



ISTITUTO ITALIANO
DI TECNOLOGIA

TITLE

Electromagnetic Based Distributed Tactile Sensor

INVENTORS

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DESCRIPTION

Tactile sensor system able to detect contact, pressure distribution and the deformation profile at occurred contact. It consists of an infrared (IR) based optical sensing layer comprising: a detection area having at least two sides, light emitters (LE) and light detectors (LD) embedded in a transparent layer and located at its periphery, and a backprojection reconstruction algorithm. The tactile system working principle is based on a transparent layer that acts as an optical waveguide, where light travels and undergoes losses due to concurrent effects of frustrated total internal reflection and mechanical deformations of the waveguide. LEs are activated one at a time and the read-out is performed through all LDs. Then the information is processed via an *ad hoc* software and finally the pressure distribution map is obtained. Great advantages of this solution are its speed, electromagnetic immunity, and low power consumption. When the transparent layer is made of a flexible material, the sensor has some additional features and benefits: in this case its total flexibility and extensibility make it suitable for flexible, bendable, lightweight devices and for a smart sensor skin.

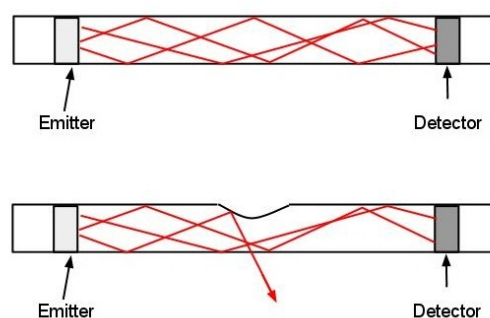


Figure: Top: Cross-section view of the device between an emitter and a detector, in absence of external stimuli. Bottom: Cross-section view of the device showing electromagnetic waves between an emitter and a detector, in presence of an external stimulus deforming the sensing layer

APPLICATIONS

The invention offers a solution that can easily be integrated in different fields, ranging from industrial automation and manufacturing to product design to consumer devices. Furthermore, a wealth of new and innovative applications can emerge by combining the tactile pressure sensing system to smart electronic platforms and interfaces. For example, the invention could be used to provide an intuitive and natural tactile interface to a range of home appliances.

The possible application areas are touch-screen displays, robotics, domestic, wearable devices, automotive.

KEYWORDS

Tactile sensor, touch screen display, infrared based optical sensing layer

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Dispositivo e processo di rilevazione tattile

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Applicants

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