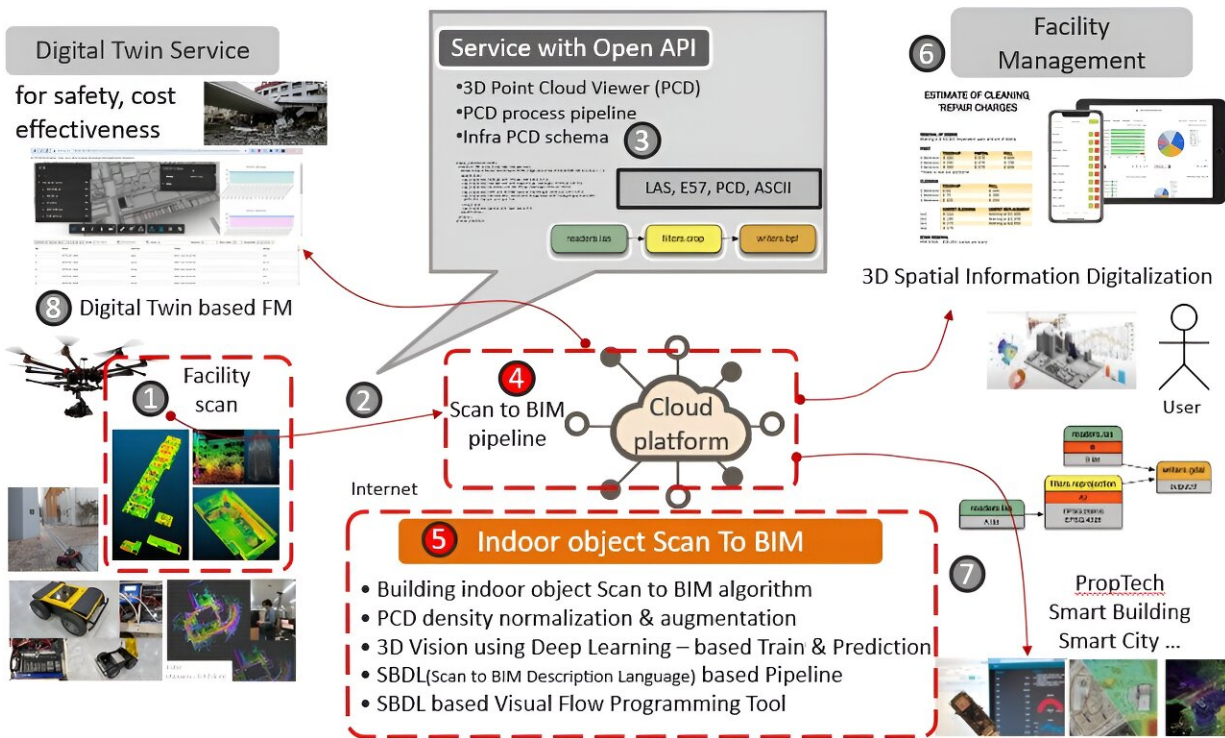


# Team develops scan-to-BIM for reverse engineering from 3D vision data

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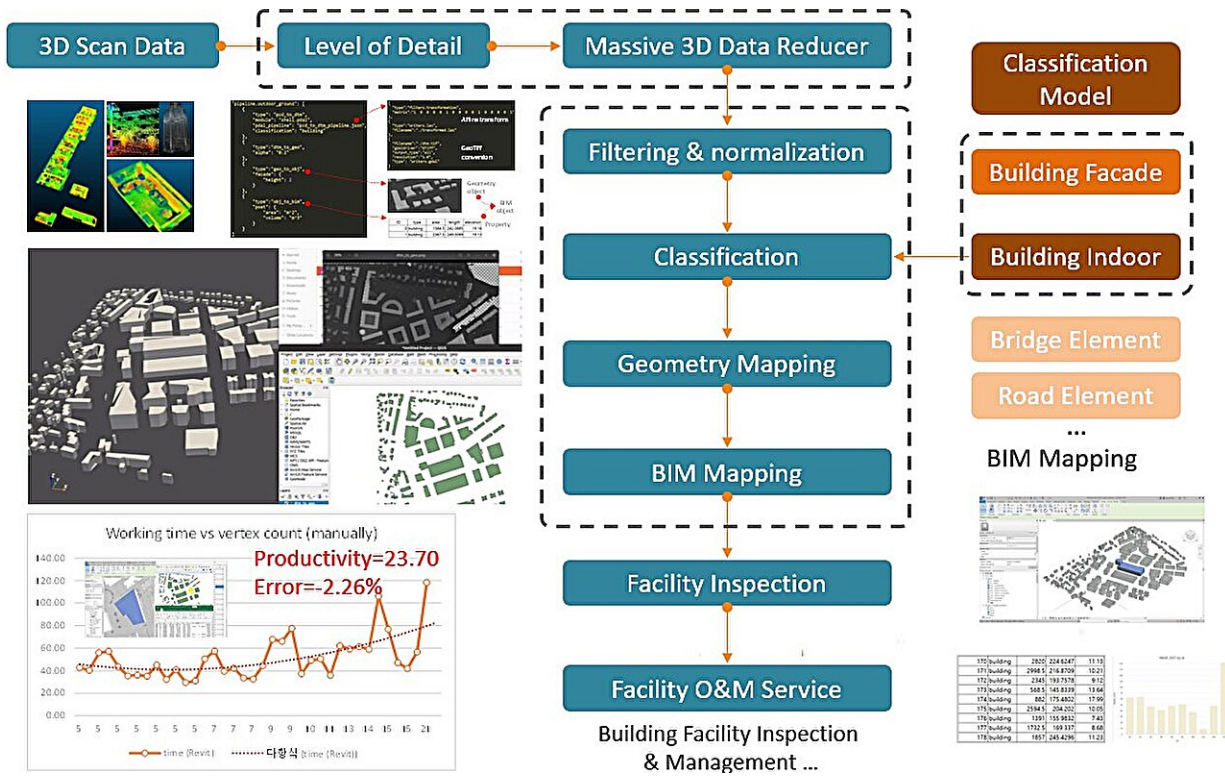
Scan data collected from rovers, drones, lidar, etc. is automatically processed through the Scan to BIM pipeline to generate the information desired by the user. This spatial information digitization technology can be used in digital twin-related services that use spatial information. Credit: Korea Institute of Civil Engineering and Building Technology(KICT)

