

Multi-tasking micro-lights could spark a communications revolution

January 25 2013

Tiny LED lights now being developed could deliver Wi-Fi-like internet communications, while simultaneously displaying information, and providing illumination for homes, offices and a whole host of other locations.

Over the next four years, with Engineering and Physical Sciences Research Council (EPSRC) funding, a consortium of UK universities led by the University of Strathclyde will be developing this [innovative technology](#) to help unleash the full potential of 'Li-Fi' – the transmission of [internet communications](#) using visible light rather than the [radio waves](#) and [microwaves](#) currently in use.

Although the potential possibilities offered by Li-Fi are already being explored all over the world, this EPSRC-funded consortium is pursuing a radical, distinctive vision that could deliver enormous benefits.

Underpinning Li-Fi is the use of light emitting diodes (LEDs), a rapidly spreading [lighting technology](#) which is expected to become dominant over the next 20 years. Imperceptibly, LEDs flicker on and off thousands of times a second. By altering the length of the flickers, it is possible to send [digital information](#) to specially adapted PCs and other [electronic devices](#) – making Li-Fi the digital equivalent of Morse Code. This would make the visible part of the [electromagnetic spectrum](#) available for internet communications, easing pressure on the increasingly crowded parts now used.

But rather than developing Li-Fi LEDs around 1mm² in size, which other researchers around the world are concentrating on, the EPSRC-funded team is developing tiny, micron-sized LEDs which potentially offers a number of major advantages:

Firstly, the tiny LEDs are able to flicker on and off 1,000 times quicker than the larger LEDs this also means they can transmit data more quickly. Secondly, 1,000 micron-sized LEDs would fit into the space occupied by a single larger 1mm² LED, with each of these tiny LEDs acting as a separate [communication channel](#). A 1mm² sized array of micron-sized LEDs could therefore communicate 1,000 x 1,000 (-i.e. a million) times as much information as one 1mm² LED.

Moreover, each micron-sized LED would act as a tiny pixel. So one large LED array display (e.g. used to light a living room, a meeting room or the interior of an aircraft), could also be used as a screen displaying information at exactly the same time as providing internet communications and the overall room lighting.

Professor Martin Dawson of the University of Strathclyde, who is leading the initiative, says: "Imagine an LED array beside a motorway helping to light the road, displaying the latest traffic updates and transmitting internet information wirelessly to passengers' laptops, netbooks and smartphones. This is the kind of extraordinary, energy-saving parallelism that we believe our pioneering technology could deliver."

Eventually, it could even be possible for the LEDs to incorporate sensing capabilities too. For example, your mobile phone could be equipped with a flash that you point at a shop display where everything has been given an electronic price tag, and the price of all the items and other information about them would show up on your phone's display.

To enable the remarkable potential to be realised, the consortium has drawn together a unique breadth and depth of expertise unmatched by any other Li-Fi research team anywhere in the world.

Professor Dawson says: "The Universities of Cambridge, Edinburgh, Oxford and St Andrews are all working with us, bringing specific expertise in complementary areas that will equip the consortium to tackle the many formidable challenges involved – in electronics, computing and materials, for instance – in making this vision a reality. This is technology that could start to touch every aspect of human life within a decade."

More information: The term Li-Fi was coined by one of the partners in the project, Professor Harald Haas from the University of Edinburgh in a TED talk in July 2011. For more information: bit.ly/tedvlc

Provided by Engineering and Physical Sciences Research Council

Citation: Multi-tasking micro-lights could spark a communications revolution (2013, January 25) retrieved 24 April 2024 from <https://phys.org/news/2013-01-multi-tasking-micro-lights-revolution.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.