Digital wallpaper means end for painting and decorating

Redecorating your living room could be as easy as pressing a button thanks to European scientists who have created a new ceramic tile that can change colour, pattern, or play videos with one tap of your finger, radically changing the way we interact with buildings or public spaces, and taking us a step closer to instant camouflage.

Ever wanted to make your living room look like the inside of an art gallery, a Stone Age hut or Buckingham Palace? Have you wanted to redecorate your bedroom every day of the week, or watch films on your ceiling? Now you can, thanks to this digital ceramic panel created by Italian scientists.

Using pioneering photonics technology, The 'Luminous Electronic Tile', or LUMENTILE, project mixes the simplicity of a plain ceramic tile with the complexity of today's sophisticated touch screen technology, creating a light source and unparalleled interaction. All it takes is one tap to change the colour, look or mood of any room in your house.

This is the first time anyone has tried to embed electronics into ceramics or glass for a large-scale application. With the ability to play videos or display images, the tiles allow the user to turn their walls into a large ‘cinema’ screen, where each unit acts as a set of pixels of the overall display.

A combination of ceramic, glass and organic electronics, the luminous tile includes structural materials, solid-state light sources and electronic chips and can be controlled with a central computer, a smart phone or tablet.Project coordinator, Professor Guido Giuliani of the University of Pavia explains:

“This is not just a digital panel to replace an animated poster like you see on the Underground network, but a whole new way of life. You are instantly in control of your own environment: if you don’t like your bathroom in blue, now you can change it to green with one tap. If you like flowery wallpaper, ducks or Christmas trees, that’s up to you.”

Each measuring the size of a standard, rectangular A3 piece of paper with their own internal power source, the tiles can be tailored entirely to the customer’s needs: completely or partially covering the walls of a room, a floor, ceiling, or perhaps total submersion. So long as the pieces tessellate, any shapes will be possible such as hexagonal or triangular ceramic tiles.

The tiles, which can be switched off so that a basic silver, black or white colour can be a default setting, are equipped with an on board micro-controller, and operate on a lexical network invisible to the user. The surface of each tile has uniform and efficient illumination, achieved by LUMENTILE’s smart light management system, a new approach based on a light guiding slab and spatially selective light extraction.

Exterior ‘Chameleonic Skin’

With its durable nature, the luminous ceramic tile holds boundless possibilities: placing it on the outside of a building creates the obvious potential for advertising or changing the colour or appearance. However the tiles can be flat or curved to fit around columns or uneven contours.

Military vehicles, for example, fitted with this external ‘skin’ crossing a variety of terrains, such as woodland, desert or water would be capable of unlimited camouflage at the flick of a switch.

“It may sound like the stuff of James Bond but external tiles would createa ‘chameleonic skin’, or instant camouflage. Although we are a long way off this yet,thiswould allow a car or building to blend completely into its surroundings, and hence ‘disappear’,” Giuliani enthused.

Smart Floors

With the ability to configure the tiles to become ‘smart floor panels’ that recognise when an elderly user is no longer standing or has perhaps fallen, in security situations where a floor will be sensitive to intruders, or in shopping centres where a ‘dynamic path’ can be created to direct shoppers to a particular store, the LUMENTILE product is more than just a light source.

Earlier this year LUMENTILE received a grant of € 2,470,113.75 from Horizon 2020 via the Photonics Public Private Partnership. Hoping to be available to users in two years the LUMENTILE project aims at mass production by the end of 2020.

Coordinated in Italy by UNIVERSITA DEGLI STUDI DI PAVIA, LUMENTILE is comprised of a number of partners from Finland, Italy, Switzerland, Spain, including TEKNOLOGIAN TUTKIMUSKESKUS VTT (Finland), ECLEXYS SAGL (Switzerland), JULIGHT SRL, KERAPLAN SRL (Italy), STUDIO ITINERANTE ARQUITECTURA SL, KNOWLEDGE INNOVATION MARKET S.L. (Spain).

About LUMENTILE

LUMENTILE Project is funded by the EC within the Horizon 2020 Program, with contract no. 644902. LUMENTILE aims to fill the gap between a simple construction element and a luminous surface element, and goes far beyond, by developing a cutting-edge technologic module (the luminous electronic tile) that is capable of displaying lights, colours and images that can be used as a chameleonic display to be employed as a skin for horizontal (floor) or vertical (wall) applications.

The final product will be an “on-the-fly” high energy efficient device that can be considered as a sustainable and competitive lighting element. On the other hand, the possibility of adding other sensors internally to the electronic tile enables it to increase the above mentioned properties (such as the detection of people walking onto it) and also to empower other creative or multifunction purposes. This project will address the above-mentioned challenges by exploring and developing new materials and integrated systems, manufacturing processes and business scenarios in luminous designed tiles and architecture.

About Photonics21

Photonics21 is the European Technology Platform (ETP) for photonics –a technology encompassing all of the products and processes around the emission, manipulation and detection of light. It is integral to a wide range of industries that include the medical, healthcare, transport, manufacturing, and telecommunications sectors.

In December 2005 "Photonics21" was set up to bring the community of photonics professionals and industries together. In September 2009, the European Commission defined photonics as one of five European Key Enabling Technologies (KET's) and shortly after the European Research & Innovation Program "Horizon 2020" invited Photonics21 to become a "Public Private Partnership" (PPP).

In November 2013 the "Photonics 21 Association", a legal entity under Belgium law, became the private contract partner in a Public Private Partnership (PPP) in conjunction with the EU Commission.

Today Photonics21 represents more than 3200 personal members from all over Europe. Our members are experts in the photonics industry, research organisations and universities who actively engage with us to develop a joint photonics strategy for future research and innovation in Europe.

With the global photonics market growing at twice the world economic growth rate, from 350 Billion Euros in 2011 to 615 Euros in 2020, Photonics21 stands in a secure global market position. The production of European photonics alone accounts for 60 billion Euros and employs over 350,000 people directly. With strong growth forecast, current industry trends like digitalisation, resource efficiency, individual and zero failure production will drive the photonics industry further. For more information about Photonics21 please go to http://www.photonics21.org/index.php