

Self-powered sensor for tactile physicochemical recognition

CSIC has developed a self-powered touch sensor that responds to contact with human skin through a triboelectric response. This device can distinguish whether the contact is made with a polymeric surface or natural or artificial fibers, such as different types of gloves, distinguishing the finger's position, speed and direction of movement. The transducer generates an electrical signal of short duration (from microseconds to a few milliseconds), which favors the achievement of an instant detection range. The device has potential in fields such as robotics and security, including fingerprint recognition and movement patterns.

Industrial partners are being sought to collaborate through a patent licence agreement.

An offer for Patent Licensing

Description of the technology

Nowadays, transduction mechanisms used in touch sensors include piezoelectric, resistive, and capacitive effects. In all of them, the measurement is related to the physical deformation that occurs in the sensor when it interacts with human contact.

The triboelectric effect produces an electrical signal in response to the contact with a surface. The developed sensor makes use of this triboelectric mechanism to generate a voltage peak as a monitoring signal of contact with the finger or other material in a self-powered and instant way.

The developed device can function as a single self-powered transducer to produce an electrical signal from interaction with a finger, or it can integrate a large number of triboelectric transducers close to each other, forming a distribution for the detection of several contacts at the same time or to produce transduction signals of different physicochemical properties at the same time.



The sensor allows multiple detection of different contacts and different parameters

Main innovations and advantages

- The physicochemical parameters of the contact define the shape, amplitude, polarity and duration of the voltage and power peak.
- The active dimension of the invention is in the micrometer to subcentimeter scale and allows for instant detection of contact and its properties.
- It can be produced in matrix form using IC, CMOS, MEMS, CCD, soft lithography, printing, or other high-yield manufacturing techniques. Matrix arrangement can be used to detect a single contact or multiple contacts.
- The nature of the triboelectric surface can be polymeric, ceramic, or hybrid. Similarly, electrodes used for instant capacitance generation at touch contact can be made of metals, oxides, conductive polymers, etc.
- Application in the fields of robotics, human-machine interfaces and safety devices.

Patent Status

European priority patent application suitable for international extension

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