Experiments on Producing an Interactive Campus Map

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Contents

Introduction

Several scientific experiments have been conducted on printing electronic devices with traditional printing equipment. The results have shown the feasibility of the currently applied technologies, but there is not yet a full understanding on implementing conventional printing for producing functional printouts in an uncontrolled environment setting.

This study presents:

- Research on printed intelligence;
- Experimental work on producing an interactive campus map in an uncontrolled environment;

Objectives

Goal of the experimental work:

- Creating an interactive map product – Metropolia UAS interactive campus map;

The research questions in this study are:

- What is the applicability of conventional printing technologies on adding functionality to printouts?
- Is it feasible to produce functional printouts in an office environment setting?

Literature Review and Analyses

The literature study involved:

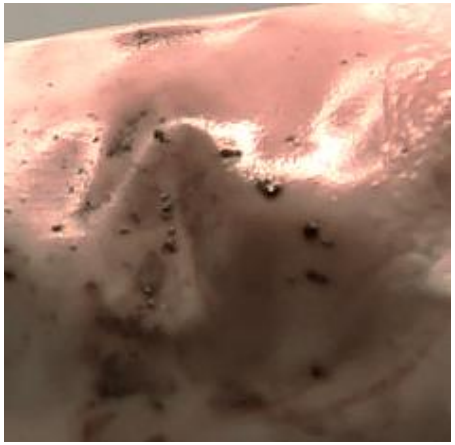
- A research on the different printing methods;
- Making SW (strengths and weaknesses) analyses based on the studied literature for traditional and digital printing methods in producing intelligent applications;

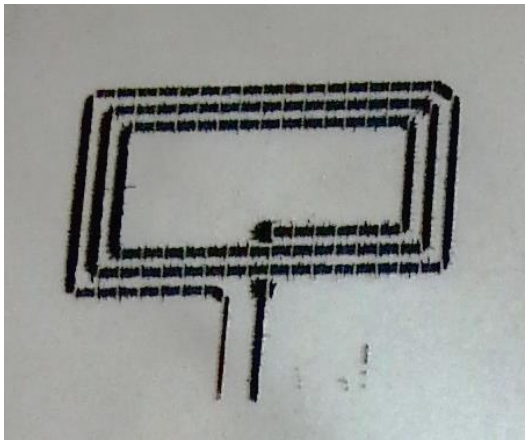
The SW analyses provided guidelines for the development of the interactive campus map. The conducted analyses led to utilising Inkjet technology in producing the circuitry of the map as this method provides an optimal solution for minimising the throughput of the used inks.

Interactive Campus Map Conceptual Design

Image 1. The first design of the Interactive Campus Map of Metropolia University of Applied Sciences.

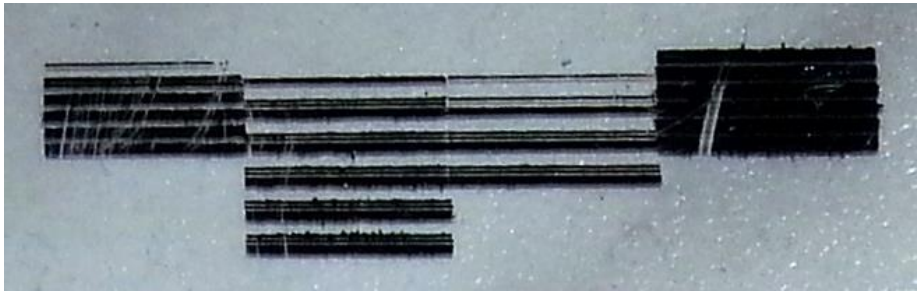
Production of the Map Circuitry



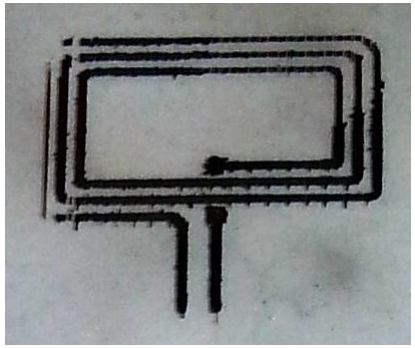


a) Nanosilver ink particles with IPA. b) Pixel pattern. c) Image pattern.

Image 2. Inkjet test print problems using IPA as a cleaning agent.



a) Pixel pattern (ink surface scratched during testing).



b) Image pattern.

Image 3. Inkjet test print problems using Tetradecane as a cleaning agent.

