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Usefulness of Acoustic Sounds from 3D Printers in an Eavesdropping Process and Reconstruction of Printed Shapes

Tytuł

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Abstract: Information protection is an essential safety issue in many human activity fields. The development of computerisation (informatisation) brings new challenges in the area of non-invasive information processing in information technology (IT) systems. The known fact is that VGA, DVI/HDMI interfaces, for example, or formatter systems of laser printers that process video signals are sources of effective disclosing electromagnetic emission. Emission safety of the more and more common three-dimensional (3D) printers is less known. The selected 3D printer with the ME3DP (Material Extrusion 3D Printing) technology was tested to analyse the existing risk. Simple objects were printed during its operation to identify the stepping motor operation that are emission sources in the secondary channels. The analysis carried out focused on finding the correlation between the registered emissions and the printer head (printhead) movements when printing an object. It was shown that the analysis of the registered sensitive signal runtimes and their spectrograms allows us to recreate the printed object shape. The studies focused on measuring the acoustic signals that came from the stepping motors. The analysis of the possibilities of identifying the shapes of printed objects was based on the visual method. The article presents the study results and their analyses.

Keywords: protection of information, electromagnetic infiltration, acoustic infiltration, 3D printer, data acquisition, reconstruction of shapes

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