**Develop a 3D design and simulation platform for PV stations based on BIM technology**

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ABSTRACT

BIM (Building Information Modeling) is a newly 3-D, object-oriented, CAD approach for architects and engineers, grows very fast in the architecture, engineering, and construction (AEC) industries, which has five characteristics of visualization, coordination, simulation, optimization and graphability.

This paper presents the development of a 3D design and simulate platform for PV stations- SolarPV Plugin，which embodies BIM technology through Sketchup. The goals of SolarPV Plugin is to achieve the following functions: (1)Rapid 3D virtual reality modeling of PV stations, parametric design of PV stations; (2)Automatic arrangement of PV stations; (3)Hourly shading analysis of PV stations; (4)Meteorological data interface based on Meteonorm and NASA; (5)Cloud-enabled project, user, database and algorithm; (6)Massive database of PV modules and inverters; (7)Export standard CAD files; (8)Support PV stations with curved surface or mountain terrain.

SolarPV Plugin has followed key technologies: (1)Plugin development based on Sketchup Ruby API; (2)Scan-line method to fill PV modules on irregular planar surfaces; (3)Parallel-line method to fill the surface with obstacles; (4)Ray method for shading report; (5)Seamlessly integrate with SolarPV simulation engine; (5)In-depth analysis and layout optimization combined with radiation.

Based on the above functions, BIM gives a more intuitive project experience to PV designers and users, and brings PV simulation into the early phases of the design process. To summarize, SolarPV Plugin can combine BIM technology and PV simulation technology, and it is an efficient tool for the 3D design and simulation of PV power plants.

Keyword: PV Stations; Design and simulation; BIM; Sketchup; Automated arrangement; Shading analysis.

## Personal information



Prof. Jianbo Bai got Ph.D. degree from Southeast University in 2006. Then, he was a research associate at the Hong Kong Polytechnic University from 2007-2008. He acted as a visiting scholar at the Lawrence Berkeley National Laboratory from 2013-2014. Now he has served as vice dean of the College of Mechanical and Electrical Engineering at Hohai University since 2016. His current research interests include comprehensive and highly efficient use of solar energy, simulation and optimizing of PV power stations, etc. He has hosted a project supported by National Natural Science Foundation of China and two projects supported by National Natural Science Foundation of Jiangsu Province in China. Prof. Bai has published a book named “Modeling, Simulation and Optimizing of Solar PV Systems” in Chinese in 2014. His research team has developed a software for design and simulation of grid-connected PV systems named “Hohai Anneng SolarPV”, which has been adopted by some universities and PV companies in China.

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