chalon-sur-Saone, France

<sup>2</sup>Universidad de los Andes, Colombia

Corresponding author: [pierre.raimbaud@ensam.eu](mailto:pierre.raimbaud@ensam.eu), [p.raimbaud@uniandes.edu.co](mailto:p.raimbaud@uniandes.edu.co)

**Keywords:** BIM, virtual reality, immersion, clash resolution, clash analysis

In the Architecture, Construction and Engineering (AEC) industry, a crucial task is Building Information Modelling (BIM) models coordination. Clashes can be detected automatically by current BIM tools. Clash origins (Parn et al., 2018), or avoidance (Singh et al., 2015) have been studied. But, clash resolution still needs the civil engineers' expertise. Currently, in a computer with a 3D BIM tool, they use annotations. As previous research showed that Virtual Reality (VR) can help to perform better AEC tasks, in terms of time and accuracy (Chalhoup and Ayer, 2018), we propose an immersive VR tool to solve clashes.

## Methodology

As for us, immersion is missing in the current method, so, in VR, clashes may be understood and solved faster and better. Comparison with the current method in a within-subjects design experiment allowed to evaluate our solution, measuring time and solution quality. Experts had to use annotations in both methods to explain their solution. Preliminary results tend to confirm initial hypotheses: they solved the inconsistencies faster in VR, and for some clashes, they solved it better. So, new experiments with more experts are necessary to get more conclusive results.

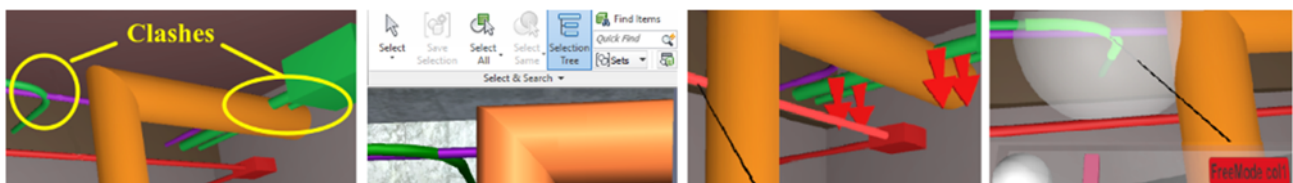


Figure 16. From left to right: clashes examples; BIM tool interface; annotations in our VR tool: narrows, spheres.

## References

- Parn E.A., Edwards D.J. and Sing M.C.P., 2018. Origins and probabilities of MEP and structural design clashes within a federated BIM model, *Automation in Construction*, 85, 209-219.
- Singh M. M., Sawhney A. and Borrmann A., 2015. Modular Coordination and BIM: Development of Rule Based Smart Building Components, *Procedia Engineering*, 123, 519-527.
- Chalhoub J. and Ayer S. K., 2018. Using Mixed Reality for electrical construction design communication, *Automation in Construction*, 86.