

A true bargain house: First prototype built from MIT's effort to construct houses for \$1,000 each

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The interior of the house designed by Ying chee Chui as part of MIT's 1K House project.

Home prices in many of the world's most famous cities run to well over \$1,000 per square foot. By contrast, MIT architects have produced a decidedly more affordable alternative: the first prototype from the Institute's "1K House" project, an effort to see if low-cost homes for the poor can be constructed for \$1,000, total.

The prototype, called Pinwheel [House](#), was designed by Ying chee Chui MArch '11, a graduate of MIT's Department of Architecture, and has been constructed in Mianyang, in Sichuan Province, China.

“It’s part of the responsibility of an architect, to create these spaces for people to live,” Chui says. “It’s from the heart.”

Chui first designed Pinwheel House in 2009 as part of the design studio — essentially a class — that launched the 1K House effort. The project is particularly focused on affordable housing for areas hit by natural disasters, such as the 2008 earthquake in Sichuan. This prototype turned out to be more costly, at \$5,925, but is still very inexpensive in relative terms.

The idea to attempt building \$1,000 homes was first conceived by Tony Ciochetti, the Thomas G. Eastman Chair at MIT’s Center for Real Estate, and inspired by One Laptop Per Child, the foundation headed by MIT professor Nicholas Negroponte that brings low-cost computers to children.

“There is a huge proportion of the world’s population that has pressing housing needs,” says Ciochetti, who first got the idea for the initiative after seeing a family of four emerge from a tiny mud hut while he was traveling through rural India. Like One Laptop Per Child’s aim of developing \$100 computers, Ciochetti adds, the idea of the \$1,000 house is intended as a challenge to designers: “Can you build affordable, sustainable shelter for such a large population?”

Pinwheel and courtyard

Chui’s house is one of 13 plans that emerged from the first 1K House design studio, in 2009. It features hollow brick walls with steel bars for reinforcement, wooden box beams, and is intended to withstand a magnitude 8.0 earthquake.

The Pinwheel House prototype was more expensive to build partly because it is larger than Chui’s original design — about 800 square feet,

rather than 500 square feet. The smaller version of the house could be built for about \$4,000, says Chui, now an architectural practitioner in New York City. That figure could be still lower if a large number of the homes were built at once, she adds.

In any case, the central design concept of Pinwheel House is the same: It has a modular layout, with rectangular room units surrounding a central courtyard space. “The module can be duplicated and rotated, and then it becomes a house,” Chui says. “The construction is easy enough, because if you know how to build a single module, you can build the whole house.”



The exterior of the house.

Yung Ho Chang, a professor of architectural design at MIT who helped oversee the 2009 1K House design studio, thinks the prototype has fulfilled the promise of Chui’s design. “The house Chee built has good ventilation and good light,” Chang says.

Chang, for his part, is originally from China, and runs an independent practice there, Atelier FCJZ. He was attracted to the 1K House project, in part, by the shortage of good housing in some parts of his native country.

“After the earthquake, this project came as a natural thing to do,” Chang says. “It’s not just about how cheap the house is, but if it’s decent. When you look at living conditions in parts of China, India and Africa, they don’t meet the basic standards of what we think of as real housing.”

From \$1K to \$10K?

The 1K House project has proven successful enough, and attracted enough attention, that Chang is overseeing a related MIT design studio this fall, along with a number of outside collaborators. This one aims to create a series of home designs, intended for Japan, which would cost \$10,000 to build. Participants in the studio include architects and designers from Tokyo University, the Japanese architecture firm Tsushima Design Studio, Atelier FCJZ, the Japanese retailer Muji, and Vanke, a real estate development firm in China.

“The idea of the 1K house is very much about how could we, as architects in research institutions like MIT, work on world poverty,” Chang says. “This semester, the mission is more about how design could reach a bigger percentage of the population, in the middle class.”

The new design studio also aims to create homes that could be built inexpensively following natural disasters, such as the earthquake and tsunami that struck northern Japan in March. Rebuilding in such situations, Chang says, often entails three stages of construction: the creation of temporary shelters, then stronger temporary homes sturdy enough for winter weather, and then permanent replacements for damaged or destroyed buildings.

During that process, Chang says, “there are a lot of resources wasted, including energy.” Alternately, he suggests, inexpensive and simple houses built from an existing template could let countries rebuild more quickly with practical, permanent structures.

The use of inexpensive housing for rebuilding is, in part, why architects in Japan are now engaging with the project. The initiative “is an important step in the realization of rapid/permanent community building,” says Andrew Wit, an architect with Tsushima Design Studio, responding to questions by email. After disasters, he adds, “the government very quickly builds shelters to house all of those affected by the events, but these cheap housing types have very short lifespans and are also made at very low quality standards ... But the [MIT house project] asks if it is possible to utilize new technologies and processes for the quick creation of housing equal to or higher than the typical quality standards which are currently seen in Japan.”

Plenty of hurdles remain before any home can be manufactured for \$1,000 or less. “If it were easy, somebody would have done it,” Ciochetti says.

But ultimately, Chang hopes, convening further studios in the vein of the 1K House project will allow more designs to move from the drawing board and onto solid ground. “The inexpensive laptop got to be more than an idea, it became available for children,” Chang says. “I hope one day we’ll be in the same position.”

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