Woven light emitting display

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INTRODUCTION

Nowadays clothing has more functions than just climatic protection and good look. Developing smart and interactive apparel sector, clothing obtained additional ability to communicate with environment and its wearer [1]. The concept of communication apparel may be perceived as the result of a convergence of two industries: textiles and electronics [2]. Electrotextiles represent huge potential in creating a new generation of flexible textile platforms for electronic systems and smart garments [3]. Smart textile systems different range of applications like medical (monitoring of health, medical therapeutics), safety (work wear and protective clothing), leisure and fashion etc.

In this study research is focused on photonic textiles, designing woven light-emitted textile display. Flexible light emitting textile can be used as output interface integrated into communication clothing by representing different animated images directly on clothing.

MATERIALS AND METHODS

For light-emitting display substrate design digital looms was used with warp density 38 ends / cm. Weave was designed in software *Weavepoint*. Cotton yarns were used in warp and weft systems, in some part of textile copper yarns (330/34x7 dtex/f) were interwoven in warp and weft directions for electrical connections. Light emitting diodes (LEDs) were attached to electrotextile during weave.

CONDUCTIVE YARNS PLACEMENT IN TEXTILE

For display matrix construction was used, therefore conductive yarns should be placed in weft (assumed as anode) and warp (assumed as cathode) yarn systems. To avoid interconnection of both polarities in point of yarns intersection, electrotextile was designed as two layer fabric.

Projecting two-layer electrotextile for LED display substrate when both layers are interwoven, it was important to note proper:

- Type of weave;
- Placement of conductive weft and warp yarns;
- Interweaving point of top and bottom layer

Weave design in *Weavepoint* software is shown in Fig.1.

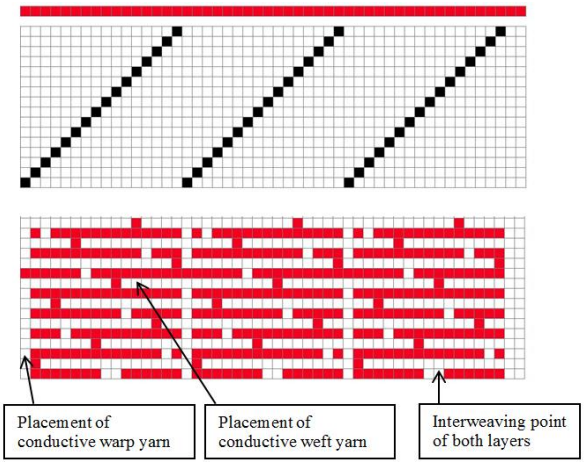

Figure 1. Weave design in *Weavepoint* software

Light emitting diodes were attached to electrotextile both during weaving process, and after textile was woven.

CONCLUSIONS

Described approach was used to fabricate light illuminated woven fabric which can be integrated into clothing or in other object related to textile applications. This technology is not only limited to light illuminated displays but could be used to build other smart textile constructions like sensors, conductive textile traces etc.

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