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Electronic Skin

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ABSTRACT:

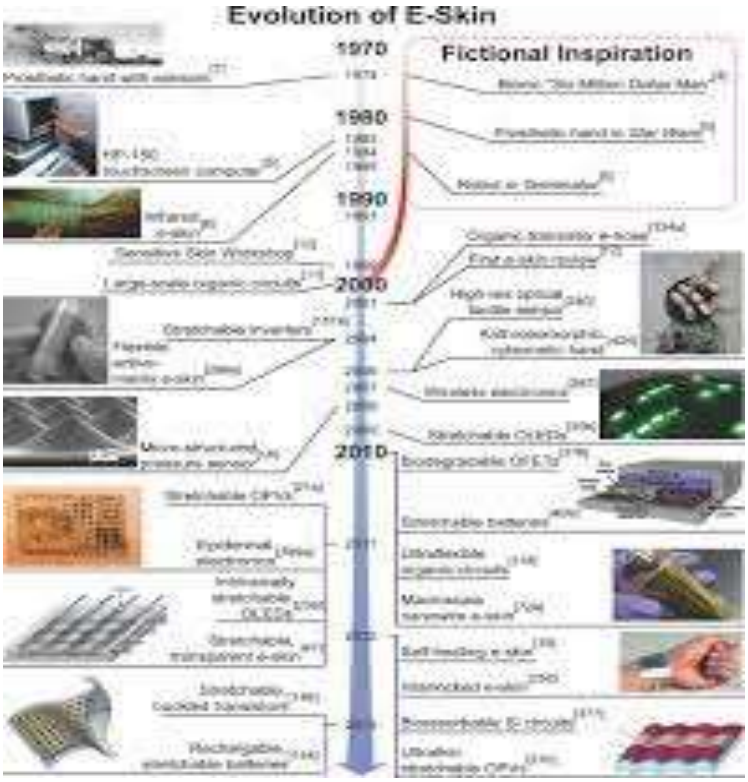
Electronic skin (e-skin) is an artificial skin that mimics the sensing capabilities of human skin, which brings many potential applications in robotics, artificial intelligence, prosthetics, and health monitoring technologies[1]. It refers to flexible, stretchable and self-healing electronics that are able to mimic functionalities of human or animal skin. The broad class of materials often contain sensing abilities that are intended to reproduce the capabilities of human skin to respond to environmental factors such as changes in heat and pressure. [2]

Introduction:

Most e-skins are made by layering an active nanomaterial (the sensor) on a stretchy surface that attaches to human skin. Joseph Campbell. Researchers from the National University of Singapore have developed an 'electronic skin', capable of recreating a sense of touch thanks to more than 100 small sensors. In 2010, she and her team developed a skin from the elastic polymer PDMS that could detect tiny changes in pressure to mimic the sense of touch. Researchers have developed a new type of malleable, self-healing and fully recyclable “electronic skin” that has applications ranging from robotics and prosthetic development to better biomedical devices. Electronic skin, known as e-skin, is a thin, translucent material that can mimic the function and mechanical properties of human skin. A number of different types and sizes of wearable e-skins are now being developed labs around the world as researchers recognize their value in diverse medical, scientific and engineering fields. E-skin has sensors embedded to measure pressure, temperature, humidity, and airflow. [3]

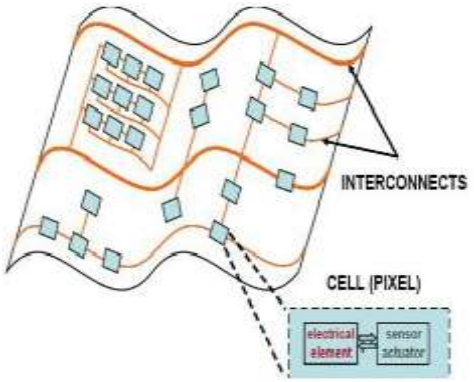
Evolution of E-skin:

It was the first mass-marketed electronic device capitalizing on the intuitive nature of human touch. In 1985, General Electric (GE) built the first sensitive skin for a robotic arm using discrete infrared sensors placed on a flexible sheet at a resolution of ≈5 cm [6]

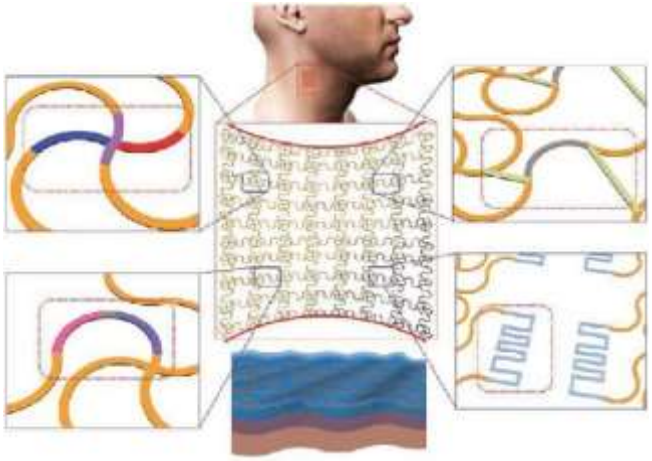


Architecture:

Electronic skins for robots and medical prostheses—multifunctional structures, in which sensors and actuators are closely integrated with microelectronic circuits—bring a new dimension to electronics flexibility. Shaped electronics and skin-like electronics may experience



To achieve flexible and stretchable skin, sub circuit cells, made of a transducer and an electronic circuit, will be placed on mechanically separated islands, which are fabricated on a deformable substrate that takes up most of the total strain. The figure shown above is a sketch of such an island carrying electronic surface. The islands are made sufficiently rigid to protect them from breaking We have three options for making deformable interconnects: making thin metal films that can withstand large plastic deformation, deforming a sacrificial mask which serves in liftoff metallization, and making stretchable metallization.[5]



E-Skin features:

- Optimization of pressure sensors & Electronic read out-but no Human Readable output.
- The new e-skin: Spatially map the applied pressure and instantaneous visual response through OLED.
- Can measure electrical activity of the heart, brain waves & other vital signs.
- It can record electrical activity along the scalp.
- Muscle contractions in the neck can control the mouse in a computer

Advantages of using E-skin

- It helps the body to adjust after the transplant.
- It can make robots more sensitive.
- The use of tiny electronic wires allows the skin to generate impulses, similar to that of the body's own nervous system.
- It could lead to advancements in medical equipment.

Applications:

- Automatic control panel
- Interactive input devices
- Robotics
- Medical & Health monitoring device

Conclusion:

The Electronics Devices Gain More Demand When They Are Compact In Size And Best At Functioning. The Artificial Skin Is One Such Device Which Depicts The Beauty Of Electronics And Its Use In Daily Life. Scientists Create Artificial Skin That Emulates Human Touch. According To Experts, The Artificial Skin Is "Smarter And Similar To Human Skin"[4]

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