Researchers at the Korea Institute of Civil Engineering and Building

Technology have developed building scan to BIM (Building Information Modeling)-based reverse engineering technology required for 3D geospatial information modeling domains such as digital twin information modeling.

Scan to BIM-based reverse engineering technology was studied to prevent errors and rework caused by manual work when modeling shapes or BIM from 3D scan data. Existing reverse engineering work is either done based on a lot of manual work or semi-automatically using expensive overseas software.

KICT Research Fellow Dr. Kang Tae-wook and an international joint research team (from University of North Florida, Prof Jonghoon Kim; from Purdue University, Prof Kyubyung Kang; from IUPUI, Prof Dan Koo; and from The State University of New York, Prof Jongseong Brad Choi) developed Scan to BIM technology customized for each reverse engineering purpose based on accumulated 3D vision, [deep learning](#), and data processing pipeline technologies.



The Scan to BIM pipeline we are working on normalizes the reverse engineering process into task units so they can be assembled. Reverse engineering tasks are predefined, including LoD processing, classification, and geometry generation. This technology provides Scan to BIM Description Language (SBDL) to connect and assemble tasks. Credit: Korea Institute of Civil Engineering and Building Technology(KICT)

This technology automatically segments objects from 3D point cloud data, extracts shape information, and creates BIM objects. Through this, information model creation time and rework required for digital twins can be dramatically reduced.

Productivity analysis cases were presented in [a paper](#) published in *Applied Sciences*. According to published data, this technology improves reverse engineering productivity by 23.7 times and improves the amount

of modeling information by 110.21%. Additionally, this technology can be customized depending on the purpose.

**1 Scan**

**TX8**

Large volume dataset  
Variable Density, LoD  
Informal data structure

**2 Geometry Modeling (Drawing, Geometry)**

**4 Insight information for FM in PropTech**

Data captured  
Inputs for Progress & QC

**BIM**  
Geometry & Labels

**3 BIM Modeling**

Object Type  
Quantity, Position, Area, Volume...

**5 Report for Periodic Facade Inspection (PFI) and Management**

A	B	C	D	E
Floor	Facade Type	Area	Volume	Manufacturer
Floor	Floor Generic 100	24.00㎡	3.33㎥	
Floor	Floor Generic 110	8.00㎡	1.22㎥	
Floor	Floor Generic 120	8.00㎡	1.18㎥	
Floor	Floor Generic 130	11.00㎡	1.71㎥	
Floor	Floor Generic 140	11.00㎡	2.01㎥	
Floor	Floor Generic 150	11.00㎡	2.43㎥	
Floor	Floor Generic 160	16.00㎡	2.42㎥	

ESTIMATE OF CLEANING REPAIR CHARGES

**Drawing to Schedule. 15 ≤ working day.**  
(T- Towner. 56F, B/E/F buildings, Area, Grille, Windows)

This R&D project believes that indoor and outdoor scan data can be used for facility maintenance and operation, construction management, infrastructure quality inspection, and proptech asset digitization. Using Scan to BIM automation technology, we can extract the desired quantities from scan data, which is a simple point data, and obtain the dimensions of the object quickly. Credit: Korea Institute of Civil Engineering and Building Technology(KICT)

This technology is used for 3D precision map construction, 3D vectorizing, abnormal pattern detection during construction site safety management, precise construction management, and 3D digitalization of spatial information using the location, size, and direction information of

objects required from scanned [image data](#) and more. It can be used as a base technology that can be included in vision-based robotics and autonomous driving support systems.

The developed technology is being tested on-site with a scan reverse engineering company (BNG Co., Ltd) collaborating with Trimble Building Point in Korea and overseas partner organizations. In addition, for the development of the industry, some technologies were open-sourced and [shared on GitHub](#).

Dr. Kang said, "Currently, Scan to BIM reverse engineering automation technology is difficult to specialize for each purpose in construction, and the cost for the AEC (architecture, engineering, and construction) industry to utilize the technology is also high. The recently developed Scan to BIM technology will greatly help AEC domestic industrial competitiveness."

**More information:** Taewook Kang, Scan to BIM Mapping Process Description for Building Representation in 3D GIS, *Applied Sciences* (2023). [DOI: 10.3390/app13179986](https://doi.org/10.3390/app13179986)

Github [http://github.com/mac999/scan\\_to\\_bim\\_pipeline](http://github.com/mac999/scan_to_bim_pipeline)

Provided by Korea Institute of Science and Technology

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