

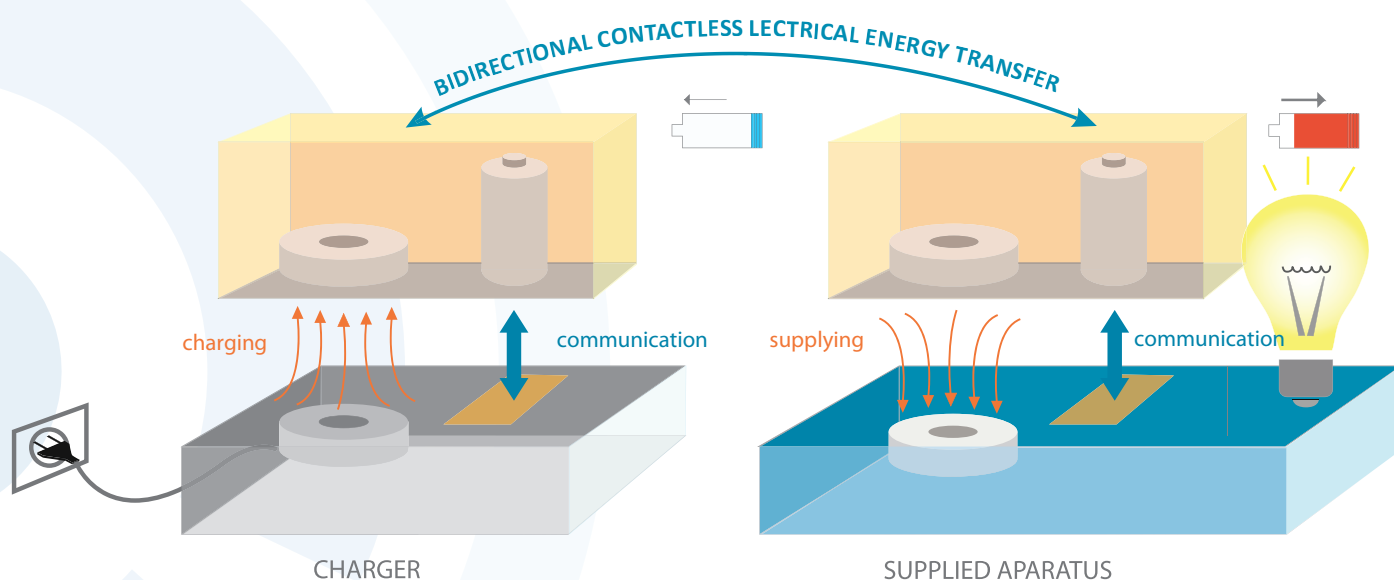
The presented integrated magnetic module solution is designed for contactless electrical energy transfer. The job of the module is to shape the magnetic flux in a way that the overall energy transfer efficiency is very high in a broad range of distances between energy source and energy receiver. Thanks to two magnetic elements the module can be easily adapted to a highly efficient LCLC series-parallel resonant power converters.

Contactless energy transfer systems are especially useful in environments, where there is a risk of gas or dust explosion, such as coal mines, gas stations and in chemical and petrochemical industry. They are also used in cases, when direct galvanic connections are impossible, such as in medical implants, moving parts or underwater equipment.

The technology

A big advantage of the integrated magnetic module is the built-in ability of bidirectional energy transfer, with efficiency exceeding 80%, while delivering up to 3W of power. Other advantages of the technology are:

- complete elimination of mechanical contacts in the energy transfer device and the possibility of achieving full hermetization,
- possibility of increasing operational safety by limiting the short circuit currents, according to ATEX directive, while keeping the available power close to the maximum,
- ability for easy adaptation in corrosive or dusty environments, or even under water,
- wide range of power rating: from several watts to many kilowatts.



Exemplary application : a contactless battery

For powering mobile devices working in harsh environmental conditions, in which battery exchange is dangerous or inconvenient a contactless battery seems to be a perfect solution. It is fully hermetic and without any mechanical contacts, providing safety and comfort to the operator. A contactless battery can be designed to be charged and discharged in explosive atmospheres or under water, which opens a path to new applications in mining, chemical and petrochemical industries, underwater equipment, medical implants etc.

Parameters of the exemplary exhibition model:

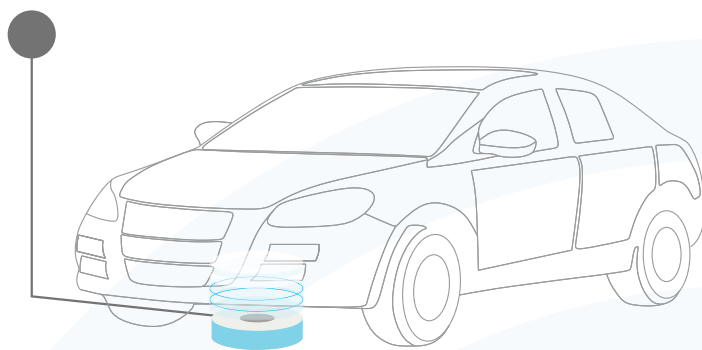
Output power: 3W

Power source: two Li-Ion cells 2x3,6V/1800mAh



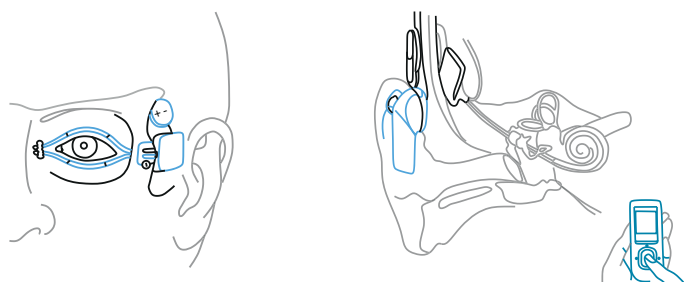
Exemplary application: contactless charging of electric vehicles

The idea of increasing electric vehicle share in transportation and logistics is supported by governments in many countries. In North America, the Society of Automotive Engineers published the SAE-J1773 standard, entitled „Electric Vehicle Inductively Coupled Charging“. The standard describes a contactless electrical energy transfer circuit, placed on the bottom of a car that automatically charges the vehicle while it is parked in a specially designed charging place. In addition, thanks to the integrated magnetic module the contactless charger may charge and discharge the car battery. Such solution will allow to use electric car batteries as an energy storage, which is a key element in new smart grid power networks, and helps to solve problems with renewable energy sources.



Exemplary application: powering the medical implants

The integrated magnetic module can also be used to charge medical implants placed inside human body. The life time of an implant is limited due to its battery capacity. When the battery discharges, the implant must be replaced through a surgery. Contactless charging of implants can extend their time of operation, thus minimizing the number of surgeries needed. Also, due to a contactless energy transfer, in cases when high power is needed, there is a possibility for continuously powering the implant, and increasing the patient's mobility.



Proposal

The integrated magnetic module is under patent protection in Europe, USA, Canada, Brazil, China, Australia and India. The AGH University of Science and Technology offers:

- a non-exclusive license for using the technology in selected fields of application
- a service of adaptation the technology to customer demands

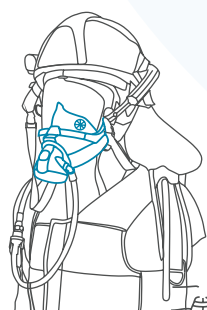
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Patent pending:

PL: P389907

PCT/EP2010/069552

EPO: 10795657.5

USA: US 2012/0242445

Canada: 2783144

Australia: 2010332971

Brazil: 016120002873

China: 2010800567178

India : 5071/DELNP/2012