

Software Lab:



BIM2SIM: Transferring construction tasks to simulation

Description

A Build Information Model (BIM) contains geometric and semantic information about construction works, but not directly compatible with robotics simulation environments which require physical constraints and action constraints of description. At the same time, NVIDIA Isaac Sim is an emerging simulation platform for robotic development. This project aims to develop a structured pipeline that converts a drywall framing BIM model into a simulation-ready environment in NVIDIA Isaac Sim. The pipeline will extract relevant geometric and semantic information from BIM and generate a physically consistent ISAAC simulation scene. The resulting environment can support robotic perception and task registration and can assist in construction-relevant robotic interactions as well as automating data generation for downstream learning tasks.

Task

- Transferring a construction environment from BIM to Isaac Sim.
- Localization/registration of construction tasks in a simulation environment.
- Optional: Simulating sensors to estimate the pose of framing components and validate perception of accuracy against BIM-derived ground truth within the Isaac Sim environment.
- Optional: Motion generation and execution using BIM data.

Supervisor

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References

Wong Chong, O., Zhang, J., Voyles, R. M., & Min, B.-C. (2022). BIM-based simulation of construction robotics in the assembly process of wood frames. *Automation in Construction*, 137, Article 104194.

<https://doi.org/10.1016/j.autcon.2022.104194>

Kim, K. & Peavy, M. (2022). BIM-based semantic building world modeling for robot task planning and execution in built environments. *Automation in Construction*, 138, Article 104247. <https://doi.org/10.1016/j.autcon.2022.104247>