



Wikihouse 4.0: Towards a smart future

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Abstract

This paper discusses the advances made on the experimental housing project, Wikihouse 4.0, built at The Building Centre in Store Street, London as part of the London Design Festival in September 2014.

The key themes of the project were to develop a design that could be made freely available online for others to download from which they could print and assemble their own home using readily available materials with only modest professional skills.

Keywords: Digital Fabrication, Timber housing, 3D printing.

1 Introduction

The Wikihouse is an experimental housing project whereby digital files can be downloaded for free on line and used to construct a house. The digital files describe a cutting pattern that is used to fabricate pieces of timber from flat sheets cut on a Computer Numerical Control (CNC) cutting machine. The pieces can then be assembled - flat-pack style - into a house.

Wikihouse 4.0 was a development following previous versions of this concept aimed at demonstrating the feasibility of the system for a complete two storey house.

Arup collaborated with Architecture 00, the originators of the concept, and The Building Centre to develop the timber structure for two storey construction and to develop the building servicing strategy along the same principles of open source design.

Various components were designed and detailed with a similar intention to make these designs freely available online and reproducible at a small scale using such equipment as small hand tools and 3D printers. This included windows, doors and

furniture as well as components of the building services design.

The house was built using orientated strand board (OSB) as readily available, cheap panel material. A system of box beams and frames that could be assembled on the ground and raised into place was developed to form the overall chassis of the house.

The wall, floor and ceiling panels were all fixed into place using a timber wedge connection that then allowed the panels to work compositely with the frames to complete the structure. This provides a very efficient system that can be built rapidly with a relatively small labour force.

The house was erected over 10 days by a team of around 8 volunteers from the participating companies. This included fitting open source timber framed windows and doors using double glazed units supplied by Pilkington, waterproofing and decking to the upper level.

A 3D printed mechanical ventilation unit with heat recovery was designed and made from scratch using readily available materials.