



## Press Release

**HOLOXICA** Video <https://vimeo.com/168966470/14d957da23>

**ACTPHAST** Videos <https://www.youtube.com/watch?v=Er6NTQhKNts&feature=youtu.be>  
<https://www.youtube.com/watch?v=pP2yYDxwtHU>

# First hologram video player to show your beating heart

*UK scientists are developing an interactive holographic video created from an MRI or CT scan that can display live footage of internal organs in front of a user where features can be rotated, enlarged, and isolated, delivering a breakthrough in medical imaging and education.*

Popping in to your local hospital may be much more revealing in as little as three years thanks to engineers at Holoxica Limited, who have invented a moving 3D video hologram.

Watching your heart beat, your lungs inflate or your unborn child in life size and before your eyes as a hologram that can be rotated or enlarged, in real time is no longer the stuff of science fiction.

With no need for 3D specs or a virtual reality headset, the dynamic or 'moving video' 3<sup>rd</sup> Generation holograms are made by gathering multiple 'slices' of an internal organ, such as a brain or a liver, from a normal CT or MRI scanner. These 'slices' of data are then assembled through a 'diffractive holographic screen', producing single colour green pixels, or 'voxels', in mid-air and essentially bending light to the will of the user.

Teaming up the European photonics innovator accelerator ACTPHAST, hologram specialists Holoxica have linked photonics technology with their 1<sup>st</sup> and 2<sup>nd</sup> Generation holographic motion displays to develop one of the most revered gadgets of science fiction, an idea that never seemed to take off in real life. Holoxica's CEO, Dr Javid Khan explains:

"Hollywood depicts holographic displays as something ubiquitous in films from Iron Man to Avatar. This has created inflated expectations in the mind of the public who largely believe that displays or 'holographic projectors' already exist and are trivial to make. This is not the case."

Instead of trying to create a mythical "Star Wars" display, Holoxica took a more pragmatic approach by starting with the simplest holographic display, a single pixel, or 'voxel', in 3D space, that could be switched on or off.

"After the first voxel, we moved on to two, working up to 4, then 9, then 16 voxels and so on. Our images are not projected; they are holographically reconstructed using diffractive optics. Projection implies scattering off a surface, but here there is no surface, only air. We are using photonics design and engineering of diffractive optical elements to bend or form light to produce images in mid-air."

“Although we are looking at targeting medical, scientific and engineering imaging fields to start with, holographic video will change gaming, communication and create a new digital revolution,” Dr Khan enthused.

With the possibility to isolate features, zoom in, rotate and pan around 3D space, the 3<sup>rd</sup> Generation dynamic display presents an array of exciting opportunities for the future of surgery and anatomical study.

“Take current imaging techniques like CT scans where radiologists are trained to interpret the multiple levels of data, or ‘slices’ of the brain. Medical consultants, specialists and surgeons are not trained to do this and therefore need to build up a mental stack of the scans or rely on second-hand interpretation.”

“For the first time, a physician will be able to see a tumour in an impossible part of the brain and make an informed decision. This is also easier for patients to understand what is going on. Teaching anatomy with this device will give students a hitherto unrivalled understanding.”

While Augmented and Virtual Reality both have their strengths, both rely on an artificial separation from the real world, a point Holoxica are keen to exploit.

“VR headsets have fundamental limitations which makes them unsuitable for a true 3D experience. These technologies do not recreate a true 3D image: they present a pair of 2D images to both eyes.”

“This stereo disparity leads to a poor 3D experience as it is fundamentally unacceptable to the human brain, resulting in problems such as motion sickness, dizziness and nausea. The headsets also mess up your hair and provide a potential breeding ground for bacteria.”

Dr Javid Khan could be as important a 3D pioneer as the Italian painter Masaccio, who, with his use of linear perspective in the early 1420s played a central role the cultural phenomenon we now call the Renaissance. Painting suddenly went from two dimensions to three. Like Masaccio, Dr Khan’s work may be laying the foundations for the next cultural revolution, making our modern, digital world 3D:

“In laptops, tablets, news, 2D is accepted. Our world is three dimensional: our brains are wired for three dimensions. Holoxica’s work is spearheading an entirely new Renaissance for our time.”

Earlier this year the Holoxica received a grant of €1.3 million from the EU via the European Union’s Horizon 2020, after a successful partnership with ACTPHAST, the ‘one-stop shop’ digital incubator designed to provide open access to photonics innovation support for eligible European companies.

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#### **About Holoxica**

Holoxica specialises in producing full-colour 3D holographic images from medical scanners including Computed Tomography (CT), Magnetic Resonance Imaging (MRI), Emission Tomography (PET) or Ultrasound. The digital holograms are used for outreach, education, diagnostics and even surgery. Our work is presented in many public venues including the MIT Museum (Boston, USA), The Royal College of Surgeons Edinburgh and The National Museum of Scotland.

Holoxica Limited is a company registered in England, registration (6587101), VAT (GB 984992934). The company is located at [CodeBase](#), which is in the Argyle House building. This is the largest tech incubator in the UK. Holoxica is located on floor D, office nr 1. Holoxica Ltd, CodeBase, 38 Castle Terrace, Edinburgh, EH3 9DZ, Tel: +44 (0)131 618 2142

## **About ACTPHAST**

ACTPHAST (**A**ccess **C**en**T**er for **P**Hotonics innov**A**tion **S**olutions and **T**echnology Support) is a unique “one-stop-shop” for supporting photonics innovation by European companies, which is financially supported by the European Commission under the FP7 framework (Grant Agreement No. 619205).

ACTPHAST supports and accelerates the innovation capacity of European companies by providing them with [direct access to the expertise and state-of-the-art facilities of Europe's leading photonics research centres \(the ACTPHAST Partners\)](#), enabling companies to exploit the tremendous commercial potential of applied photonics. There are 23 research institutes who together make up the ACTPHAST Partners.

The ACTPHAST program is [particularly suited to the needs of small to medium-sized enterprises \(SMEs\)](#) who do not have the financial resources to invest in in-house R&D expertise and state-of-the-art technologies, nor to undertake risky innovation projects. ACTPHAST support is 100% subsidized for projects undertaken with SMEs.

ACTPHAST is designed to provide open access to photonics innovation support for all European companies who meet the eligibility criteria, and we have [strict governance structures and systems in place around the key persons responsible for running the program](#) to ensure that ACTPHAST remains true to its mission and mandate, and that all decisions are open, transparent and properly accounted for.