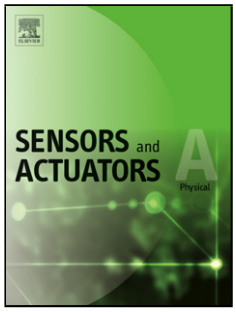

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Development of a tactile sensor based on optical fiber specklegram analysis and sensor data fusion technique

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Highlights

- A tactile sensor based on fiber specklegram analysis and data fusion was developed.
- Measurements are performed over 30 × 30 mm² area by utilizing only 3 fibers.
- The sensor has 0.5 N^{-1} sensitivity and detects changes of 1 mm in force location.
- The force magnitude and spatial distribution can be estimated by data fusion.

Abstract

The development of a tactile sensor based on optical fiber specklegram analysis is reported. The device is comprised of 9 microbending transducers connected to 3 multimode fibers, and attached to a 30 × 30 mm² touching surface in a matrix arrange. The output fiber speckle fields, produced by coherent light transmission through the multimode waveguides, are processed for evaluation of the normalized inner-product coefficients, being further correlated to the external load characteristics according to a specklegram referencing approach. Finally, the magnitude and location of the forces applied over the tactile frame are estimated by means of a data fusion technique, yielding the probabilistic distribution of