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## Professor Develops More Efficient Sensor

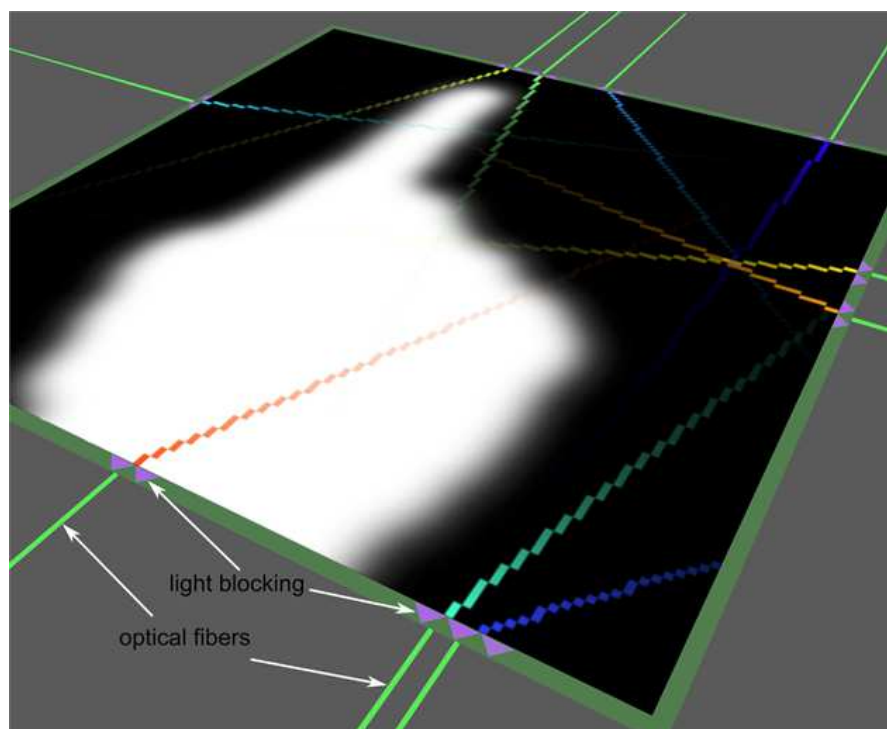
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*Classification, that is, recognizing objects, patterns, and motions, plays an important role in many image-processing applications.*

Conventional image sensors capture millions of measurements per image recording. The sensed pixels are then algorithmically processed to, for instance, detect and distinguish faces, gestures, or fingerprints. However, not every pixel has an equal role in this. Depending on the classification task, various image regions contain information that is more important for classification than others. Only those regions, so-called image features, are used to enable robust recognition while all other pixels remain unused.

The method developed by the JKU Institute of Computer Graphics (Head of the Institute Prof. Oliver Bimber) computes the most important image areas for a given classification task and uses them for a unique sensor design. The resulting sensors no longer record pixels of an image but rather they measure what computer tomograph images capture – the so-called Radon transform of the image.



*Computed sensor design for the classification of hand gestures: 22 different gestures at 300 varying poses each are detected correctly in over 99% of all cases. For recording, only 10 photodiodes are applied that measure light integrals at particular positions along the borders of a two-dimensional light guide.*

Light signals are thereby optically coupled into a two-dimensional light guide and are coupled out and measured at particular positions of the light guide's borders. The number and location of these positions depend on the actual classification task and are chosen in such a way that very high classification rates can be achieved with just a minimum number of measurements.

Despite complex classification tasks, the first prototypes for motion and gesture recognition have led to hit ratios of over 99% with less than 10 measurements.

Essential advantages of the new sensor generation not only include high classification rates, but also energy efficiency and a better read-out speed. Prof. Bimber, head of the Institute for Computer Graphics, remarked: "There are clear differences whether or not millions of pixel values have to be recorded and downloaded from the sensor, or if it only requires 10 measurements."



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Details about the new classification sensor appeared in the renowned journal of the Optical Society of America (OSA), Optics Express. The project is funded by Microsoft.

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