Detailed Design

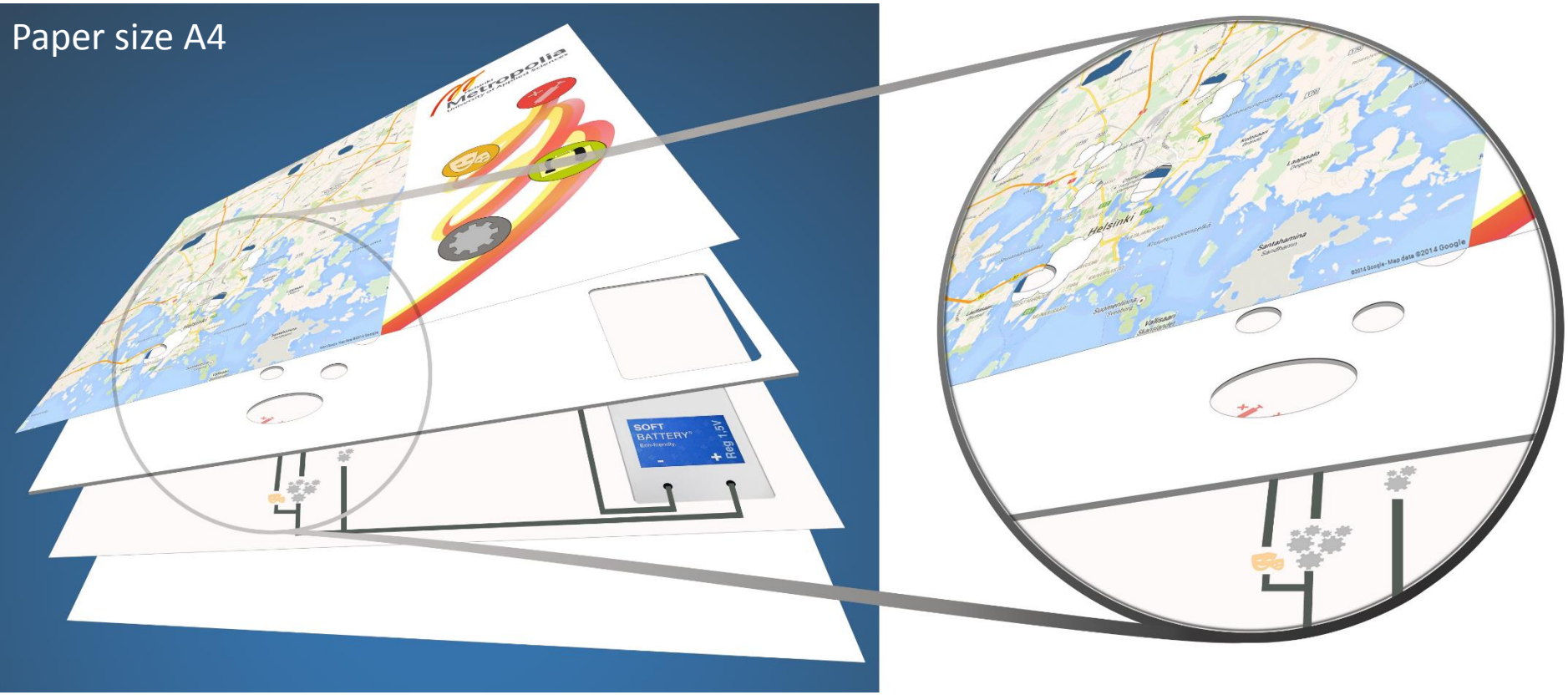


Image 4. The second design of the Interactive Campus Map of Metropolia University of Applied Sciences.

