

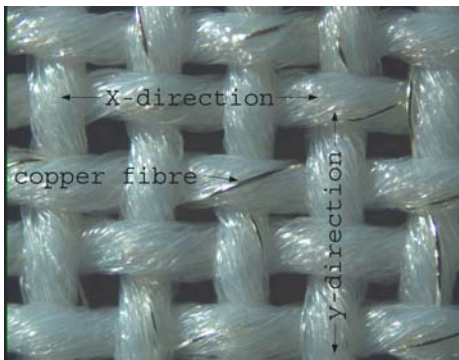
Ivo Locher, Tünde Kirstein
Electrical Engineering Department
ETH Zurich

The Future trend in wearable computing is to embed electronics directly in textiles. Our approach uses **conductive textiles** for signal transmission. We investigated the electrical performance of textile transmission lines. Adapting established measurement methods for transmission lines we were able to extract the necessary electrical parameters to finalize our textile transmission line model. These parameters include:

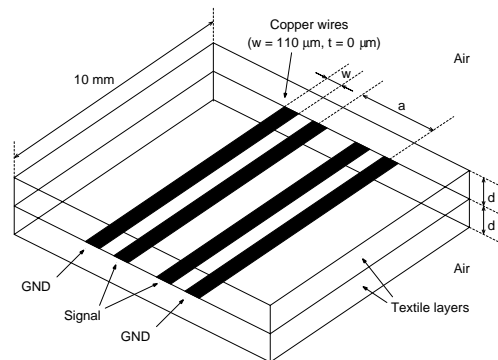
- Electrical impedance
- Characteristic impedance Z_0
- Frequency Response (Bandwidth)
- Cross-Talk
- Digital Signal Transmission Analysis

Textile Properties

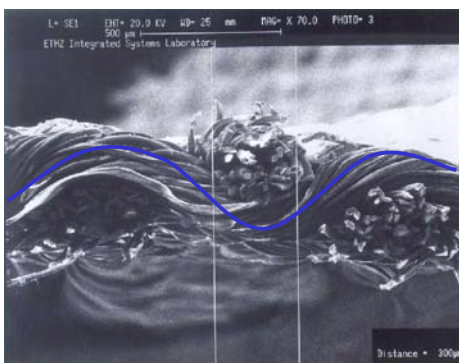
Woven Fabric with Copper Fibers



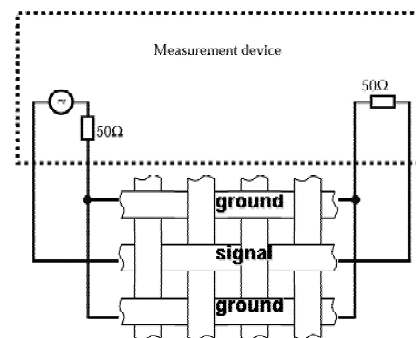
Model of Textile Transmission Lines



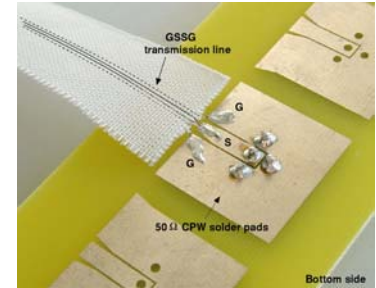
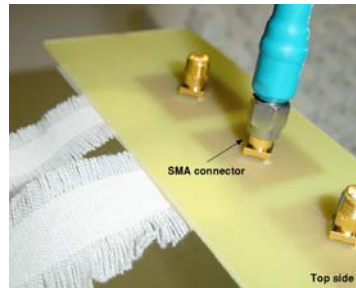
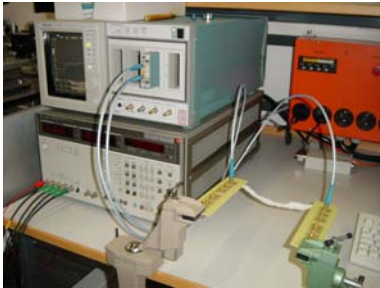
Cross Section of Textile



Measurement Configuration

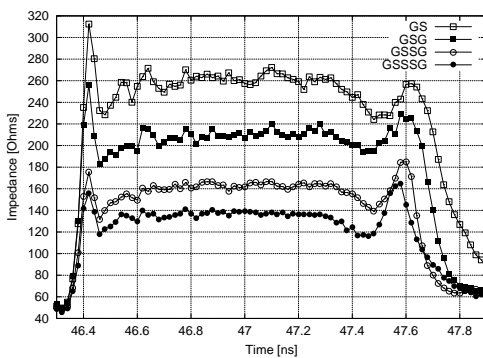


Measurement Setup



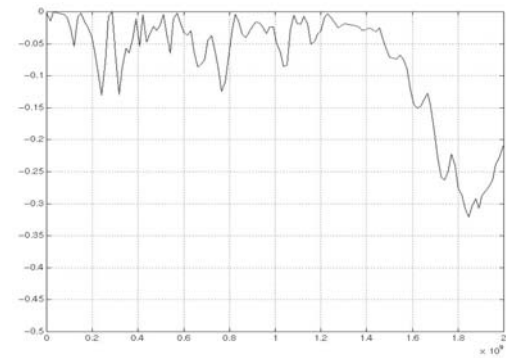
Results

Characteristic Impedance



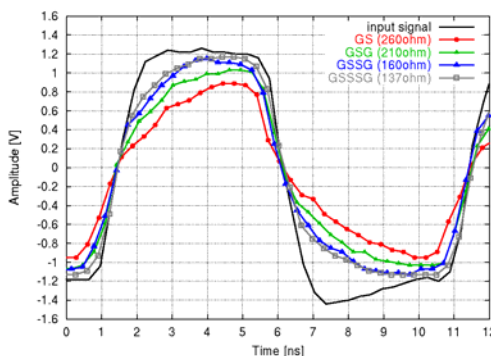
Note: The impedance decreases with the number of signal lines.

Frequency Response



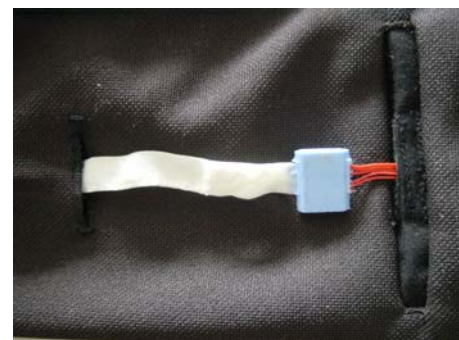
For GSSG configuration (20cm textile length)

Digital Signal Transmission



20cm textile length

Application: PAD-NET



Conclusion

These results show that the electrical properties of textile transmission lines can be adjusted and modeled using different signal line configurations according to its application. Over short distances signals up to several 100 MHz can easily be transmitted.