



BIO-INSPIRED ENGINEERING AND BIONANOTECHNOLOGY

VIDEO TRANSCRIPT

Dr. Katherine Dunn [00:00:12] I'm Dr. Katherine Dunn. I'm a lecturer in the School of Engineering at the University of Edinburgh. The overall goal of my research program is to reengineer biological molecules and systems to use them in technologies that solve real world problems such as those in the areas of medicine and energy.

[00:00:32] Biology, in many ways, processes a lot of information. Some people refer to life as a form of an information processing system, and we can take inspiration from that to design new ways of processing information for synthetic purposes - so essentially doing with biological molecules or living cells what we might try and do with transistors and circuit boards. Essentially, we can reengineer biological molecules or even living cells to process information according to certain rules and produce an output in a useful form.

[00:01:10] Whatever problems we are trying to solve it's quite likely that somewhere nature has tried to solve a problem that's very similar. So whether that's plants absorbing energy from sunlight to make their own food or animals managing to swim or fly or walk in an optimal manner, there is some form of inspiration there for us to draw on. Biology is extremely efficient because it's had millions of years to get things right. So rather than us spending lots of time to try and work on multiple solutions, it makes sense for us to borrow from nature, to take inspiration from nature and essentially learn from the best.

[00:01:54] Most people think about DNA as an information storage molecule in living things. The recipe book of life if you will. However, it's actually possible to take DNA completely out of

its biological context and use it as a nanoscale engineering material. When we do that, we can design pieces of DNA that will assemble themselves spontaneously into physical structures on the nanoscale that can do, in principle, whatever we design them to do - within certain limits, of course. In the context of drug delivery, that could mean that we make a hollow structure out of DNA, put a drug inside it, and design triggers that will open the structure and deliver the drug only in the presence of cells that actually need the drug.

[00:02:44] Bioinspired technologies could help us to solve many of the most pressing problems of the 21st century, help us to live longer, perhaps to live in a manner that is less damaging to our planet, perhaps even to fix some of the damage that's already been caused to the planet. If we look to nature, we can learn so much about how to do things better and more efficiently. I think we'd be foolish not to take advantage of that as a source of inspiration.

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