

Swan Breaks is an innovative hip-hop version of the ballet Swan Lake, which combines contemporary dance with robotics. Dr Stephen Prior, of Middlesex University, discusses the production and design of the robots.

**HOW DID YOU GET INVOLVED WITH THE PRODUCTION?**

I first heard from the dance company, Robert Hylton Urban Classicism, during the summer of 2006 when they approached the university to enquire whether anyone had the expertise to design and build six custom-made robots for their forthcoming production of Swan Breaks.

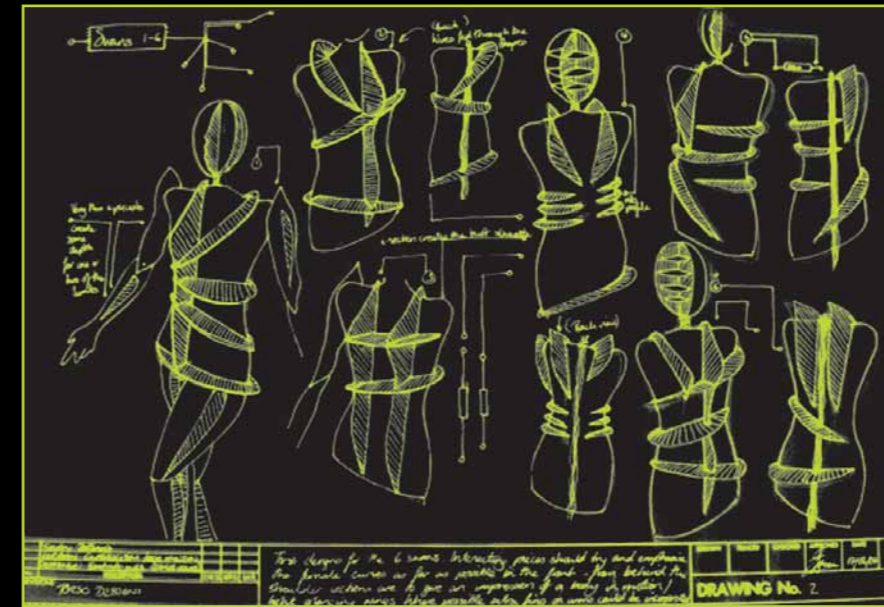
**WHO DESIGNED THE ROBOTS?**

The design team for the project consisted of myself, my PhD student Siddharth Odedra, and two second year BSc Engineering Product Design students, who are now doing a placement year with me, Tom Foran and Mehmet Ali Erbil. We had extra assistance from students, Laura Breckon and Robin Read.

**DID YOU HAVE ANY PROBLEMS DURING THE DESIGN PROCESS?**

Problems of particular note were the human size constraints, minimal base profile leading to stability issues, the cost effectiveness of the whole design, and programming and control issues using PicAXE microprocessor components.

One of our biggest hurdles was the dance company's expectations. People have a vision of robotics that they have developed from what they see on television and in films. They have images of Arnold Schwarzenegger as the Terminator lifting cars. The reality is very different and bringing expectations back to reality was a challenge. The robots are relatively simplistic, so there was a lot of negotiation between the dance company and the designers.



Designs for the torsos of the robots

**HOW MUCH DID THE PROJECT COST?**

About £5000. When we first costed the project, it was considerably less but the dance company wanted more which raised the cost. Giving the robots a greater range of movement took more time and had cost implications.

**WHO FUNDED THE PROJECT?**

Funds came from the dance company who are a charity and are funded by the arts council. The arts council have slashed funding which will impact on the dance company. If they are starved of funds, it will restrict the future of similar projects.

**HAVE YOU BEEN INVOLVED IN OTHER PROJECTS LIKE THIS ONE?**

Over the years we have been involved with many robotic/mechatronic projects including Robot Wars, Techno Games, Eurobot, World Skills Mobile Robotics and more recently the MoD's Grand Challenge Event 2008 which involves developing a UAV for the British Military. We have to create a system with a high degree of autonomy that can detect, identify, monitor and report a comprehensive range of military threats in an urban environment. The Grand Challenge will culminate in a grand finale in August 2008.

**SWAN BREAKS WAS SEEN AT THE QUEEN ELIZABETH HALL, LONDON, IN MARCH.**

# SWAN BREAKS

**TELL US ABOUT THE ROBOTS**

The robots were custom-made, in-house, at our workshops at Trent Park. We began the process with inspiration through art and film – of particular note was Fritz Lang's *Metropolis* and Sir Eduardo Paolozzi's sculptural forms. We received help in this respect with creative input from Emma Wee, RHUC's Costume Designer. We also met with the dance company to discuss their vision of the production.

The lead dancer, Rose Chu, was photographed and

her profile was used as a template for the robots' profiles. Through a series of mock-ups, we arrived at the final form which uses laser cut 'live edge' plastic for the main body and mechatronic components (Servos and DC Motors) to drive the arms, head and base.

The robots are able to move around the stage. It was important that they had a wide range of movement (about 10m x 10m) so that they could cover the whole stage area, wherever the production is performed.

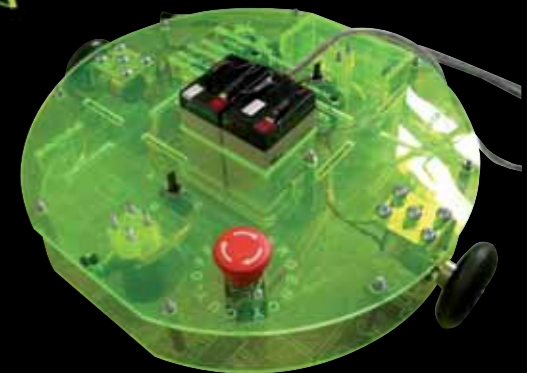
The robots are partly autonomous and are programmed to follow a routine devised by the dance company's choreographer, Robert Hylton. However, they can also be controlled remotely if spontaneous input is needed during the 50 minute performance.



A prototype of the robots



The base unit which enables the robot to move around the stage



Lead dancer Rose Chu's profile was used as a template for the robots' profiles

Photo: Adrian Wood