

## E D U W E A R

### Children designing tangible and wearable computing for playful educational purposes

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Marion Ellwanger is a Professor for smart textiles design in The Swedish School of Textiles, THS, since 2004. She received various european grants to develop new design concepts and innovative applications for smart textiles and wearable technology, considering different types of target groups, eg. children and elderly people. The new use and interactive properties of innovative textiles changes and challenges the whole textile/fashion design and manufacturing process.

Besides the development of coordinated international education modules in smart textile design and wearable technology, eg. in performance design, she is an active member in NEST<sup>1</sup> and in EURATEX<sup>2</sup>.

Marion aims to bring together The Swedish School of Textiles, THS, with other Institutions and Companies to build an international public spirited platform for the future of textiles in Borås.

<sup>1</sup> NEST is a network of participants from Universities and Research Institutes in the Nordic countries with the goal of transfer know-how and generate projects together with the industry within the sector of Smart & Intelligent Textiles.

<sup>2</sup> Euratex The European Technology Platform for the Future of Textiles and Clothing

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Understanding ICT - Information and Communications Technology - and being able to use them competently and confidently, and possibly to actively shape their development are competences that are crucial for societal participation in the information society.

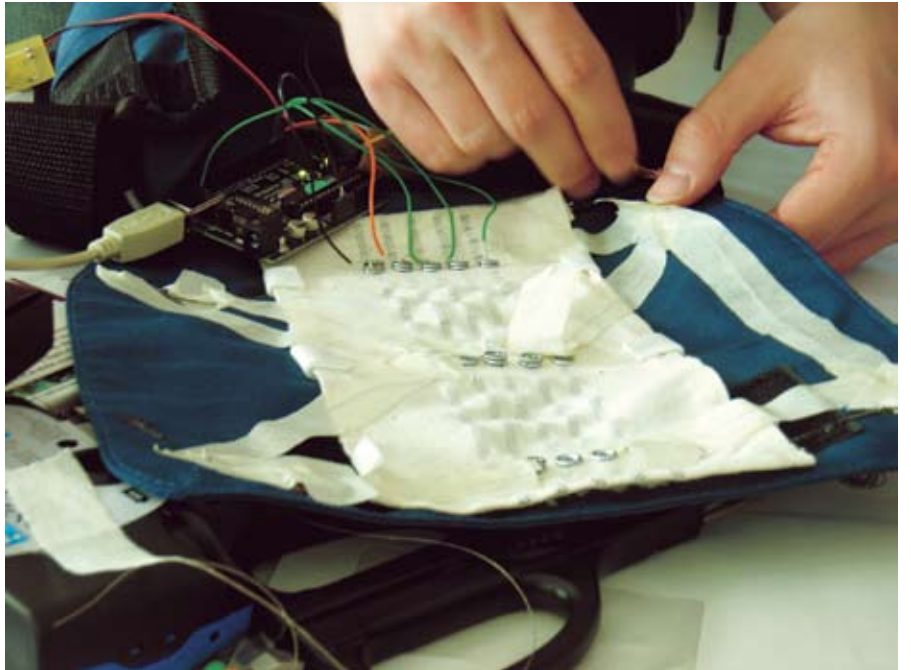
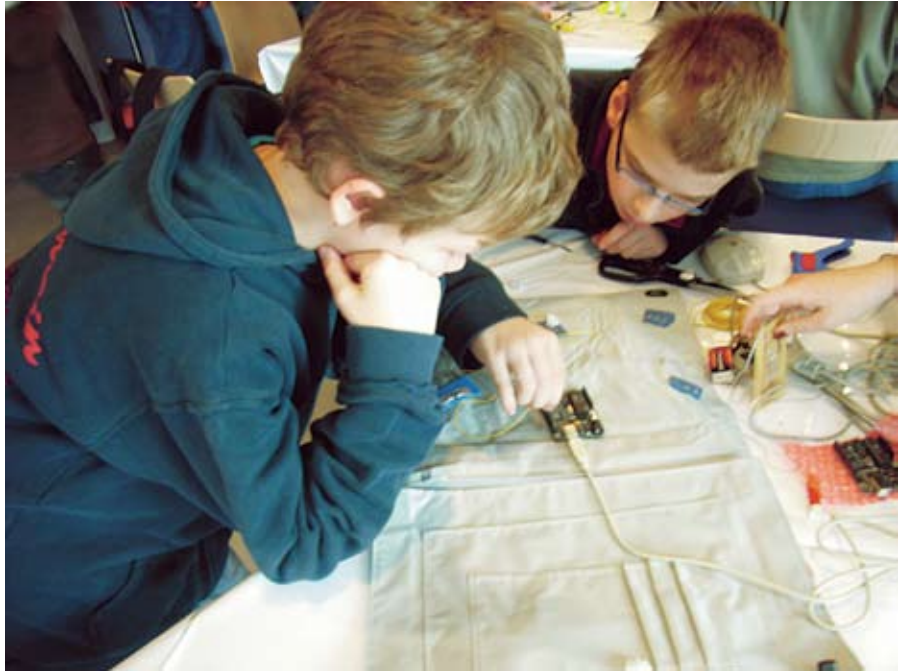
Structural barriers and mechanisms of marginalisation as well as high cost of educational ICT materials inhibit the development of such competencies.

