

Bio-inspired computer model that can design street layouts

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Researchers at the Planning and Transport Research Centre (PATREC) at The University of Western Australia have created a biologically inspired computer model that can autonomously design urban residential layouts without human assistance.

According to the study published in the journal *Environment and Planning B*, the model mimics the [biological process](#) of development, during which a single cell, the embryo, grows into a full organism.

The universal modules were created to play similar roles to biological cells. They are genetically identical with full developmental potentials but will change their physical forms to adapt to their own local context.

Lead author Mr Chao Sun said while many bio-inspired algorithms have had great success in using Darwinian evolution to improve designs, this focuses on how to create new designs in the first place. The computer has to design from scratch and the plans it produces are better than manually constructed plans according to pre-defined performance measures.

"This is learning from nature from a different perspective," Mr Sun said.

"As the great geneticist Hugo de Vries stated, 'Natural selection may explain the survival of the fittest, but it cannot explain the arrival of the fittest (quoted in *Arrival of the Fittest: Solving Evolution's Greatest Puzzle* by Andreas Wagner)."

"Nature doesn't have a conscious mind as we do, but yet, it has created complex systems way beyond our understanding. This study provides new insights into how complexity arrives through simple interactions, a phenomenon known as emergence. We've known for some time the prevalence of emergent behaviours in nature, but to make use of it requires some creative thinking. There's still a lot to be learnt from the greatest designer of all, nature, and there're still plenty of unanswered questions,"

"I know that a trained architect programming a biologically inspired [computer model](#) in the business school is a rather unusual combination, but I just followed my curiosity here," Mr Sun said.

Provided by University of Western Australia

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