

TRANSFORMING FABRICS AND TEXTILES INTO INTEGRATED DEVICES AND SYSTEM

AFFOA (Advanced Functional Fabrics of America), a Manufacturing USA institute, is catalyzing a domestic manufacturing-based revolution, transforming traditional fibers, yarns, and textiles into highly sophisticated integrated and networked systems; facilitating the conversion of the textile industry into a value-added, high-tech industry. AFFOA leads the convergence of advanced technology into fiber and textile production to commercialize products that will benefit the warfighter and consumer.

Manufacturing USA, a public-private partnership with 14 manufacturing institutes across the nation, connects companies, academic institutes, non-profits, and local, state, and federal entities to solve industry-relevant advanced manufacturing challenges in new technology areas with the goals of enhancing industrial competitiveness and economic growth and strengthening national security.



CREDIT: Kayana Szymczak

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Technology Focus Area

The merger of semiconductor technology into fiber and textile manufacturing in the U.S. will enable computation in and connectivity among advanced fabric products for both small-batch production and mass customization. Functions of fibers will dramatically increase over the coming years, creating a "Moore's Law for Fibers." Alongside commercial applications, advanced fabric technology offers opportunities to develop unique solutions to critical national security challenges, such as soldier systems, functional composite materials for ground and air vehicles, and undersea and space capabilities.

Approach to Innovation and Collaboration

Part of AFFOA's strategy is to accelerate exciting, advanced, connected textile products that introduce new business models to the industry. With highly functional fabric device systems, the ability to offer consumers "fabrics as a service" creates value in the textile industry—moving it from producing commodity goods in price-competitive markets to recurring revenue models with rapid innovation cycles, characteristic of high margin technology sectors.



Fabric Innovation Network: a collaborative infrastructure of industrial and academic partners with significant, yet previously isolated expertise, which provides an integrated collaborative prototyping and pilot manufacturing engine for the nation and establishes a virtuous high-margin innovation cycle



Fabric Discovery Centers: aimed at creating jobs and facilitating innovation in local communities throughout the nation



Nonproprietary Roadmap Projects deliver product prototypes that excite follow-on industry investment, through proprietary projects funded by industry members and executed through the Fabric Innovation Network in order to meet market needs and demands and train and grow the domestic supply chain



MicroAward Program: applies the prototyping expertise of the Fabric Innovation Network to the manufacturing challenges associated with scaling advanced fabric products, with defined needs from manufacturing roadmaps released as solicitations and iterative project cycles of 90-days or less

COLLABORATIVE PROJECT EXAMPLES

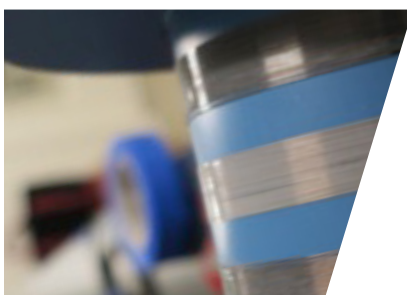
“The Fabric Discovery Center will unlock advances and jobs in revolutionary fabrics and textiles and harness emerging technologies critical to the Commonwealth’s competitiveness in advanced manufacturing and creating jobs for Massachusetts residents.”

– The Honorable Charlie Baker, Governor of Massachusetts



LOOKs PROGRAMMABLE BACKPACK: LOOKs is the world’s first programmable backpack that is mass produced yet completely unique. LOOKsPacks are made of an advanced fabric that is manufactured at Inman Mills in South Carolina and enables the wearer to program their pack through a smartphone app called LOOKs. Users with the LOOKs app can retrieve information from the LOOKs fabric by just pointing their phone at it (LOOKing). The fabric development for LOOKs advanced domestic manufacturing processes in South Carolina and exemplifies the role of U.S. product and manufacturing innovation in “advanced fabrics.”

FABRIC COMMUNICATIONS: In collaboration with members, AFFOA launched a Gen 1 “Fabric LiFi” (Light Fidelity refers to the transmission of data via light) product platform. An advanced fabric-based hat receives data from overhead light source for long distance, directional and high-bandwidth communications. This system can be used to provide precise indoor position, locate and communicate in radio-frequency and GPS denied environments and transfer highly secure information. A spectrally-unique platform was used to create a fabric turret cover for identification of friendly forces from above.



ELECTROPHORETIC COLOR CHANGE: Low-power, electrophoretic-based color changing fibers and fabrics were created with conceptual product design for implementation in 2018. These fabrics can provide on-demand color and pattern changes to adapt to changing environments. The transduction mechanism they employ is inherently low power to enable mobile solutions with long operational lives.

“We are approached by vendors all the time who want to add gimmicks to backpacks, but the AFFOA technology offers great simplicity: this backpack has no wires or batteries, yet still connects with the digital world.”

– Steve Munn, President, JanSport-Americas