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Development and Characterization of Textile Strain Sensors Using Different Weave Designs

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Smart textiles are the textile structures that can sense the stimuli and respond accordingly. These stimuli may come from mechanical, thermal, electrical or chemical sources. Textile strain sensors are one of the product of smart textiles in which sensors resistance change with applied strain. This study involves the development and characterization of textile strain sensors by using different weave designs and different blend ratio of conductive materials in the yarns. Three different woven structures of textile strain sensors are developed. Material used for these sensors are conductive yarn (Polyester/Silver blend) and lycra. 3/1 twill and multilayered structures are developed on the semi-automatic weaving machine while braided structure is also manufactured on braiding machine. After development of sensors, these sensors are tested for stretch recovery by using Tensile testing machine and electrical resistance of as developed sensors is measured by using electrical multi-meter. This study described the best suitable blend ratio and weave design for textile strain sensors. This study also explained about the sensor with best sensitivity and stability. These sensors can be used in medical field for monitoring the human respiration, for rehabilitation purposes, for monitoring the joints movement etc.

Keywords:
Strain Sensor, Conductive Yarn, Braided Structure, 3/1 twill Structure, Multi-layered Structure, Polyester/Silver blend

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