Visible Light Communications Laboratory

Webinar for WCE Students

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Reconfigurable hybrid optical-radio wireless network

VLC: Visible Light Communications

Hybrid optical-radio networks
LIOt is based on exploiting light to create a wireless connection. Light is used to
a) power up all electronics and
b) send information/data wirelessly.
- We aim to implement the LIOt using **printed electronics**

LIOt: "Expose and Connect" concept
- Privacy, security
- Energy autonomy
- Environmental impact
- Attractive use cases and applications
Light-based Internet of Things (LIoT)

Example of a LIoT application: Smart tags

![Diagram of a smart tag with DL information and product-related information. The tag displays the freshness index, price (€0.90), a note about a new recipe, expiration date (BB: 28.09.2018), and a red alert for live news about EU incorporating new states. The tag also features moving text elements.](image)
Light-based Internet of Things (LIoT)

Detail of our experimental LIoT testbed

Lighting spot with optical Tx

Light-based IoT (LIoT)

Experimental LIoT testbed at CWC

Seeing light in a new light
Connecting implants and body sensors using light

- Electronic body implants such as pacemakers, insulin pumps and brain implants need to be wirelessly connected to the external world.

- Typically, in-body devices are connected using radio technology. Some recent studies have shown that radio-based devices can be hacked.

- Radio can be in principle accessed by non-intended parties, connections can also be disrupted by jammers.

- Light (near-infrared) can be used to create optical links to in-body devices. **Communications is very secure, safe and private.**
Connecting implants and body sensors using light

- Results obtained for optical phantoms and ex vivo samples of fresh pork meat (meat, fat/meat, fat/meat/bone)

- Initial results show that ranges of up to 5 cm can be achieved. Low data rate is supported, namely tens of Kbps, which is enough for most applications.

- Studies continues. Higher data rates and even longer ranges could be potentially achieved.