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Advanced Digital Encoder Design for Next-Generation Smart RFID Tags in Textile Industry Digital Product Passports

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The fast-fashion industry's environmental impact necessitates innovative solutions to improve sustainability and transparency in textile production. This project focuses on developing advanced digital encoders for next-generation smart RFID tags to facilitate the integration of Digital Product Passports (DPPs) in the textile industry. DPPs provide detailed product lifecycle data, enabling compliance with European Union regulations and promoting environmentally responsible consumer decisions. The proposed RFID tags utilize cutting-edge materials and manufacturing techniques, including screen printing and heat transfer, to achieve durability, flexibility and reliable performance under industrial conditions. Emphasizing eco-friendly practices, this project explores the use of recyclable materials, advanced conductive inks and scalable production processes. Collaborative efforts with INESC ensure real-world applicability, with comprehensive testing validating performance in challenging environmental and mechanical stress scenarios. This research contributes to sustainable textile innovation by addressing key challenges in RFID integration and paving the way for enhanced traceability and sustainability in global fashion markets.

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