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Basic Research: First Ever 3D Plastic Film **Innovative Research at JKU: Flexible 3D Sensor Can Take any Shape and Size**

Scientists at the Johannes Kepler University have been working to apply groundbreaking research to boost the usability and applications of the 3D scanners and cameras that have become a part of our everyday lives. Researchers at the Institute for Computer Graphics have developed a new, transparent plastic film sensor that is 0.3 millimeters in size. Univ. Prof. Oliver Bimber, head of the Institute for Computer Graphics at the JKU, explains: *„The film is flexible and can take on any shape and size, making it easier to use on a daily basis.“*

Found in industrial manufacturing, robotics, in self-driving vehicles and game consoles, 3D devices and equipment consist of a large number of individual optical elements, including lenses and image sensors. Around the size of a camera, they are considered bulky and challenging for commonplace use. Prof. Bimber added: *„The sensors are currently unavailable for use in tablets, mobile phones and other interactive devices.“*

Detecting Shape and Distance

Innovative research being conducted at the JKU is about to change that: as opposed to the simple touch sensors found in today's mobile devices, new advancements make it possible to now recognize an object's shape and distance. The special film contains a fluorescent dye and effectively helps move the collected light to the edges where it is scanned. The object, located in front of the film, is calculated from the measured light signal. Optical elements, such as lenses, are no longer required. Using a small, external pico projector, the object only needs to be illuminated with a series of random noise patterns.

Prof. Bimber pointed out: *„This new technology is revolutionary because of how the shape and distance are calculated from the diffuse and random reflection of the light from the object on to the film.“* He and his team are applying approaches from a fairly new sampling theory known as 'compressive sensing' in which the light measurement calculates 256 views of an object which differ only in their shading. By applying a conventional reconstruction process called "shape-from-shading", a geometric object is determined.

Prof. Bimber added: *„In the future, the random noise patterns required for scanning will no longer be generated by an external pico projector, but rather by a coded aperture located directly within the second layer of film.“* The result is a completely lensless, transparent and flexible film camera measuring less than a millimeter in thickness.

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