Inkjet-printed wireless epidermal electronics

Matti Mäntysalo
Tampere University of Technology, Department of Electronics and Communications Engineering, Tampere, Finland
matti.mantysalo@tut.fi

Quantified self-tools and eHealth services based on the Internet-of-Things (IoT) and big-data analyses have great business potential. Sensor nodes measure different physiological parameters and activities like movement, pressure wave, muscle activity, heart activity, body temperature, etc. These parameters are sent to a mobile device. A mobile application will give instant feedback and remedy actions based on user tailored algorithms. Such a solution can work e.g. as a personal health motivator. The data is then sent to cloud for storage and deeper analysis from where medical personnel can read them and analyze patient condition to result improved care. Such a scenario is presented in figure below.

The key elements for such a development are: 1) cloud computing, big-data analyses, and development of new health markers, and 2) development of unobtrusive cost-effective sensor nodes. This study focuses on latter by presenting an intelligent, conformable, user friendly physiological monitoring platform for continual nonintrusive wireless monitoring. In particular, the inkjet-printed silver nano-particle ink is used to fabricate interconnections and a high frequency antenna on low-cost flexible/bendable plastics. Interconnections between RF SoC and passive components are made with isotropic conductive adhesive. Finally, the platform is demonstrated as a 'plaster' like sensor node that measures the ECG signal and transmits that in real-time to a mobile device using Bluetooth low-energy protocol (Bluetooth smart).

This presentation focuses on inkjet printing of epidermal electronics and applicability of technology in continuous body-monitoring.