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Use of Specialized Security Techniques to Enhance the Authenticity of Surveillance Data

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In 2013, the IAEA started testing a commercial application-specific integrated circuit (ASIC) from LiveWire technology for its ability to monitor changes in wiring systems in real time. This technology is useful in specific situations where digital video signal authentication cannot be used due to analog cameras used in high radiation level (e.g. hot cells, reading spent fuel identification numbers), dimensional requirements, or when an analog signal has to be shared with a facility's built-in camera. The LiveWire ASIC can be used for tamper indication with resulting cost savings by eliminating the need for specifically manufactured tamper indicating conduits. This technology can also be integrated within the Next Generation Surveillance System (NGSS) camera module, coupled with the upcoming implementation of the analogue video input, for the protection of analog video signals provided by an external camera head.
Digital camera identification based on sensor pattern noise analysis is another technique under investigation at the IAEA. Sensor pattern noise is unique to a device and can be used as a distinct identification 'fingerprint'. This technique is increasingly being employed for camera identification and in-image authentication & video forensics by commercial software suites. Interest in this technique for use in safeguards applications is justified by the need to own specific forensic tools and the requirement to verify the authenticity of surveillance streams acquired in analog video input configurations where the camera head is external to the NGSS camera module). Preliminary tests have been performed on surveillance data acquired by NGSS cameras and post-processed with commercial forensic software. The promising results obtained encourage further development efforts and tests to be conducted to fully assess the potential capabilities this technology offers.
This paper will focus on these two applications recently addressed by the IAEA, detailing the theory of operation and preliminary test results.

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