Digital Watermarking of Autonomous Vehicles Imagery and Video Communications

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Project Summary:

Every unmanned autonomous vehicle collects and transmits voluminous amounts of intelligence and surveillance data. This statement is true for vehicles operating in the air, on the ground or in the sea. The collected data such as video and imagery are always accompanied by metadata. Metadata is used to establish where, when and how data was collected. Examples include platform coordinates, speed, direction, sensor field of view and a host of others. In this work we propose to develop algorithms that can be used to embed the metadata in the subspace of image or video communication while simultaneously meeting the requirements of security, robustness and imperceptibility. For uncompressed video we propose a new approach that uses joint-variable domain for watermarking. This domain may include time-frequency(for video), space-frequency(for still imagery) or chirp transform. Joint -variable domain promises greater capacity and enhanced security compared to the more conventional single domain data hiding algorithms. For compressed video, we propose a novel technique based on the use of code-pair concept. By simply looking at the variable length Huffman codes in pairs, it is possible to identify a new codespace with increased redundancy in which fully reversible, hence lossless, data hiding can be accomplished.