Electronic Anti-Counterfeit Protection using a Pseudorandom Binary Sequence

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In today's society, counterfeit parts are a large problem. This project focuses on mitigating this problem by proposing an innovative, low cost inquiry-response system that works to detect fake parts and reduce counterfeiting. This system first uses software in a microcontroller to produce a Variable Timing Pseudorandom Binary Sequence (VTPRBS), which is used as an inquiry signal. This signal is then sent to a Variable Pulse Width Square-wave (VPWS) generator. This generator responds with a square wave whose pulse width is based on the input of the pseudorandom code and the inherent characteristics of the generator itself. The software then checks the response square wave to see if it matches the expected square wave-if it doesn't, a violation flag is raised. The reason this defense system works is, to create a working copy of the board, counterfeiters must exactly replicate the response of this VPWS generator, which is very difficult. Since the input is a VTPRBS, which means the amplitude and timing of the inquiry and response are both random, it is difficult to map a specific output to a certain input. In addition, the characteristics of the response waveform are determined by the components that the VPWS generator consists of. If the specifications of these parts are kept secret from the market, then the pulse width of the square-wave response cannot be guessed nor replicated by counterfeiters. The expected length of each pulse width was calculated. Additional tests were performed on a prototype board that determined the actual pulse width and tested the correctness of the system. From results of these tests, it was determined that this project exhibits an accurate, innovative, low-cost and convenient way to protect circuit board designs.

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