Accurate 3D measurement of objects in fast motion

Measurement of object's surface shape at 30-2,000 frames/second

We have developed a method to reconstruct the shapes of moving objects. The proposed method is a projector-camera system that reconstructs a shape from a single image where a static pattern is cast by a projector; such a method is ideal for shape acquisition of moving objects at a high frame rate. The issue to be tackled is to measure the shapes with high accuracy, high density, and high frame-rate. To achieve the goal, our method has the following features: 1) implicit encoding of projector information by a grid of wave lines, 2) grid-based stereo between projector pattern and camera images to determine unique correspondences, 3) pixel-wise interpolations and optimizations to reconstruct dense shapes, and 4) a single-colored pattern which contributes to simplifying pattern projecting devices. In the experiments, we succeeded in measuring the dense shape of a person in punching motion, a deforming ball, a wave on water surface, etc.

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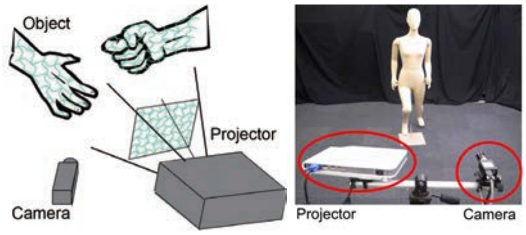

Measurement system with a projector and a camera

Measuring a person in motion by projecting wave grid pattern
Top: Input images
Bottom: Results of shape measurement

Information Technology and Electronics

Measurement and evaluation of the internal state of an organic light emitting diode device during light emission

First-ever evaluation of molecules within a sealed organic light emitting diode device in operation

We have developed a method using a sum-frequency generation (SFG) technique that has been improved to measure the molecular vibrational spectrum at the interface of a specific organic layer inside an organic light emitting diode (OLED) device. By employing a signal enhancement phenomenon that occurs at the interface with an accumulated electric field, the method can be used to evaluate the molecular condition of the organic layer during light emission without destroying the device. This world-first has been achieved through the merger of AIST's cutting-edge fundamental measurement technology with CEREBA's practical OLED device manufacturing and evaluation technologies.

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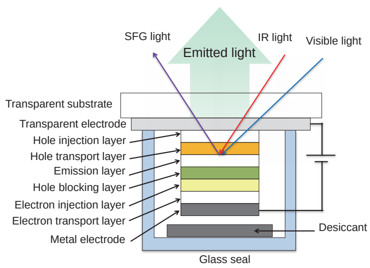
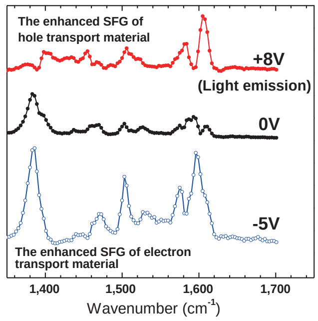


Schematic drawing of the structure of the multilayered OLED device and the directions of the incident and emitted lights used for SFG spectroscopy



Spectral changes in an operating multilayered OLED device
Starting from the top, with +8 V application (light emission), no voltage application, and –5 V application