Aalto-University

School of Electrical Engineering

Automation and information technology training program

Information technology major

**Research plan for bachelor’s degree  
with working title**

**Web application for e-textiles design**

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Professor in charge: Samuli Aalto

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# **1 Introduction**

E-textiles have been around for two centuries. They are still a growing industry. E-textiles are wearable pieces of clothing that have conductive materials woven into the fabric. Since the late 1800s people have worn clothing with conductive materials, like for example gold or silver. Only later did scientists start using the conductivity to create circuitry out of clothing. Though e-textiles have been around for so long, have the methods for designing them stagnated.

Current methods of designing e-textiles involve paper sketches complemented by computer controlled weaving machines. The method for inputting instructions into the machine is done by converting the paper sketches to images using photoshop or similar software, converting that image to a file for the weaving machine’s software and uploading that file. Simple revisions and changes to the design require reediting of the image which is time consuming and unintuitive. The software in the weaving machine has rudimentary editing tools that do not satisfy the needs of the designers.

Fabrics are woven by interlacing two different yarns, called warp and weft, with each other at 90-degree angles. The basis of weaving machines is that for each row the machine either lifts a warp or leaves it down. The Weft then goes through the warps to the other side and the cycle is repeated. The pattern that the warp and weft create is called a weave. The simplest weave, a plain weave, is achieved when for every row, every other warp is lifted. This gives us a plain chess pattern.

E-textiles often employ layered weaving to create complexity and protection to the conductive threads. The basis of layered fabrics is that the warps are divided onto the layers and stay separate from the other layers’ warps unless overlap is needed.

This research seeks to create a web-based application for the use of designing weaving patterns with the goal of assisting the design work of e-textiles.

Concepts:

E-textiles, Smart textiles, Weaving, Web application, Database, Software

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# **2 Objective**

The objectives of this paper are to research web-based applications, user experience of computer software and how to apply these to e-textiles designing.

The first version will be a rudimentary version where the objective is to create the foundation onto which the tool can be expanded. The next versions will add functionality and have user experience as the main objective.

Ideas for features in the application will be discussed with an e-textile designer Emmi Pouta from Aalto university. They include pixel based and 3D based viewing and editing of the fabric, presets for ease of use and easy conversion between fabrics of different layers.

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# **3 Schedule plans**

Working schedule:

|  |  |
| --- | --- |
| Monday: | 3h |
| Tuesday: | 3h |
| Wednesday: | 3h |
| Thursday: | 3h |
| Friday: | 3h |
| Saturday: | 0-3h |
| Sunday: | 0-3h |

Deadlines:

|  |  |
| --- | --- |
| 01.10.19 | Research plan |
| 13.10.19 | Version I |
| 03.11.19 | Version II |
| xx.11.19 | Speech workshop slides |
| 10.11.19 | Opponing exercise |
| 17.11.19 | Version III |
| 01.12.19 | Opponing report |
| 01.12.19 | Final presentation slides |
| 2-5.12.19 | Seminars |
| 15.12.19 | Final version |

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# **Bibliography**

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