SMART ePANTS

SMART ELECTRICALLY POWERED AND NETWORKED TEXTILE SYSTEMS

INTELLIGENCE VALUE

The SMART ePANTS program seeks to develop clothing with integrated audio, video, and geolocation sensor systems that feature the same stretchability, bendability, washability, and comfort of regular textiles. By weaving these devices directly into garments, Intelligence Community staff will be able to record information from their environment hands-free, without the need to wear uncomfortable, bulky, and rigid devices. As a result, personnel will have greater range of motion, thus improving their response time in challenging circumstances.

Active smart textile (ASTs) research is a burgeoning field where fabrics are designed to adapt and change their functionality in response to changes to their external environment and/or user input. Unlike passive smart textiles (PST), such as Gore-Tex® which rely on their structure to function, ASTs employ energy to power built-in sensors and/or actuators that sense, store, interpret, and/or react to information from their environment.

New, enabling, research to transfer many of the capabilities of rigid wearable electronics into ASTs has surfaced including: weavable conductive polymer "wires", energy harvesters powered by the body, ultra-low power printable computers on cloth, microphones that behave like threads, and "scrunchable" batteries that can function after many deformations. In order to transfer this research into AST products, revolutionary new materials and manufacturing techniques are needed to develop complete and integrated systems containing mechanically deformable and durable: 1) power sources, 2) sensors, 3) computation and data storage, and 4) electrically conductive system component "wires" and interconnects.

The SMART ePANTS goal is to build sensor systems that are comfortably integrated into primary clothing (e.g., shirts, pants, socks, and underwear). Research committed to developing these systems will be divided into three demonstration tracks:

- Audio recording;
- Video and photography capture; and
- Indoor geolocation.

PRIME PERFORMERS

- Areté
- Leidos Inc.
- Massachusetts Institute of Technology
- Nautilus Defense
- SRI International

TESTING AND EVALUATION PARTNERS

- MIT Lincoln Laboratory
- Advanced Functional Fabrics of America

KEYWORDS

- Active Smart Textiles
- E-textiles
- Wearable electronics
- Batteries
- Body cameras
- Body microphones

PHASE I (SEE IT):	PHASE II (WEAR IT):	PHASE III (WASH IT):
Integrated Electronics	Comfortable e-Garments	Entire system is durable and washable

Over the course of three research phases, the SMART ePANTS program will develop stretchable, durable electronic systems that are woven into textiles that can be comfortably worn and are washable. In the first phase, the world's first integrated, flexible, and stretchable electronics systems will be developed. In Phase II, these systems will be completely integrated into clothing with no rigid components. In Phase III, the ASTs produced will have all the same attributes as regular clothing, making the first stretchable, washable electronic systems.

SMART ePANTS
WEAVING ELECTRONICS INTO TEXTILES

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