

Powering Smart Wearables



Contact

Your contact

Dr. Daniel Hoffmann
 Phone +49 7721 943-187
 Daniel.Hoffmann@Hahn-Schickard.de

Hahn-Schickard, Villingen-Schwenningen

Wilhem-Schickard-Str. 10, 78052 Villingen-Schwenningen,
 Germany
 Phone +49 7721 943-0
 Fax +49 7721 943-210
 E-mail Info@Hahn-Schickard.de



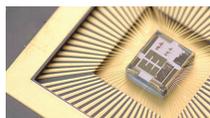
www.Hahn-Schickard.de

Hahn-Schickard

Intelligent solutions with microsystems engineering

Sensors and actuators

- > Custom-tailored sensor and system solutions for various parameters
- > Pumps and dosing systems



Integrated microsystems

- > Sensor fusion
- > Energy autonomous systems



Cyber-physical systems

- > Smart factories
- > Industry 4.0



Lab-on-a-Chip + analytics

- > Integration, parallelization, and automation of biochemical analyses



Microelectronics

- > Evaluation circuits for your sensors with ultra-low energy consumption



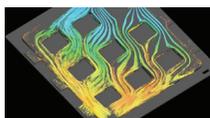
Micro assembly + packaging

- > Mechatronic assemblies
- > Functional microstructures via modern digital printing techniques



Modeling + reliability

- > Numerical simulation and optimization of your products



Energy Harvesting

Kinetic energy harvesting

Kinetic energy harvesting devices generate small amounts of electrical energy out of motion and vibrations. In the case of shoe-mounted systems, it can make use of the foot motions shown below. An integrated energy harvesting device is shown on the x-ray picture on the front of the flyer.

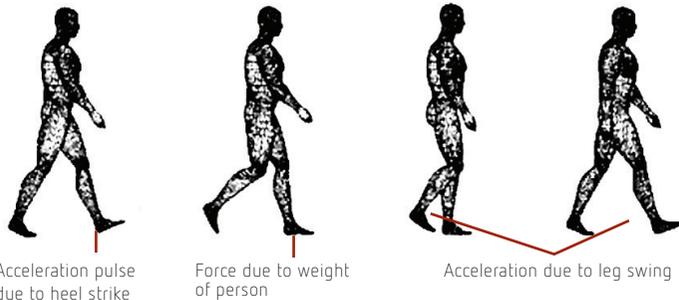
Sensor systems

The obtained electricity can power sensors which can serve many purposes:

- > Tracking of biomedical data
- > Gesture recognition
- > Motion tracking (see indoor navigation)

Power management

Whether the electricity is generated through energy harvesting or not, a means of energy storage is always required to power the system when the user is no longer moving and generating energy or when the system is to turn on immediately as the clothes/shoes are put on after a period of standstill. Generally speaking, all system components are designed with the lowest possible power consumption in mind.



Smart Wearables

Make your life comfortable!

Small body-worn systems can facilitate the life of modern users in an increasingly mobile world. They should be maintenance-free and ideally not require any battery replacements.

Indoor navigation

Imagine walking into a building and being able to keep on navigating on your handheld device although GPS is no longer available. A smart sensor system integrated into a shoe:

- > Measures the foot motion
- > Calculates the travelled path from this data
- > Transmits your current position via Bluetooth-LE to your handheld device

This can be particularly useful in large buildings like libraries or museums but also in a very different approach for rescue units venturing into unfamiliar buildings.



Self-lacing shoe

You want to leave the house? All you need to do is step into your shoes and get going! The self-lacing shoe contains sensors which detect your foot and immediately start to lace it up for you.

Although originally developed for elderly and handicapped people who are unable to lace their shoes, it is not limited to this user group and can facilitate everyone's life.

For an increased user comfort the lacing strength can be customised and the shoe can be charged wirelessly on a special mat. Just in case you did not generate enough energy during walking.

For more information read our technical paper

Energy harvesting from human motion: exploiting swing and shock excitations. K. Ylli et al. 2015 Smart Materials and Structures. Vol. 24, No. 2, 025029

