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How 'bioluminescent' trees that glow like fireflies could one day replace our streetlights

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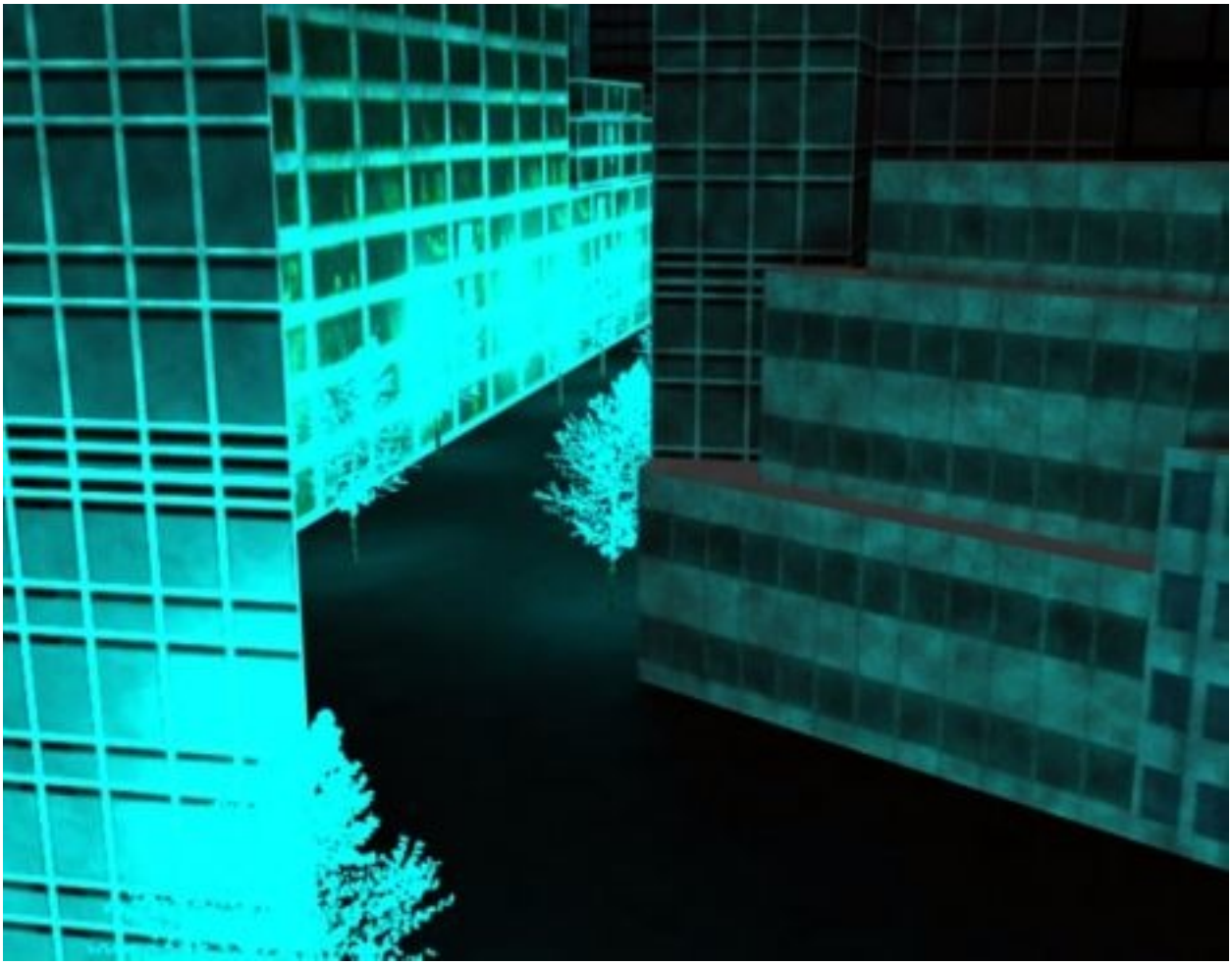
Scientists are developing ways of making trees glow so they can be used as natural streetlights without the need for electricity.
A team of researchers are experimenting with genes to allow the trait that causes fireflies to glow - bioluminescence - to be implanted into a variety of different organisms.
As well as replacing traditional streetlights, bioluminescent plants would be useful for people who are not hooked up to the electricity grid.
And if more lights were ever required, they could simply be grown.



Trees that glow naturally with bioluminescent genes could be used to light streets, as in this artist impression from Cambridge
The scientists at Cambridge University used genes from fireflies and a special form of glowing sea bacteria to create 'BioBricks' – genetic building blocks that can be inserted into a genome.
After inserting the modified genes into a sample of e-coli bacteria they were able to produce a range of colours – and created a living light that was bright enough to read by.

The scientists created the glowing effect by creating a substance known as oxyluciferin which is naturally in a high-energy state at first. However it quickly settles into a more stable, lower-energy state, and when it does so it emits a single photon of light. Geneticist Theo Sanderson, one of the members of the team, told New Scientist: ‘We didn't end up making bioluminescent trees, which was the inspiration for the project. ‘But we decided to make a set of parts that would allow future researchers to use bioluminescence more effectively.’ The research was presented at the annual International Genetically Engineered Machines competition (iGEM), held at the Massachusetts Institute of Technology.

The technology could even be used to make glowing signs that do not need to be wired up
The team say that there is huge commercial potential in replacing the street with natural bioluminescent systems. The idea is also extremely environmentally friendly as no electricity would be required and the process which produces the photons of light is extremely energy-efficient. The scientists have also considered the possibility that the fuel to fire the chemical reaction in the trees could come from human waste or food waste. And if the plant species used was a form of algae then energy could be harnessed from sunlight.

The team say on their website: ‘We might imagine a system where a bioreactor in the roof of a house - supplied with leftover foodstuffs - could pipe glowing algae through the rooms of the house during the night and across the roof during the day.’ In separate research, Taiwanese scientists have found that inserting gold nanoparticles into the leaves of trees helped the chlorophyll to glow red. Under ultraviolet light the nanoparticles glowed with blue light, causing the surrounding chlorophyll to glow red.

The glowing Tree of Souls from the blockbuster film Avatar had the ability to connect directly to the nervous system of all living things

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