The E D U W E A R - Project aims at contributing to the reduction of inhibiting factors by employing an approach rooted both in education and in ICT development. An educational low-cost construction kit for wearable and tangible interfaces – particularly smart textiles - will be developed.

These new interfaces open up opportunities for haptic, tactile and aesthetic experiences, thus a wider range of learner types can be included. Thematic concepts for courses, workshops (both as part of school offers and as freetime activities - formal and informal learning settings) will be developed, implemented and evaluated, also focussing on issues of marginalisation. A web-based virtual laboratory will be established and used as a platform for the collaborative development of the construction kit and for cross-national and project-wide communication, exchange and dissemination. One of the main objectives of the project is to foster the experience that one's environment can be shaped and influenced – and how.

In addition to family, school and peer-group, digital technologies play a major role in children's socialisation. The rapid pace of developments in information and communication technologies changes habits as well as structures of perception and communication, and it has a fundamental impact on the way we think and act: Technology catalyses changes – changes regarding what we do, and regarding the way we think. It changes people's perception of themselves, of others and of the way they relate to the world (Turkle 1984). These processes of change will be intensified even further by the development of those innovative technologies that can be summarised under the term of „ubiquitous computing“, such as tangibles, wearables and smart textiles.

Digital technologies are and will be crucial factors in life. Merely using them does not necessarily contribute to understanding how they work and their role in Knowledge Society. Hence, in order to reach an understanding, digital technologies themselves have to be experienced as something that can be shaped and modified, not as something static that users have to adapt to. Even though educational concepts dealing with those technologies mentioned above do exist, there is a lack of simple concepts that can be implemented in school and leisure-time contexts (Robotics being an exception here). Besides, though the technical equipment necessary for such educational offers usually comprises rather simple constructions, the acquisition and purchase is usually very time-consuming and tedious as there are no ready-made construction kits available.





The EduWear project aims at closing these gaps, both in the area of educational concepts and in the area of the technology required.

The interplay of technological developments on the one hand and factors inhibiting an experimental and self-confident approach to them on the other hand is the starting point of our project idea.

Specific consideration is given to access to new digital technologies as a step towards a more profound societal participation of marginalized young people. We aim at interweaving issues of marginalisation - and migration and gender in particular-, with a hands-on, joyful approach to digital technologies that combines tactile, concrete experiences with a deeper understanding of abstract concepts. For educational purposes new and innovative technologies should be in use in order to win young people's interest and to engage them in learning activities that matter for their living and acting in future society.

When using digital technologies, communication takes place via interfaces. Mouse or keyboard are not the interfaces of tomorrow. Rather, there is an increase in the development of tangible user interfaces which connect virtual worlds and the actual physical environment. Amongst those technologies, wearable interfaces that are woven into articles of clothing can be found, as well as specific robots that react to the physical environment (such as Lego Mindstorms), RFID Technologies that can accumulate information in the physical environment, tactile user interfaces, etc.

Yet by offering “Tangibles”, tactile user interfaces as pathways into digital technologies, we do not just wish to introduce technologies of the future. Rather, we are aiming at

- winning or re-gaining young people from different backgrounds for learning experiences
- facilitating a playful, experimental and concrete access to abstract concepts
- bringing across both the boundaries and the connection between “real” and “virtual” worlds by exploring abstract concepts e.g. algorithms or data transfer through tangible artefacts and the other way round
- fostering processes of a hands-on, tangible access to the world and one’s environment,
- and fostering the experience that one’s environment can be shaped and influenced – and how.

Tangibles and wearables (especially smart textiles) open up opportunities for haptic, tactile and aesthetic experiences, thus a wider range of learner types can be included. Due to the rich history of textiles, their combination with digital technology will foster a new perspective, from which textiles and their traditional symbolic and emotional meaning can be viewed. As an advanced technical material it will attract the interest of girls and boys alike.

Within the project we aim at developing hard- and software needed to reach the overall objectives as well as on developing concepts detailing how these technologies can be used in an educational setting. The concepts have to be applicable within current curricula and situations at school and in non-school related context. Within the project we want to include groups of marginalised people and focus on Gender Mainstreaming.

