

## **Prediction of Yarn and Fabric Qualities through Signal Processing of Yarn Density Profiles**

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This research introduces an original technique to predict yarn and fabric qualities by using the digitized signals obtainable when the density profiles of yarns are measured electronically. An algorithm was developed for converting analog signals depicting the density profiles of a yarn into the visual qualities of the fabrics to be produced. The actual yarn density signals were captured by the DAS specially designed for this research. These captured analog signals were converted into the digital signals. The digitized signals, in turn, then were transformed to the digitized shades. These digitized shades have been selected to represent the yarn irregularities by matching the linear densities to shades: the darker the shade the thicker the yarn, and the lighter the thinner. Finally, the fabric qualities and defects were visualized by converting the yarn into a fabric. Several computer programs were developed in order to mimic the actual fabric appearance through graphical representation of yarn profiles. Two methods for graphically simulating the fabric appearances are illustrated by using two visualization techniques. In addition, signals obtainable from two different measurement system, one based on an opto-electric sensor and the other on a capacitance sensor were compared for their effectiveness in representing the uniformities of yarn diameters or the cross-sectional shape.