Production of the EL Light Elements

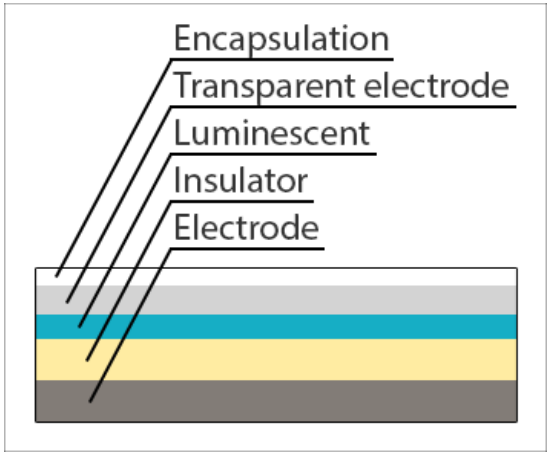
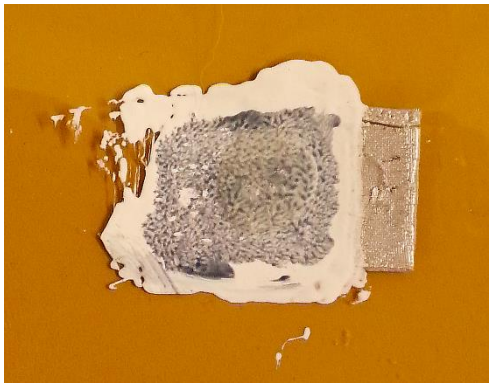


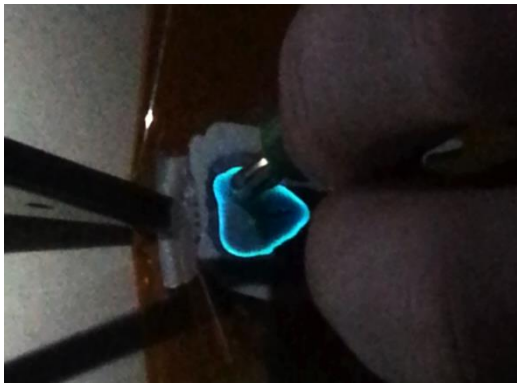
Image 5. EL light emitting element.

The produced EL light components were tested by applying AC current gradually.

- 0-100V – No light was emitted.
- 100-220V – Light was emmitted with increasing intensity.



a) EL printed element.



b) EL - 220 Volts applied.

c) EL - 280 Volts applied.

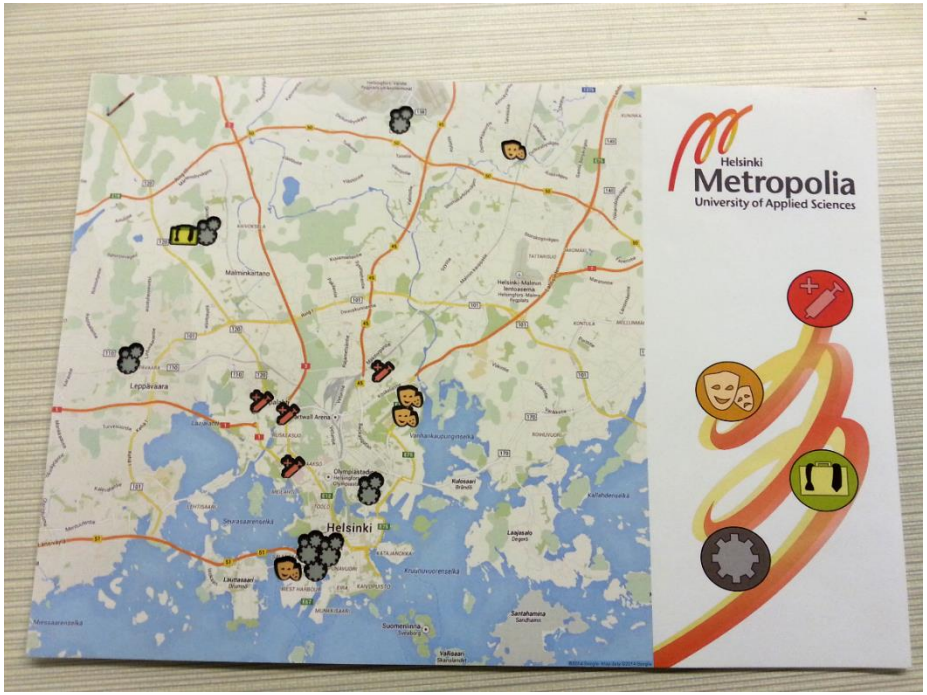
Image 6. Electroluminescence light emitting elements.

Results and Conclusion

The answers to the research questions are:

- The conventional printing technologies in the existing industry can be applied to printed intelligence. However, the nature of the product is important in terms of volume printing; for example, the requirement for changing the contents for an individual print (personalization) will rule out volume duplicate printing.
- As long as normal factory conditions do not damage the printouts, it is possible to produce functional printouts in an office environment setting.

The findings presented in this paper indicate there is demand for studying, finding and learning new ways of applying conventional printing technologies for developing and multiplying intelligent devices and objects.



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Thank you!