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JORDAN BOYLE

JOB TITLE: Lecturer in Mechanical Engineering

EMPLOYER: University of Leeds

HIGHEST QUALIFICATION: PhD



**JORDAN IS A ROBOTICS ENGINEERING RESEARCHER;
HE RESEARCHES BIO-INSPIRED ROBOTS.**

The idea

My research is in the field of bio-inspired robotics, which means that I take ideas from biological systems (usually animals) and apply them to solve robotics challenges. I once designed a robotic worm. I first been studied a worm, called *C. elegans*, and figured out how its nervous system makes it crawl. I then modelled the nervous system on a computer and used it to control the robot, which crawls just like the real worm.

Collaboration

Working on your own all the time isn't much fun! I work with other engineers, including PhD students and other academics. My most interesting and valuable collaborations are with people from outside my discipline, such as computer scientists (because computer simulations are a powerful tool for studying biological systems and for developing robots) and biologists (before applying an idea from an animal to a robot, you must understand how that bit of the animal works). I often contact experimental biologists who works with a particular animal and convince them to collaborate with me. We put our heads together and come up with one or more experiments that will teach us more about how biology 'works'.

Funding

In the early stages of my career I worked on other people's projects for which they already had funding. Now that I'm an independent academic, I need to get my own money! The standard approach for doing so involves first coming up with a good research idea, before writing a grant proposal which explains what you want to do, why it's important and why you are the right person to do it. These can be anywhere from 10 to 100 pages long depending on who you're asking. In my case I often submit proposals to the EPSRC, which is the UK's main provider of research funding for engineering. After writing your proposal you submit it for evaluation by other experts in your field. If it's good enough, you get the money you asked for. Unfortunately this is a very competitive process and most applications don't get funded.

Impact

My research is generally at quite an early stage, so its impact on the public will come further down the line. However, there are several avenues through which my work will affect the public. First, my work often improves our understanding of how nature works, which is generally beneficial. Then, the specific robots I develop can have impact in all sorts of areas. They might be used to do dangerous tasks that people don't want to do; they might help us explore places we haven't been; they could even be used in some surgical applications!



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Publication

I communicate my results to other scientists through publications in peer reviewed scientific journals or conferences. These are generally the only sources that other scientists will “trust”, because all papers are checked by other knowledgeable experts before being accepted. As for non-scientists, some of my work has been featured in the news (including print, TV and radio) and I also often take part in public engagement events like “Champion the Researchers”.

PUPIL QUESTIONS FROM THE EVENT ...

Do any robots exist that are capable of controlling the human mind?

Definitely not! There are robots that can be controlled by the human mind, but nobody has yet found a way to control the human mind directly. Of course your mind can be influenced by something you see, hear or touch, but I don't think that counts as controlling it.

Do you think it would be possible for robots to have emotions in the future?

Yes, I think that's possible, but it won't be happening any time soon! What we may see quite soon is robots that appear to have emotions. This is relatively easy to do. But creating an artificial intelligence that actually feels emotions requires self-awareness, which is much harder. Also, I'm not entirely sure it would be a good idea, even if we could.

Would it be possible (maybe it is already) to use nano-robots to treat viruses inside the body?

Hmm, well, there is already some very limited use of miniature robots inside the body for medical purposes. I'm also pretty sure that nano-robots will one day exist, and that these would be able to treat problems inside the body. However, viruses themselves are incredibly small, so I don't think they are a good target for nanobots. I think viruses would be better treated through biological means, with nanobots reserved for things like repairing tissues.

Would it be possible for scientists to put DNA into robots?

There is already work being done on “DNA machines”. It is possible to create specific DNA sequences that physically fold themselves into shapes, or create simple mechanical mechanisms. However, I don't think it would work to add DNA to a regular robot made from materials like metals. We will probably live to see tiny “robots” made purely from DNA and/or proteins, but then is it really a robot, or is it an artificial life form? Depends on your definitions I guess.

Is it possible for 'soft' robots to replace the limbs of amputees?

In short, yes. I'm not sure if you'd want to use a purely soft robot however. Even though our flesh is relatively soft, our skeleton is rigid. There are already several examples of robotic prosthetic limbs out there.