

New Ace in the Hole

The new tiny Digitalstrom all-rounder, the **Digitalstrom Identifier**, promises a lot, that other devices can also provide indeed, just cheaper and easier. Now the chip comes up with a new ace in the hole: **Smart Metering**. And at the same time, the first complete **Digitalstrom Installation** evolves in Switzerland: A building complex with 85 flats is being built in Limmatfeld in Dietikon (Switzerland). **Text:** Michi Lieberherr and Richard Staub

□ **digitalstrom.org**, a non-profit organization, was brought into being in 2007 under the patronage of the ETH Zurich, for the purpose of developing a new, open standard for electrical intelligence. Except for the chip design Digitalstrom is entirely open source (for example: Linux, Open Office). The basic technology, an integrated high voltage chip (dSID – Digitalstrom Identifier), is developed by Aizo AG in Wetzlar und Zurich and will be available by end of 2009 as version 1.0. Founded in 2004 by Prof. Ludger Hovestadt (ETH Zurich), and Wilfried Beck, aizo currently employs 30 engineers. However, although this innovative technology is not fully developed yet, it arouses great interest. The

first Digitalstrom-ready appliances are to be available by end of 2009.

The requirements towards a modern installation are enormous. End consumers want more comfort but are not willing to pay more money. Electricians seek a solution for retrofitting old buildings and reconstructions easily, without major engineering time and effort. And power supply companies are confronted with operating more and more decentralized power grids. These are quite challenging tasks. New solutions for power distribution are required which can only be achieved in cooperation with information technology.

The new Technology

The Digitalstrom (shortcut «dS»)

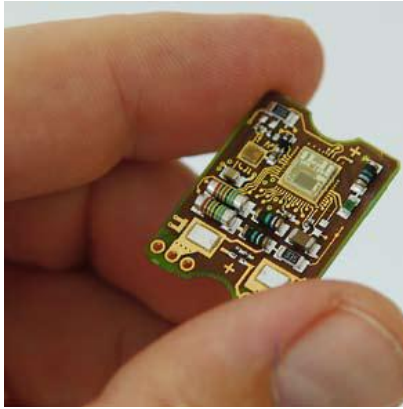
transmission method is different from that of Powerline.

In a new and for experts' quite astounding process with multiple industrial property right protection, information is transmitted close to the zero point of alternating current in the baseband. Unrivaled high transmission safety and extremely compact design thanks to MOSFET technique are the result. Only promoters of the Digitalstrom.org are presented the detailed functional principle under NDA. Members of the alliance can acquire demonstration kits for test purposes in their laboratories, and obviously many of them have already done so.

The dSID chip, tiny all-rounder and core of the Digitalstrom technology, fits into any terminal block, any outlet socket and most probably will create a sensation in the present electrical installation technique. According to the developers, it may be similar to the barcode which revolutionized logistics. The merger between logistics and information technology paved the way for world-wide exchange of goods. Yes indeed, another merger with IT is to occur: Energy and information technology. More than 60 functions are integrated in the chip, e.g.: power measurement, serial interface, direct connection for sensors and actuators up to 200 mW like luminance, temperature, humidity, piezo microphone, piezo loud speaker, infrared or pressure sensor. With power electronics components the chip serves as rms value dimmer up to 120 W, motor control unit or heating control valves, are already integrated in the terminal block.



In the Wetzlar Digitalstrom apartment, Lars Wilhelm of aizo presents the various possibilities of the new technology. Photos Richard Staub



A circuit board with dSID-Chip serves as dimmer and fits into a terminal block.

Digitalstrom Circuit: Just three components

To install and retrofit Digitalstrom is very easy. Three components are required: Digitalstrom web server, Digitalstrom Meter and the chip. The electrician fits a dS web server and a dS meter into the fuse box. And furthermore one terminal block, comprising one dSID chip, needs to be mounted into each switch and into each lamp. No new cables or wires are required. The pre-programmed chips come in one out of nine colors: For example yellow stands for light. A dimmable and miniaturized dS adapter is available for table lamps. For other applications, like shading, heating or safety, terminal blocks in different colors are mounted, e.g. gray for shading. The entire logistic is room-based and comprises many complex functional relationships. In other words: Installation done, and basic programming done as well. The electrician or even the customer can assign devices through clicks on the push button/switch. Specific connections are configured through the web browser. This also presents household appliance manufacturers with boundless opportunities, as Digitalstrom offers networking functions at no additional cost that any device needs anyway. An indicator light in the apartment could be imaginable, where a simple red/green light shows, whether the washing machine located in the downstairs laundry room is ready or not.

