Biophotovoltaics – Design in Science

Interview of Alex Driver & Carlos Peralta– Designer by L'Observatoire de l'Ecodesign

OED : Who is the originator of the project ?

Alex Driver : Research into Biophotovoltaics is funded by the Engineering and Physical Sciences Research Council (EPSRC).
A separate research project called Design in Science, also funded by the EPSRC and led by Dr James Moultrie, is being conducted at Cambridge University's Institute for Manufacturing. Its aim is to explore how designers can play a role in early stage scientific research.
As part of the Design in Science project, designers Alex Driver and Carlos Peralta teamed up with scientist Paolo Bombelli to develop the moss table.

OED : What is your previous work, background ?

Alex Driver is a Research Associate in the Design Management Group within the Institute for Manufacturing (IfM) at Cambridge University. Alex gained masters degrees in mechanical engineering at Imperial College London and industrial design engineering at the Royal College of Art. He went on to work for 3 years as an industrial designer for Atkins, the UK's largest engineering and design consultancy before moving to Cambridge. He is currently researching potential contributions of industrial design to scientific research. This involves participating in collaborative projects with scientists working on 'live' research projects from a variety of disciplines.

Carlos Peralta is a product designer currently reading for a PhD at Cambridge University that examines the ways in which designers and scientists interact and collaborate. He also teaches at Central Saint Martins College of Art and Design in London on the BA Product Design course and the MA Innovation Management course. Between 2003 and 2007, Carlos was the head of the Product Design Department at the Glasgow School of Art and has worked in design education in Colombia, England, Singapore and Spain. His professional design experience includes work for industry, design consultancy and design entrepreneurship.

OED : How did you get involved in the project ?

Alex Driver : Carlos and I have worked on a variety of case study design projects with scientists from across Cambridge University.
We heard about Paolo's work during a meeting with colleagues, and were intrigued by the idea of generating energy from plants. We met with Paolo and his colleagues to see if they would be interested in participating in a collaborative design project. The scientists were initially skeptical about how we could contribute to their research as they considered it to be a long way from application. However, the scientists needed a poster for a science exhibition to help them communicate the potential of the technology to the general public.
We conducted a brainstorming exercise with the scientists to generate a range of potential future applications for BPV technology. These included an algae solar panel, a floating device which would harvest desalinated water, a floating 'lily pad' power station and the a domestic table. Following on from the success of the poster, the scientists agreed to try and prototype the algae solar panel and then the moss table.

OED : Why this technology was chosen for this project ?

Alex Driver : Quite simply because we thought the technology was really interesting and we wanted to try and imagine how it might be used in the future.

OED : How did you (the designers) work with the engineers ?

Alex Driver : We worked very closely with Paolo (the scientist) throughout the project, frequently spending time with him in the laboratory and even conducting experiments with him. Similarly, Paolo engaged with us in the design process by brainstorming ideas and sketching new device configurations. At the start of the project, there was a large amount of scientific information for Carlos and I to assimilate, so we created graphics and visualisations to help us confirm with the scientists that we had understood what they had told us. These graphics turned out later to be useful tools for communicating how the science worked to other non-scientists.

OED : How did you conduct the design research? Did you have a brief or did you build it with the engineer? Was it a whole or free

Alex Driver : When we started the project we had no idea how we might be able to collaborate with the scientists. We organised a meeting with them to discuss how we might be able to work together – and this resulted in us agreeing to produce the poster for the exhibition. After that the project seemed to evolve quite naturally, with the scientists asking us to help them to produce prototypes of the applications that we had visualised (like the algae solar panel). In response to our suggestion that we produce the moss table to help communicate the potential of BPV technology to the general public at the London Design Festival, the scientists shifted their focus from algae to moss as it is more robust. In this way, the collaboration helped to steer the scientist' research towards a specific application.

OED : How did you conduct the design research? Did you have a brief or did you build it with the engineer? Was it a whole or free collaboration? brainstorming, meeting, prototype ?

