3D-imaging: a scanning light pattern projector

The technology of electrically adjustable optical interfaces has found applications in, e.g., camera lenses, where an adjustable focal length provides automatic focusing for the camera. In this paper, we will investigate a liquid lens, where both the focal length and the tilt of this lens can be adjusted electrically. Specifically, the tilting ability of this lens will be tested by combining the liquid lens with a projector in order to scan lines across a three-dimensional (3D) object. The linearity, reproducibility, hysteresis, and time response of its tilting functionality will be tested. Further, crosstalk between the two functionalities of the liquid lens is tested for the specific case, where the focal length is set to infinity. Finally, the liquid lens and the projector in combination with four stereo cameras will be demonstrated as a 3D imaging setup.

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