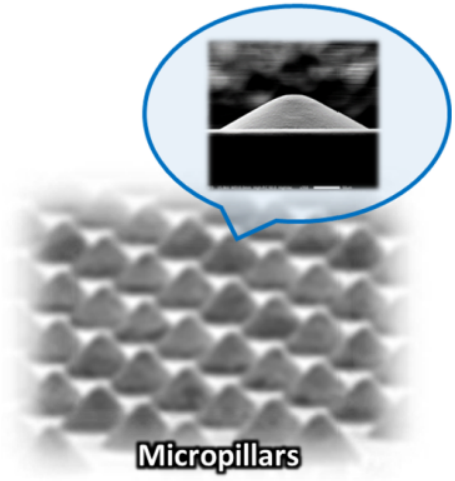
TECH OFFER

Intuitive and Durable Capacitive Force Sensing Technology



KEY INFORMATION

TECHNOLOGY CATEGORY:
Electronics - Sensors & Instrumentation
Infocomm - Augmented Reality, Virtual Reality & Computer-Simulated Environments
Infocomm - Human-Computer Interaction
Infocomm - Robotics & Automation
Infocomm - Internet of Things

TECHNOLOGY READINESS LEVEL (TRL): TRL4
COUNTRY: SINGAPORE
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OVERVIEW

Force sensing is used in a wide variety of applications and one of the primary methods of detection is the use of capacitance sensors. These sensor systems are based on parallel plate and MEMS technology. The force is detected by the shift in capacitance value. This response is nonlinear with respect to the load range and leads to a mismatch between the perception of the human operator and the actual output level. The systems are also difficult to scale due to higher cost of MEMS for larger sized sensors.

The technology developed enables accurate detection of volume changes even in low load range by employing micro-pillars (micro-protrusions) which are just tens of microns in dimension. These micron structures are formed in a conductive rubber using

an original microfabrication technology. These capacitive sensors have a high linearity with respect to the load and provide a more intuitive operation where human perception matches the output characteristics. The sensitivity characteristics – linearity, load range, and capacitive response to load, can be tuned to suit the application by adjusting the design of the micropillars. Since the change in capacitance is governed by the deformation behaviour of the conductive rubber, this technology is also robust and has a high durability and lifespan.

TECHNOLOGY FEATURES & SPECIFICATIONS

This capacitive force sensors technology based on microfabrication technology has the following features –

- Force sensing utilizing micro-protrusions (pillars) formed on a conductive rubber electrode.
- Highly linear response to external load for a more intuitive operation.
- Ability to adjust the sensor characteristic and feel by tuning the micro-protrusions and rubber hardness.
- Excellent durability due to the use of elastic deformation of conductive rubber for force sensing.

POTENTIAL APPLICATIONS

The technology can be used to provide a much better user interface for various input devices spanning multiple technology fields –

- Smartphones, smartwatches, XR and other ICT related devices.
- Game controllers.
- Electronic musical instruments.
- Digital cameras.
- Stylus pens.

Use case as a sensor exist in both industrial and commercial products –

- Robot hands.
- Grip / Touch detection.

UNIQUE VALUE PROPOSITION

The technology provides a highly durable force sensing solution which is well suited for long and continuous usage. The linear output characteristics and the possibility to tune the output by design make it ideal for use in several applications, especially where human operators are involved.