Very Slowly Animating Textiles: Shimmering Flower

Joanna Berzowska
Concordia University
joey@berzowska.com

1 Introduction

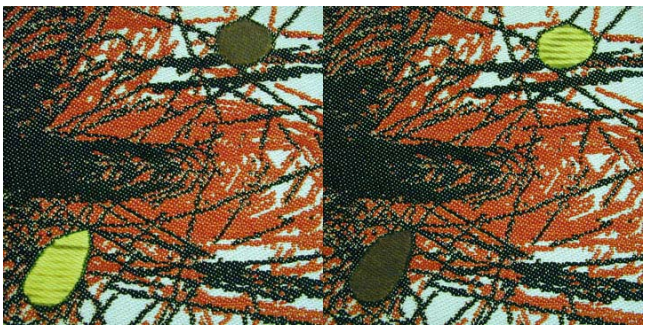
Shimmering Flower deploys a simple technology for non-emissive, color-change textiles. It functions as a woven animated display, constructed with conductive yarns and thermochromic inks together with custom electronics components. The textile is woven on a Jacquard loom, which allows the creation of beautiful and complex imagery. The flower image was created with custom drawing software.

2 Visually Dynamic Fabrics

Dynamic, reactive or interactive clothing is predicated on the development of textile displays: visually animated materials that can be embedded or incorporated in a fabric.

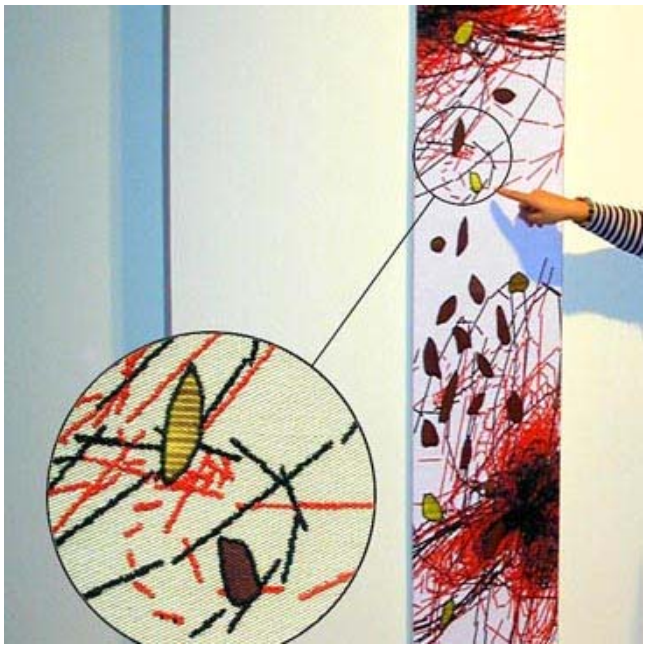
Materials for display such as light emitting diodes (LEDs), electroluminescent (EL) material or woven optical fibers coupled with high brightness LEDs offer potential for wearable displays or animated fashion. Non-emissive materials that simply change color – such as electronic ink (E-INK) and various photochromic or thermochromic pigments – are more interesting. Textiles with emissive displays are visually appropriate for evening and youth wear, whereas non-emissive textile displays remain closer to the tradition of weaving and textile printing.

I use thermochromic leucodye materials that can be engineered to change from a specific color to a clear state at arbitrary temperatures between -25°C and 66°C. Many colors are possible and unexpected color changes can be obtained by combining thermochromic and regular inks. By mixing inks that change at different temperatures, a more complex effect can be achieved. The inks can be applied with a various printing processes, such as screen printing. In existing products, color change is activated by body heat or through resistive heating that employs a layering of conductive and thermochromic inks (on battery testers).



The Shimmering Flower piece is constructed using traditional textile manufacturing techniques: weaving and printing with inks. Conductive yarns are woven together with insulating yarns to construct a textile fabric substrate that is overprinted with areas of thermochromic ink. Control electronics send power to different areas of the electronic textile in order to heat the ink. This allows for the creation of dynamic designs on the textile. Visual properties are determined by the pattern and physical configuration of the conductive yarns and thermochromic inks integrated into its surface.

Initial prototypes were woven on a hand loom and demonstrated simple, orthogonal designs. Shimmering Flower is woven on a Jacquard loom, which can weave complicated weave structures, including double and triple weaves. On a Jacquard loom, each warp yarn is individually addressable, so that complex and irregular patterns can be woven. The Shimmering Flower design was created with my custom drawing software, which applies algorithmic representations to gestural input. Future work includes incorporating conductive yarns with the non-conductive yarns to construct three dimensional fabrics that mimic simple electronic components. Double weaves can create conductive and insulating textile surfaces that function like a woven circuit board.



3 Conclusion

The aesthetics of the display mirror the soft qualities of the construction. The textile changes in a slow and contemplative way, referencing the process of weaving, knitting and other textile construction techniques. Resulting imagery blurs the boundaries between digital image and textile design motif. The aesthetic of the patterns and the animation references the idea of “pixel”, traditional quilting and weaving practice, as well as emerging research in visual display technology.

4 Notes

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This research is based on Electric Plaid prototypes I developed at International Fashion Machines, which I co-founded in 2001.

5 References

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