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Implementation of Robotics in Costumes and Theatre

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Robotic sculpture is a class offered at UMD. This excited me—a combination of art and science, creating robots that are also art. However, with the introduction of the class came the redefinition of the word "robot." A robot is anything controlled by an electronic circuit or computer program. Robots, in fact, can be very simple. I worked with the Arduino kit that is sold in the UMD bookstore. This kit, which was required for class, contained a breadboard and arduino computer chip, multiple LEDs, a small motor and servo, as well as various sensors for detecting light, pressure, and motion. My professor asked me one day if I knew what "e-textiles" were. I did not, so he explained that these robotic mechanisms could be incorporated into fabric and costumes, in a field termed "electronic textiles" or "e-textiles." With all of these supplies already available to me, I was exceptionally excited to research this new field of electronics.

I began exploring the resources available for creating electronic art. There are various brands of machine washable computer chips, all made small and compact enough

to incorporate into costumes. LilyPad by Arduino and Flora by adafruit are the two main circuit boards on the market. They are created so they can be hidden in the project or aesthetically incorporated into the design, and they both contain easy conduits to connect to conductive thread. Conductive thread was another resource used to create circuits. This thread conducts electricity and can be sewn into costumes, reducing bulk and streamlining the circuits. The thread can also be used to create designs and can also be threaded into a machine.

The most interesting material I found for creating electronic textiles was conductive paint. Bare Conductive paint is a washable paint that conducts electricity. On the website, it suggests mending broken television remotes or making light up cards. It is washable, so it must be carefully tended to when on fabrics. It can also be painted over, as long as the circuit does not break.

I started working on a large dragon mask to explore the possibilities of this field. I made a base structure out of a large cardboard box. I covered it with tinfoil and put a solid layer of paper maché over that. I then painted the surface purple and added details, like horns, made of air-dry clay. I sculpted large horns and eyes out of plastic Christmas ornaments. The eyes are fitted with yellow LEDs and the circuits are connected with the conductive paint. The conductive paint is on the outside of the mask, forming a design. I intended to create blinking eyelids for the dragon using small servo motors, but I ran out of time in the summer.

Potential uses of this e-textile technology can be used in the upcoming production of *The (curious case of the) Watson Intelligence.* One of the characters in the play is a computer, so I discussed with the costume designer the incorporation of LEDs or EL wire

accenting the costume. I was also approached about helping with the incorporation of lights into an opera production of *Midsummer Night's Dream.* Other possibilities involve creating flickers costumes for dance concerts where the costumes react to light sensitivity or proximity to other dancers, or possibly using the conductive paint to create interactive glowing sets for dances or shows. Subtle motions could also be incorporated into masks or other accessories.

I was also provided with a copy of the play *R.U.R. 'Rossum's Universal Robots* (1920), which is the literature that coined the term 'robot.' Creating a glowing robot character is now accessible for the UMD Theatre, through the introduction of e-textiles.

References:

Bare Conductive, http://www.bareconductive.com/

The (curious case of the) Watson Intelligence, Madeleine George, 2014. Samuel French Trade

R.U.R. (Rossum's Universal Robots), Karel Capek, 1920.