


Chapter 15

Applications of E- Textiles on Healthcare, Sports, and Defense

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ABSTRACT

Electronic textiles (e-textiles) are reshaping wearable technology by seamlessly embedding sensors, actuators, and communication systems into everyday clothing. This chapter explores their transformative role across healthcare, sports, and defense. In healthcare, e-textiles support continuous, non-invasive monitoring of vital signs, aiding chronic disease management and post-surgical care. In sports, they provide real-time feedback on performance, muscle activity, and hydration, enhancing training outcomes and reducing injury risk. In defense, smart uniforms monitor soldier health, adapt to environmental changes, and enable stealth through responsive camouflage. Despite their promise, challenges in durability, power supply, and scalability remain. As advances in materials and embedded electronics continue, e-textiles are poised to become integral to daily life, blending comfort with intelligent functionality.

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INTRODUCTION: WHEN THREADS MEET TECHNOLOGY

Once, fashion had an easy task to clothe us, to warm us, to show our personality. It provided comfort, but not conversation. It never heard or replied. But that is no longer the case. Gently and deeply, clothing is acquiring feelings, a voice, and movement.

Envision reaching out for a shirt that not only fits your shape but gets it. That knows your heart races, taps your stride when you push too hard, or alerts a physician if you're in trouble. These are no longer the concepts of science fiction. These are happening now, integrated into the very fabric of what we wear. Welcome to the era of E-textiles smart textiles changing how our clothing interacts with our bodies.

In contrast to strapping a gadget on your wrist, E-textiles integrate intelligence into the fabric itself. Sensors, circuits, and communication modules are woven, printed, or embroidered into the cloth. The outcome? Clothes that stay soft and wearable, but are full of life detecting heartbeat, hydration, temperature, motion, and more.

Their strength is subtlety. A shirt is still a shirt. But beneath the surface, it could be tracking your vital signs at night or alerting you to dehydration during a game. A jacket could siphon power from movement or the sun to feed sensors that communicate with your phone. They're not just practical they're smart.

Consider a baby's onesie that monitors breathing. Or a vest for recovering from surgery that coach's posture. Or rescue uniforms that stream important stats to a command centre during disasters. These are not science fiction concepts they're being tested in clinics and laboratories today.

The closeness of clothing makes E-textiles particularly compelling. Clothing is intimate worn continuously, frequently in contact with skin. This close contact enables richer, more ongoing tracking than devices we sometimes glance at or neglect to wear.

Nevertheless, the potential is staggering. E-textiles are making passive material active companions ones that do not merely cover us but nurture us. The future is not just wearing technology; it's merging with it. As we embroider intelligence into fabrics, we're sewing the new chapter of human-tech bonding one thread, one heartbeat at a time.

E-TEXTILES IN HEALTHCARE

Meera, 65, resides alone in a quiet flat on the outskirts of boisterous Mumbai. A lively schoolteacher with a dominant voice and bright smile, her days are now less

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