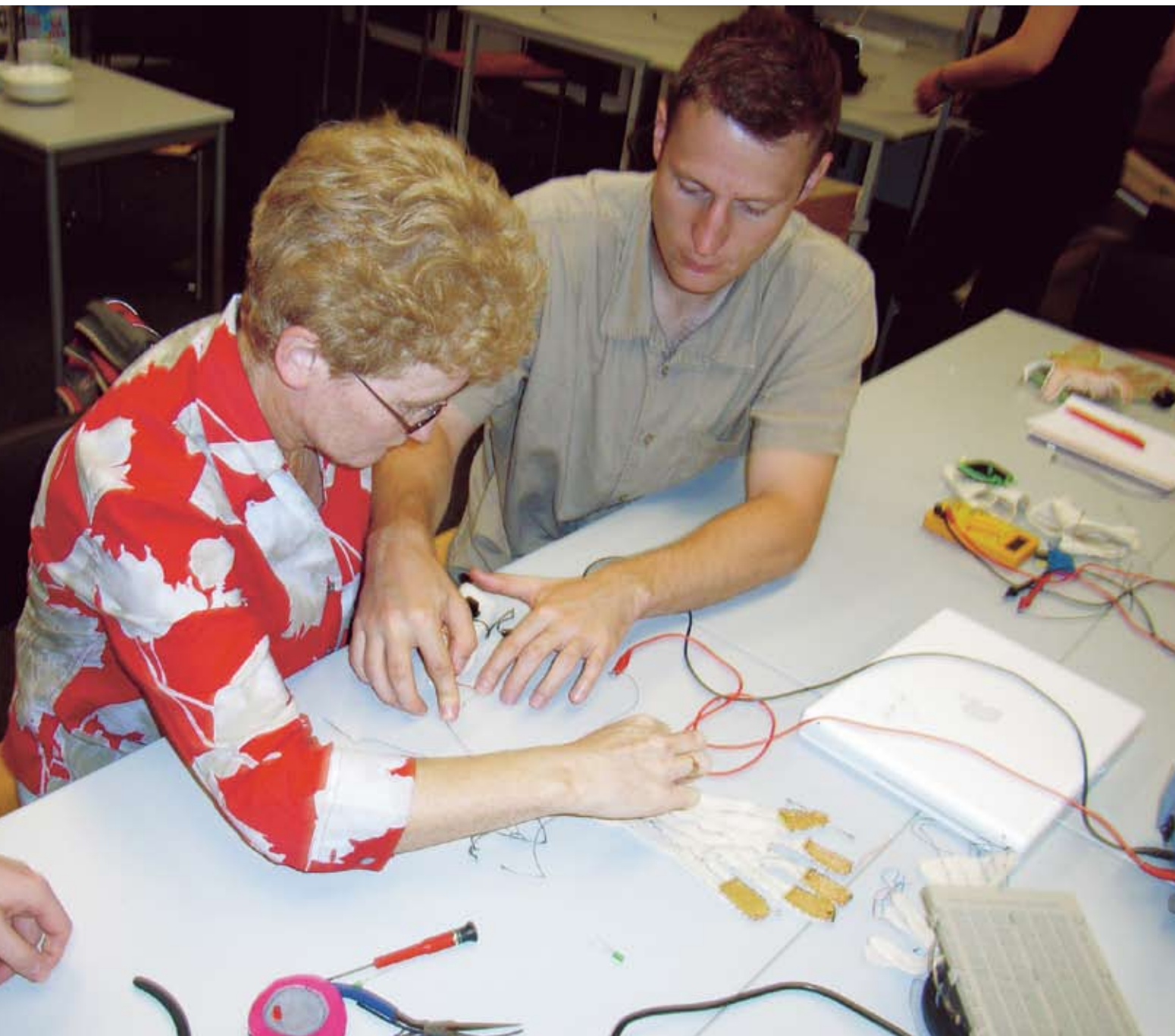
The combination of high-tech components from current developments in ubiquitous computing, adapted to children as a target-group, resulting in a low cost development kit is innovative. In particular, the design of Smart Textiles is a young and rarely explored area. To create simple and cheap soft technological devices for children is a unique approach in Europe.

Other innovative aspects are:

- the participation of children in the development process of the kit (children as designers)
- a hands-on approach of addressing the changes in every-day life and experiences brought about by digital technology
- enhancing the understanding of innovative technology and boosting children’s interest in/attraction to learning processes
- actively addressing marginalised groups
- specifically addressing girls with offers that attract them
- supporting processes of actively shaping, designing and modifying technology.











The E D U W E A R project is part of the Partners

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