Pressure Sensitive Fabrics

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BACKGROUND

Piezoelectric sensors have long existed to monitor applied pressures between two objects. In large applications with malleable substrates or where low cost is key, individual piezoelectric sensors are not practical. A variety of applications exist where monitoring the pressure being applied to a soft surface would providing meaningful insights into the system or subject under observation. For instance, in a long-term care setting where patients need to be monitored for pressure ulcers, a bedding material that could sense the pressure points between a person's body and the mattress could alert care givers that an adjustment in body position is warranted. Likewise, in a sports training application, a pressure sensitive boxing ring canvas could track a boxer's footwork, or punching power and hand speed if applied to the inside of a punching bag. Pressure sensitive soft toys could also benefit from feedback that might differ when a child scratches behind their stuffed animal's ears vs. rubbing its belly. To achieve discrete sensing in these applications, a low cost bulk sensing system is needed.

TECHNOLOGY DESCRIPTION

Researchers at UC San Diego have developed a bulk process to render any ordinary fabric conductive by applying a nanotube enriched paint along the back surface of the fabric to be sensed. Next, using conductive thread, low cost leads are attached along the perimeter of the fabric, in effect realizing a pixel grid across the entire fabric surface. The fabric is then biased with a low voltage and as incident pressures are applied, the conductivity of the nanotube enriched paint changes in a localized fashion. The change in the read out voltages from the perimeter electrodes is measured and rendered visually as a pressure position and intensity reading. Prototypes developed to date have very low latency and great sensitivity, enabling many low cost applications for this technology.

APPLICATIONS

This invention has the potential for broad use in large scale and/or distributed pressure sensing applications. For healthcare, pressure sensing bed linens and wheelchair seats are readily made which can monitor for blood-flow occlusion which could lead to pressure ulcers (bed sores). In retail products, the technology could find ready application to sporting goods with pressure (force) based feedback and toy applications.

ADVANTAGES

This invention removes the need to apply discrete piezoelectric sensors by enabling the entire surface to act as a pressure sensor with discrete localization of applied pressures. This invention also works on pliable/soft surfaces with limited support, an application unsuited for piezoelectric sensors.

STATE OF DEVELOPMENT

Working prototype

INTELLECTUAL PROPERTY INFO

Patent pending and available for licensing.

PATENT STATUS

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United States Of America	Published Application	20170241847	08/24/2017	2017-043

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OTHER INFORMATION

KEYWORDS

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CATEGORIZED AS

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