

Telemetry by processing digital moiré patterns

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Operations with hidden optoelectronic grid patterns for measuring distances from a camera to an object were described in recent papers. In this paper, the possibility of performing metrological teleoperations with digital moiré patterns processing is discussed. We introduce two new processes: (1) instead of using hidden grids as in previous works, we digitally apply contrasted Ronchi grids to the images by an AND operation; (2) the process is related to the generation of moiré fringes. We perform this operation at two slightly different camera-object distances where the camera displacement ΔL is known. By using this method it is possible to measure both the object dimensions and the distance between the object and camera in the same operation. In a previous paper a relative uncertainty of less than 10% for a distance of 40 m from a photographic analogue camera to an object was reported. In the experimental laboratory demonstration presented in this paper using our method of digital moiré pattern processing, it was possible to reduce the uncertainty to 1.2% for a camera-object distance of 2 m and to 4% for 12 m, using an object dimension of 30 cm. Experimental results for several camera positions are presented along with sources of uncertainties. We also present concluding remarks and prospects for future work.