

System for Real-time Information Transfer from Movie to Remote Device

Prior Art

Digital watermarking (http://en.wikipedia.org/wiki/Digital_watermarking) is the known method used to embed information into audio, picture, or video signal.

In visible watermarking, the information is visible in the picture or video. Typically, the information is text or a logo which identifies the owner of the media. The image on the right has a visible watermark. When a television broadcaster adds its logo to the corner of transmitted video, this is also a visible watermark.

In invisible watermarking, information is added as digital data to audio, picture or video, but it cannot be perceived as such (although it may be possible to detect that some amount of information is hidden). The watermark may be intended for widespread use and is thus made easy to retrieve or it may be a form of steganography, where a party communicates a secret message embedded in the digital signal. In either case, as in visible watermarking, the objective is to attach ownership or other descriptive information to the signal in a way that is difficult to remove. It is also possible to use hidden embedded information as a means of covert communication between individuals.

This document describes a system where the movie has to be “watermarked” with specific information at particular movie frames. Technically any method of watermarking can be used for the system being described. The idea presented in this document does not concern with the watermarking process, but rather with the process from detection of such watermark, extraction and decoding of the embedded information to the transmission of the information using wireless data transmission signal.

Description of the Drawings

FIGURE 1: System design. This figure shows the implementation of the three functional components in the hardware/software: information detector, data extractor, and RF transmitter.

FIGURE 2: Sequence of image frames in a movie.

Detail Description

Various embodiments of the present invention will be described in detail with reference to the drawings, where some numerical references represent parts and assemblies throughout the several views. Reference to various embodiments does not limit the scope of the invention, which is limited only by the scope of the claims attached hereto. Additionally, any examples set forth in this specification are not intended to be limiting and merely set forth some of the many possible embodiments for the claimed invention.

Throughout the specification and claims, the following terms take at least the meanings explicitly associated herein, unless the context clearly dictates otherwise. The meanings identified below are not intended to limit the terms, but merely provide illustrative examples for the terms.

- The meaning of "a," "an," and "the" includes plural reference.
- The meaning of "in" includes "in" and "on."
- Words which are gender neutral or gender specific include each gender.
- The term "connected" means a direct electrical connection between the items connected, without any intermediate devices.
- The term "movie" or "video" means a sequence of images displayed consecutively in a series of time duration.
- The term "circuit" means either a single component or a multiplicity of components, either active and/or passive, that are coupled together to provide a desired function.
- The term "signal" means at least one current, voltage, charge, temperature, data, or other measurable quantity.

FIG.1 describes the overall system design. Electronic display 100 is any kind of electronic displays such as television, computer screen, and advertising screen. Electronic display 100 receives and displays movie signal from the source of movie signal 300, which can be in the form of TV signal receiver, VCD/DVD player, computer, etc.

Information detector 301 scans every single image frame displayed on electronic display 100 to look for the embedded information. Information detector 301 can get the input directly from movie signal source 300 (e.g.: in the case of cable tv set top box) or from the video output of electronic display 100 where applicable. When the block of embedded information is found, information detector 301 passes the block of information to data extractor 302 which retrieves the information such as screen coordinate (X,Y), data to be broadcast, and data-availability time duration t. There can be various kinds of information available; however the mandatory ones are data to be broadcast and data-availability time duration.

Data extractor 302 shall validate the retrieved information, and then pass the validated information to RF transmitter 303. Upon receiving the validated information, RF transmitter 303 shall broadcast the information using any wireless transmission protocol, such as blue-tooth, infra-red, Wifi, ZigBee, 2G/3G, etc.

FIG 2 describes the implementation in the movie. A set of data consists of coordinate (X,Y), data to be broadcast, and data-availability time duration t, are encoded into frame N of a movie. This set of information is referred to as embedded information 401. The method used to encode the embedded data into the image can be any method known as described in prior art, as long as the resulted image pattern can be detected and captured by information detector 301 in an efficient way.

The frames which come after embedded information 401 frame are the frames which make up the visual sign 402. Visual sign 402 is a series of images which is design to suggest user to trigger remote device to capture the available information. FIG 4 shows one possible arrangement in which the visual sign shows an animated circle which changes its shape from small to large, then large to small, repetitively until data-availability time duration t has elapsed. However, other type of animation is possible as long as the animation can serve its purpose, i.e.: as long as it is effective to suggest the user to trigger his/her remote device to capture the information embedded in the movie.

In this description, numerous details have been set forth in order to provide a thorough understanding of the system. In other instances, well-known features have not been described in detail so as not to obscure the description of the system unnecessarily. A person skilled in the art will be able to practice the present invention in view of this description, which is to be taken as a whole. The specific embodiments as disclosed and illustrated herein are not to be considered in a limiting sense. Indeed, it should be readily apparent to those skilled in the art that what is described herein may be modified in numerous ways. Such ways can include equivalents to what is described herein.

The following claims define certain combinations and sub-combinations of elements, features, steps, and/or functions, which are regarded as novel and non-obvious. Additional claims for other combinations and sub-combinations may be presented in this or a related document.

Claims

1. A system where specific information embedded in movie frames can be captured in real-time by remote device via wireless data transmission signal. The system includes the following functions:
 - Information detector, which looks for the embedded data in image frames of a movie. When the embedded data is detected, it will pass the embedded data to the data extractor.
 - Data extractor, which function is to extract specific information from the embedded data. It will pass the specific information to RF transmitter.
 - RF transmitter, which broadcast the specific information via wireless data transmission signal.
 - Remote device, which is capable of capturing the specific information sent by RF transmitter.
2. The information detector of the system described in point 1 is connected to the source of the movie signal which is the video input to the electronic display, or to the video output of the electronic display.
3. The information detector of the system described in point 1 check every image frame of a movie stream to find a specific symbol/data pattern which identifies the embedded data. When such symbol/data pattern is found, the associated embedded information is retrieved and passed to the data extractor.
4. The movie scanned by the information detector described in point 1 shall contain visual sign to indicate the availability of embedded information. Therefore, the embedded information is available to be captured by remote device when viewer sees the visual sign. The visual sign is an animation or static symbol which is part of the movie.
5. The data extractor described in point 1 shall extract at least two information from the embedded information mentioned in point 2 and 3, which are
 - Data to be passed to remote device, and
 - Data-availability time durationData extractor shall send the extracted data to RF transmitter within data-availability time duration in real-time. Data extractor shall have real-time clock.
6. Remote device is capable to retrieve the information sent by RF transmitter when triggered by user or it can be configured to retrieve the information sent by RF transmitter in a periodical manner.