

## ***Project Summary: A Cultural Shift in Computer Science: Introducing Computation through Fabrics and E-Textiles***

*Principal Investigators: Leah Buechley, Michael Eisenberg, and Wendy Dubow*

Computer science in the United States has acquired what seems to be an unalterable reputation as an overwhelmingly male discipline. Many worthwhile efforts have been undertaken to increase the diversity of computer science as a discipline; but judging from the current state of affairs, more and more creative work needs to be done. Consistent with research in the subject, we believe that the crucial factors in the inequity of the discipline are cultural: that is, the culture that has grown up around computer science has a variety of attributes that appeal more to males than females. In response, this project seeks to design an alternative cultural pathway into the subject—a pathway that does not purport to change or even implicitly criticize the existing CS culture, but rather seeks to provide a very different culture through which new populations (and especially females) can become fascinated with computing.

Specifically, this project will develop and disseminate tools for engaging people in computing through the medium of fabrics and electronic textiles (or e-textiles). This work will build upon our ongoing efforts to create accessible, powerful tools and materials that allow users to design and build their own programmable interactive fashion. The types of projects that users undertake within this alternative culture of computer science are rich in content, but refreshingly non-traditional: they are tangible, colorful, dramatic, richly interactive, and beautiful. This project proposes to encourage the growth of this new culture via two complementary avenues of work: 1. *the development of a visual programming environment for the LilyPad Arduino*—a toolkit we developed that enables people to build e-textiles—and 2. *the development, dissemination, and evaluation of an “E-textiles in-a-Box” kit* for educators. This kit will be disseminated through the large network developed by the National Center for Women and Information Technology (NCWIT) and its effectiveness will be assessed by NCWIT’s social science team. These efforts are what we believe to be the most crucial next steps in engaging a broad audience in e-textiles and—via this engagement—a new and diverse audience in computing.

**Objectives and Intellectual Merit.** The proposed work addresses the diversity issue in computer science by seeking to re-imagine the “look and feel” of the discipline as it appears to currently underrepresented populations (especially women). In doing so, there are a host of interesting intellectual challenges and research problems to address: the design of appropriate software tools for the creation and control of e-textiles; the study of how alternative cultures within an established discipline emerge and evolve (and what metrics may be used to document this process); the investigation of the relationship between gender and computer science. In short, this project has the strong potential to make intellectual progress on a variety of fronts—in software design for physical artifact creation, in hardware design, and in pedagogical and social research in computer science.

**Broader Impact of Work.** This project promises to have widespread impact in computer science education, precisely because it does not seek to remake or lambaste the existing disciplinary culture, but rather because it looks toward the creation and evolution of an alternative culture to act as an inviting pathway into the larger world of computational media. Through the various means of dissemination proposed here as well as extensive academic dissemination (through papers, presentations, etc.) this project is designed to have lasting, innovative, and strongly beneficial social and intellectual impact. Indeed, should the project succeed in attracting a more diverse population into computer science, the impact of this work could be extensive and profound in ways that would be hard to predict or gauge at present.