Royal Academy of Engineering | Leaders in Innovation Fellowships®

Innovator Showcase

DEVELOPING AFFORDABLE HOMES USING SUSTAINABLE CONSTRUCTION TECHNOLOGY

Hexpressions

India

Abhimanyu Singh

Despite its widespread use in packaging, honeycomb paper has not, until now, been used inside modular construction panels. These mass-produced, four-foot panels combine strength and impact/shock resistance with soundproofing and heat retention, low weight, and minimal CO2 emissions. They enable sustainable modular homes to be assembled on a concrete base in a matter of days.

The cost-effective manufacturing and rapid construction methods underpinning Hexpressions' Quadra Home contribute to the UN's Sustainable Development Goals, particularly inclusive and sustainable human settlements.

The use of recycled paper and minimal reliance on more resource-intensive materials supports the global call for action to address the climate crisis, disrupting a historically slow-moving industry and tackling the sector's huge carbon footprint.

Hexpressions has a core team of seven staff, but its unique approach to construction extends to teaching the future residents of its dwellings how to construct them. These new skills can then be deployed to construct more homes for other people in the local community. The 37m2 Quadra Home can either stand alone, or become a quartet of adjoining properties for greater land efficiency.

It's estimated that by 2030, two billion people will be in urgent need of a home. However, while modular housebuilding techniques have been used for a hundred years, raw materials are often finite, or require energy-intensive production.

Abhimanyu Singh's company, Hexpressions, has developed a prefabricated panel system using recycled composite paper honeycomb, clad in waterproof outer materials which can include concrete, timber or stone. This enables the affordable and cost-effective manufacturing and construction of eco-homes, with minimal CO2 output and excellent insulation qualities.

Abhimanyu says his involvement in LIF has brought "a lot of visibility, a lot of connections and a lot of handholding. I've had the best mentor in the world, and his support was phenomenal. The relationship is still going strong, and one of the highlights of the LIF programme is to have a great mentor." He describes LIF as "a seamless journey where meeting innovators, getting mentorship and exchanging advice becomes a complete package. It can take your idea to the next level."

Amid burgeoning demand for affordable and sustainable homes throughout developing nations, Abhimanyu is planning to expand across Europe and Africa. Hexpressions will establish a global office in London to service the many B2B customers already on its books, with future plans to directly manufacture customised homes for consumers. These pioneering construction techniques will ultimately be licensed to some of the world's largest affordable housing companies, maximising the impact of their rollout.

The Royal Academy of Engineering's Leaders in Innovation Fellowships (LIF) programme supports talented entrepreneurs from around the globe to turn their engineering innovations into impactful, sustainable businesses.

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