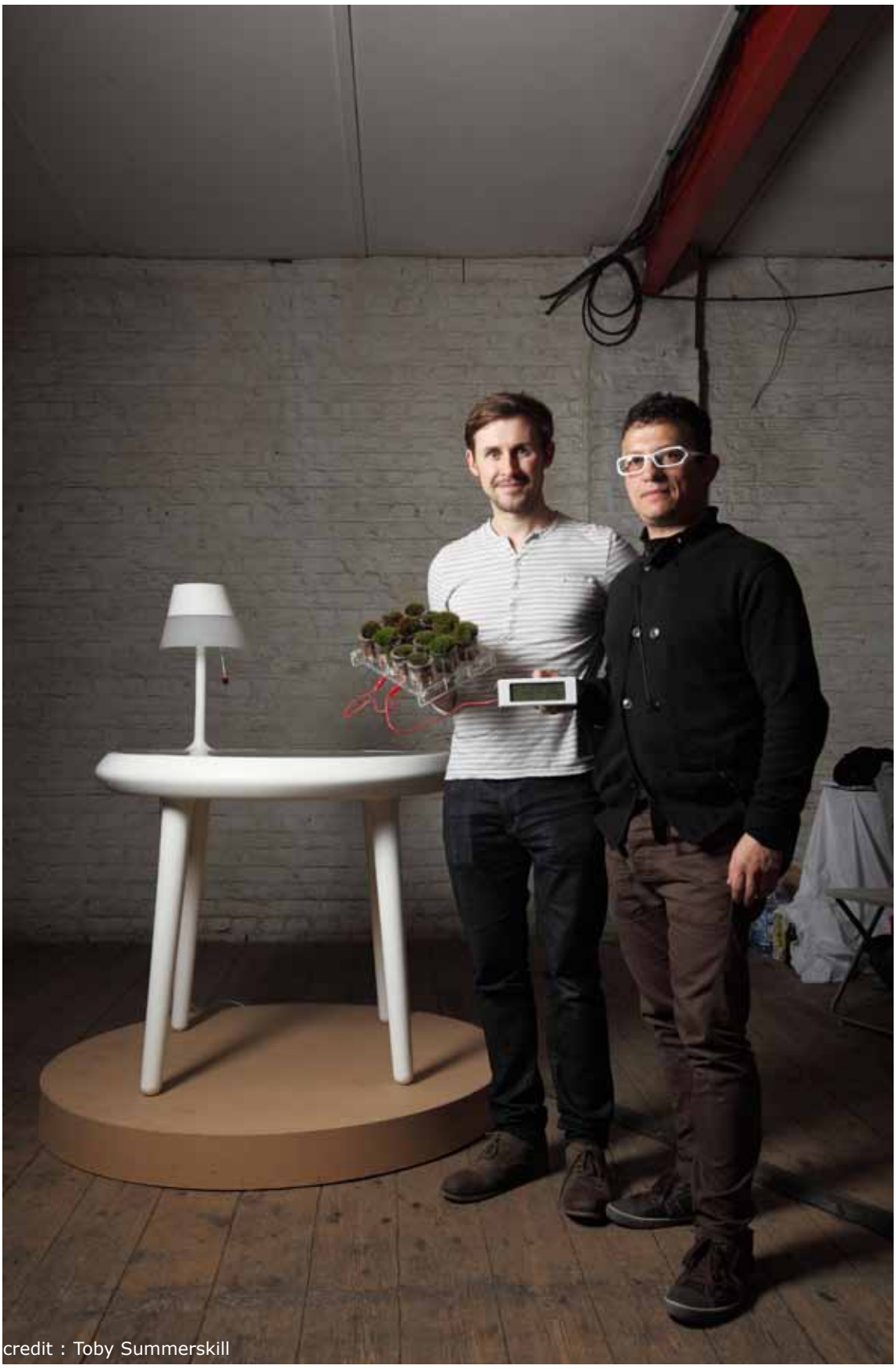
Alex Driver : The purpose of the table is to demonstrate through a familiar domestic object, that this early stage technology has potential applications in everyday aspects of our lives. Our intention with the design of the table and lamp was to create simple forms which were instantly recognisable, and which wouldn't prove a distraction from the core technology. It was not our intention to create something for commercial exploitation. A great deal of research is required in order to develop BPV into a commercially viable technology. Low cost BPV devices may become competitive alternatives to conventional renewable technologies such as bio-fuels in the next 10 years. The most likely application of BPV technology is on a very large scale (e.g. many thousands of hectares) as the efficiencies of the devices are currently low when compared with silicone based photovoltaic devices. However, BPV has several advantages over these technologies in term of the energy required to manufacture them, and the production of byproducts including desalinated water and hydrogen gas.

OED : How did you choose/select the object to be the most useful for commercial or people impact ?

Alex Driver : The purpose of the table is to demonstrate through a familiar domestic object, that this early stage technology has potential applications in everyday aspects of our lives. Our intention with the design of the table and lamp was to create simple forms which were instantly recognisable, and which wouldn't prove a distraction from the core technology. It was not our intention to create something for commercial exploitation. A great deal of research is required in order to develop BPV into a commercially viable technology. Low cost BPV devices may become competitive alternatives to conventional renewable technologies such as bio-fuels in the next 10 years. The most likely application of BPV technology is on a very large scale (e.g. many thousands of hectares) as the efficiencies of the devices are currently low when compared with silicone based photovoltaic devices. However, BPV has several advantages over these technologies in term of the energy required to manufacture them, and the production of byproducts including desalinated water and hydrogen gas.

OED : How the project is going to be further developed? What is the next step?

Alex Driver : Research in to Biophotovoltaic technology is ongoing. The purpose of the moss table was to raise awareness of this fascinating technology, and we are still realising the results of the exhibition as people contact us wanting to know more about our work. Our plan is to take the table to the Milan furniture fair next year which will hopefully generate further interest in the project. Beyond that we are working with Paolo to write a funding application to develop the first floating BPV device. This represents a completely new way of doing research and we are hoping that it will form a model for how scientific research is conducted in the future. We envisage a world in which self-sustaining organic-synthetic hybrid objects surround us, and supply us with our daily needs in a clean and environmentally friendly manner.



credit : Toby Summerskill

OED : We thank Alex Driver & Carlos Peralta for all their contribution.