Detecting furtive power guzzlers

Digitalstrom wants to become the future basis for a more economic

use of electrical energy in the future. Only when consumption data are registered and monitored it is possible to optimize them. In everyday life one could tell a tale about that. Just imagine buying an energy saving lamp and saving some energy compared to operating a normal bulb. At the same time you probably start running a new set-top box for your digital TV. And there you are – the savings effect is gone. Quite the contrary happens, even more energy is required. First of all, Digitalstrom attends to itself. Whereas conventional devices still consume a couple of watts, a Digitalstrom component requires 0.3 W at present and next generation components will need 0.1 W in stand-by mode. But despite cross linking and 24/7 standby, losses are still being generated. The Swiss Federal Office of Energy (SFOE) has commissioned a study to measure whether there is a potential for reducing the energy consumption in „smart homes“. Previous measurements have shown that „smart homes“ are anything but intelligent, when it comes to saving energy.

Digitalstrom Alliance takes shape

How about an electricity bill for each device? So that power guzzlers could be identified immediately? Similar to the possibility to check every single connection listed on your mobile phone provider's bill? With the Digitalstrom chip individual recording for each device will be possible. Detailed consumption data of each device can be made visible and observed in your web browser at home. All devices, stand-by modes and units will be switched off with a central-OFF switch. For the first time, residents are able to actively take corrective measures and deliberately optimize their energy consumption. Just in time for the trade show «Metering, Billing/CRM Europe 2008» in Amsterdam, held on September 22 – 24, the Digitalstrom Alliance was able to welcome new prominent members besides Yello: Landis + Gyr AG Zug (Switzerland), world-wide market leader for metering systems, and Holley Metering Ltd., the largest metering manufacturer in China. «Open smart metering» is the

name of the Digitalstrom Alliance initiative, where new challenges in view of measuring and controlling the individual consumption of energy, gas and water are discussed, formulated and implemented, based on the model of the open operating system Linux.

Last dry run

After installation of a demonstration apartment in Wetzlar Germany), the penthouse apartment of Digitalstrom co-inventor Prof. Ludger Hovestadt in Zurich – and another apartment in Richterswil (Switzerland), Digitalstrom (dS) is now ready for the final test. In Limmatfeld, on the previous grounds of machine manufacturer Rapid, which moved to Killwangen (Switzerland), a new building complex with 50 rental flats and 35 condominiums is to be built. The 45 million building project was designed by the Zurich architects Gigon/Guyer. Based on the plans of electrical designer R + B Engineering, the entire electrical installation will be equipped with Digitalstrom. In addition a fiber optic cable network, «Zürinet»-light, will be installed for internet, TV and telephone services in this building complex. Halter Generalunternehmungen AG, project developer and full service general contractor, has founded its own technology business unit which is actively involved in developing dS. Balz Halter, who is also CEO of the Chip Designer aizo, fully trusts this new technology and implements it right away in a grand style. Within one year it will become quite obvious, whether the grand promises made with Digitalstrom can be kept in practice. RS



A real world record: The smallest network-compatible cable dimmer with Digitalstrom.



Addition to the Digitalstrom installation: Web server and Meter.

**Minimum consumption,
maximum comfort**

Digitalstrom also promises: The technology shall be available at such a low price that it will be unquestionably included. An installation equipped with Digitalstrom can be operated just like a conventional installation without Digitalstrom: The switch is simply a switch: On/off. Or users can benefit from the additional functions: Selecting light scenes, dimming, soft start and controlling groups of devices. The operating concepts remain the same, but are upgraded gently, like with the innovative Digitalstrom push button: When pressing the button, the light turns on or off.

Pressing one of the corners results in changing the kind of application e.g. from light to audio. This is indicated with a colored LED in the push button's center. One click on the top or bottom in the audio setting adjusts the loudness. The radio station is changed with a click to the left or right. And a click into the correct corner leads back to the light mode. In a different mode even lighting scenes can be parameterized and saved. «Ambient Assisted Living» (AAL) is another issue, which is profoundly discussed especially in Germany and in commissions of the European Union. The intention is to provide technical assistance in the field of autonomous living, for elderly or handicapped persons.

This goes from tele-medication and monitoring, safety features, ambiance control systems to mobile assistants. Thanks to Digitalstrom existing properties can be retrofitted easily as described above. Just think of integrated alarm push buttons with microphone and loud speaker. In case of emergency a person is directly connected to a helpdesk and can ask for assistance. Thanks to the wireless transmission of Digitalstrom into the internet and web technology, in-house applications can be linked to external services easily.

Reference: www.digitalstrom.org,
www.erlenhof.ch