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Efektywne metody skrytej synchronizacji akustycznych kanałów steganograficznych

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Abstract

Steganography is a technique that allows to hide additional information in the original signal. The dissertation concerns with the applications of acoustic steganography, focusing in particular on hiding information in speech signals.

Develop and accessibility of contemporary networks and IT systems give people opportunity for long distance communication. An important factor in communication is to ensure the confidentiality of the information sent. Confidentiality guaranteed by encryption and confidentiality guaranteed by data hiding, together create a combination of attributes that definitely increase the security of transmission. Steganography and cryptography can be seen as complementary techniques. Thus, research on steganography will allow to expand the state of knowledge in the field of information security.

This dissertation includes acoustic steganography methods review. One of the analyzed methods - operating in the frequency domain, was selected for further analysis. This method was implemented with an alternative version having a psychoacoustic correction module based on the MPEG-1 standard.

One of the major issue in present steganographic systems is ensuring synchronization. In the dissertation, four proprietary mechanisms have been designed and implemented to achieve synchronization on the receiving side. When designing these methods, particular emphasis was placed on their simultaneous operation with the steganographic data embedding system in the speech signal. Three of the developed methods works directly on the speech signal while the fourth one operates in the higher layers analyzing the structure of the extracted data.

All procedures developed for the thesis were thoroughly tested to assess the quality of the signal quality and the synchronization efficiency. A complete assessment regarding the signal quality and the synchronization efficiency have been done for all procedure developed for the thesis. The signal quality assessment was conducted using objectively as well as subjectively methods. Carried out studies confirm the efficiency of quoted synchronization procedures during steganographic data transmission in the VHF radio connection and VoIP channel.