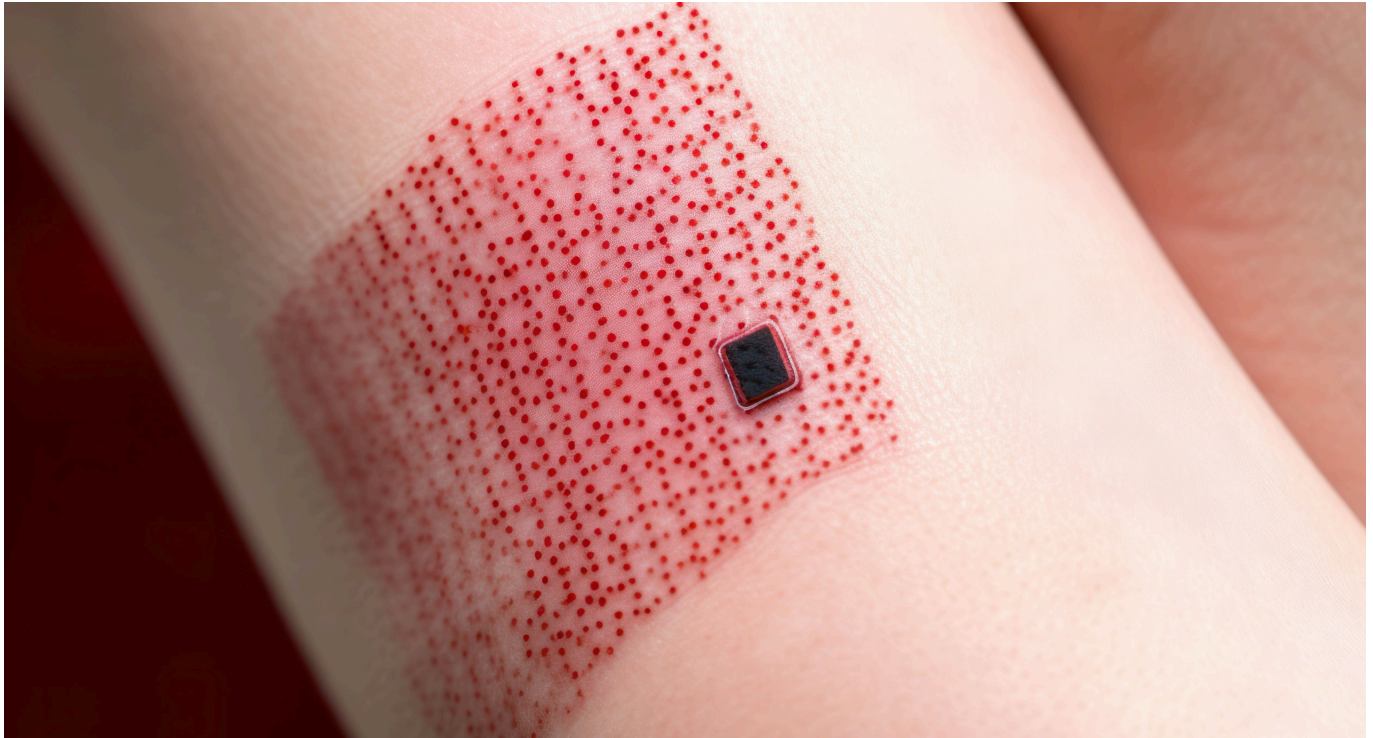**TECH OFFER**

Tactile and Temperature Sensing Electronic Skin for Healthcare and Cosmetic Applications

KEY INFORMATION

TECHNOLOGY CATEGORY:

Electronics - Sensors & Instrumentation
Healthcare - Medical Devices
Infocomm - Internet of Things
Personal Care - Cosmetics & Hair

TECHNOLOGY READINESS LEVEL (TRL): **TRL8**
COUNTRY: **SINGAPORE**
ID NUMBER: **TO175077**

OVERVIEW

The human skin is the largest organ of the body, capable of extremely sensitive sensing ability and functional characteristics including elasticity, mechanical resistance and self-healing due to different mechano-receptors and sensory nerves. Electronic skin (e-skin) or synthetic skin, is a thin electronic material that stimulate the characteristics of the skin, making it possible for applications in prosthetics, robotics, wearables devices and percutaneous drug delivery systems.

This patented technology is an e-skin with tactile, pain and temperature sensing, capable of differentiating various mechanical forces, sensory heat or moisture concurrently. It is a promising technology for healthcare applications. Currently, majority of the sensors in the market for healthcare are in rigid forms and for small application areas, which make it difficult for portable and wearable applications in large surface areas. This thin film flexible electronic skin can detect applied pressure and temperature on it. The skin's electrical resistance varies with applied pressure and temperature. By measuring the skin's electrical resistance, the

applied pressure and temperature can be derived. The skin can be made stretchable to be covered on irregular curved surfaces. These features complement the drawbacks of rigid sensors for healthcare applications.

The technology owner is looking for collaborators in the medical and robotics sectors and potential opportunities outside of healthcare such as beauty and cosmetics.

TECHNOLOGY FEATURES & SPECIFICATIONS

- Skin size, shape, density: customizable
- Pressure and temperature detection ranges: customizable (up to 5000KPa and 120°C)
- Single sensor repeatability: less than 10%
- Thickness: less than 1mm
- Communication port: via digital IO, UART, USB, Bluetooth, and Wi-Fi
- Data storage: SD card or other storage media
- Working voltage: DC 3-5V, or customizable

POTENTIAL APPLICATIONS

The electronic skin can be:

- Embedded in insole for fall risk warning, fall detection, gait analysis, foot, and leg abnormality detection.
- Embedded in rehabilitation glove for finger gripping strength assessment.
- Embedded in surgical glove, robot end-effector and body for tactile sensing and force feedback control.
- Embedded in bed for bed sore prevention.
- Covered on artificial limb for pressure, temperature, and collision sensing.
- Deployed at shower room or bed side for fall detection.
- Used for teeth alignment and tongue muscle strength measurement.
- Used for training of doctor to operate surgical robot, under AR, MR, metaverse environment.

MARKET TRENDS & OPPORTUNITIES

Wearable electronic devices with skin-like properties will provide various applications for monitoring of human physiological signals such as body pressure, temperature, motion, and disease-related signals.

UNIQUE VALUE PROPOSITION

- Low cost.
- Customizable and durable electronic skins based on requirements.
- Compared with rigid sensors, these electronic skins have soft surfaces, can be made in large size, and covered on various flat and curved surfaces.
- Possible to develop an interface to connect the e-skin to human neural brain or spinal cord.
- API under Windows, Linux, Android, and iOS to facilitate development of various applications.