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Digital Innovations in the Kimono Industry of Nishijin, Kyoto

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Nishijin district in Kyoto is a famous production center of *kimono*, traditional Japanese clothes. Nishijin *Ori* (textiles) for *kinomo* and *obi* (wide belts in *kimono* fashion) are often sold at extraordinary prices. Kyoto was the capitol of Japan from 794 to 1869 after the Meiji Reformation, and the origin of Nishijin textile dates back to the 15th century. Historically, main customers of Nishijin textiles were the Imperial Court and the nobility. Nishijin textiles have also long been connected to such traditional cultures as *Chano-yu* (tea ceremony), *Ikebana* (flower arrangement) and dances. Consequently, Nishijin textiles have been famed for their fine and sophisticated designs, which require superior weaving techniques.

Traditionally, Nishijin had confined its market locally around Kyoto. After the Meiji Reformation, however, the industry expanded their market nationwide and established a leading position in *kimono* production. Nishijin experienced two major technological innovations in its modern history. First was the introduction of the Jacquard loom technology from France in 1880's. Nishijin textiles require complex control of loom machines to make fine patterns. Jacquard loom technology automated the loom controls using the punched card system, a primitive and mechanical “digital” technology. The Jacquard loom improved the productivity of manufacturing, and enabled the market expansion. Second was the digitization in 1980's, which replaced the punched cards to electronic digital technologies, or the “direct-Jacquard” system. Those technologies were developed locally, and penetrated into smaller factories. Simultaneously, computer graphics technologies were introduced in designing and control-code making of the fabrics patterns. Today, key technologies in Nishijin textiles are extensively digital.