Visions to Products

# Intelligent Implants

## for electrophysiologic diagnosis and therapy

**In several projects dealing with medical engineering Hahn-Schickard develops highly miniaturized, electronic implant systems, that monitor physiological processes in the human body by recording electric body signals and influence their behavior by highly defined current stimulation.**


**Abb. 1:** Schematic display of the intelligent implant system consisting of a flexible, functionalized electrode mat that is attached to the pancreas, a power management and data communication buoy implanted directly beneath the skin, a belt-worn external unit and an Android device for data display and function control.

Many deseases of the human body are caused by malfunctions of physiologic control loops. In these cases it can be reasonable to support them by means of electronically active implants. One fundamental advantage of this method of treatment compared to conventional medicamentous therapy is the accurate spatial selectivity in the impact on the body.

In the course of the project innBWimplant a prototype of an according implant system for the treatment of diabetes type II was developed, that will allow to monitor the blood glucose level by recording electric cell signals and to trigger the release of body's own insulin by current stimulation of the pancreas. In this way patients could be relieved from the necessity to constantly stabilize their own blood glucose level by measurement and injection of biosynthetic insulin.

Three application specific integrated circuits (ASICs) were developed during the project. One for high-resolution multichannel cell signal recording, another one for specifically parametrizable current stimulation of the pancreas with six output drivers and a last one for inductive power supply and to provide a bidirectional data channel. The latter is used to download the recorded cell signals through the skin barrier and to program the numerous parameters on the implant memory, like stimulation waveform, current amplitude etc.

To provide the possibility of data display and intuitive parameter control an Android-App was designed that is connected to the system via Bluetooth.

As shown in figure 1 a belt-worn, battery powered external unit is used as an energy source for the inductive interface and as an information gateway between the implant system and the Android device.

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