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Video Compression Using Gsm and Satellite Telemetry

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Abstract: - **Here we propose video compression using Global System for Mobile communications and Satellite Telemetry. Various devices exist that transmit videos and images through GSM network. Transmission through satellite telemetry like INMARSAT, INSAT is also done. Video compression using these technologies can help in speedy data transmission with little or no loss at the reception. These compression techniques will be useful to prevent excessive bandwidth consumption and optimal utility of current systems.**

***Keywords*: Compression, telemetry, gsm.**

I. INTRODUCTION

Data transmission is necessary for continued conversation. In large applications, this data consists of huge figures of several GB. Video can be considered as a series of still image frames; a typical video file contains of image, audio and metadata in addition to the file wrapper or container. Compression is reducing the number of bits required to store or transmit information. It removes the redundancy.

Video Compression allows the efficient utilization of bandwidth by reducing file size. Most video compression algorithms use lossy compression and combine spatial image compression and temporal motion compensation.

Lossy compression: The redundant bits are permanently removed with some loss of data. It has high compression ratio.

Factors that impact the final video file size are bitrate

1) Lossless compression: Lossless data compression algorithms usually exploit statistical redundancy to represent data without losing any information, so that the process is reversible.
2) Spatial (Intraframe) Compression: Compresses individual frames using earlier or later frames.
3) Temporal (Interframe) Compression: Uses current frame; compresses group of frames together by eliminating redundant visual data across multiple frames.

Below are the widely used compression techniques:

- MPEG-2 (DVD)
- JPEG 2000 (Digital Cinema)
- H.264 (Everything else)

compresses data, then sends it down a channel with two other streams of user data, each in its own time slot. It operates at either 900 MHz or 1800 MHz frequency band. GSM provides standard features like phone call encryption, data networking, caller ID, call forwarding, call waiting, SMS, and conferencing.

For practical and everyday purposes, GSM offers users and frame rate along with the combination of the format and codec used. The format may be MP4,AVI etc and the codec may be H.264, H.265, etc. The various formats have different applications but MP4 format with H.264 codec is the most commonly used. The MP4 format with H.264 codec provides optimum result (ie best combination of video quality with file size).

Video coding techniques provide efficient solutions to represent video data in a more compact and robust way so that the storage and transmission of video can be realized in less cost in terms of size, bandwidth and power consumption. ITU-T and ISO/IEC are the two main international organizations which decides the standards for video compressions.

- ISO/IEC MPEG/ standard includes MPEG-1, MPEG-2, MPEG-4, MPEG-4 Part 10 (AVC), MPEG-7, MPEG- 21 and M-JPEG.
- ITU-I VCEG standard includes H.26x series, H.261, H.263, and H.264.
- Currently, both VCEG and MPEG are launching their next-generation video coding project. This new generation

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aims to meet the new requirements future applications may impose on the video coding standard.
The entire compression and decompression process requires a codec consisting of a decoder and an encoder. The encoder compresses the data at a target bit rate for transmission or storage while the decoder decompresses the video signals to be viewed by the user. This whole process is shown in fig.1. In general decoding is considerably less complex than encoding. Due to this reason research and implementation efforts are more focused on encoding.

GSM is an open, digital cellular technology used for transmitting mobile voice and data services. GSM supports data transfer speeds of up to 9.6 kbit/s, allowing the transmission of basic data services such as SMS (Short Message Service). Another major benefit is its international roaming capability, allowing users to access the same services when travelling abroad as at home. This gives consumers seamless and same number connectivity in more than 210 countries. GSM satellite roaming has also extended service access to areas where terrestrial coverage is not available. wider international roaming capabilities than other US network technologies and can enable a cell phone to be a “world phone." What's more, things like easily swapping phones and using data while on a call is supported with GSM networks but not CDMA. GSM carriers have roaming contracts with other GSM carriers and typically cover rural areas more completely than competing CDMA carriers, and often without roaming charges.

Satellite telemetry offers a communication alternative for remote locations where phone lines or radio frequency systems are an impractical choice. Using satellite telemetry, communication is achieved by interfacing a datalogger to a satellite transmitter, which in turn transmits the data from the field site to a receiving station

II. PROPOSED WORK

The most common approach is to design a very large scale integration circuit for video compression. One can have function specific hardware, but due to the exploitation of the data flow of the algorithm processing capability of this approach may increase ten times compared to conventional microprocessors. Further, the complexities limitations of the circuit design may occur and restrict its implementation potential for growing multimedia applications. The key to achieve video compression performance is to reduce the amount of information about each frame that needs to be transmitted to allow the receiver to reconstruct that frame. Modern video compression techniques, such as those specified in the MPEG standards, do this by making the assumption that consecutive frames in a video sequence have largely overlapping fields of view and thus contain largely redundant data. Thus, the previous frame can be used to predict the appearance of the current frame. This assumption is often justified, since the rate at which a video camera moves is typically slow compared with the rate at which frames are captured. The GSM mobile network provides a package data transmission protocol and supports a data rate upto 9600 bps. As a result, it will not be possible to transmit such huge volume of multimedia data from client to server without any compression. The Intel Indeo R video 3.2 codec is employed to compress a video frame
Telemetry is an automated communications process by which measurements and other data are collected at remote or inaccessible points and transmitted to receiving equipment for monitoring. Systems that need external instructions and data to operate require the telecommand.
Many modern telemetry systems take advantage of the low cost and ubiquity of GSM networks by using SMS to receive and transmit telemetry data.

Satellite telemetry offers a communication alternative for remote locations where phone lines or radio frequency systems are an impractical choice. Using satellite telemetry, communication is achieved by interfacing a datalogger to a satellite transmitter, which in turn transmits the data from the field site to a receiving station.
Telemetry data is often not compressed at all. One rationale is that it is often several orders of magnitude less data than what is being generated by the payload (be it imagery, communications, or data from another type of instrument or sensor), and thus in the broad scheme of things not worth compressing. Telemetry is also often sent as a stream of data (rather than a file), which limits the types of compression schemes that could be used. One advantage of the invention is that the telemetry transmitter of a satellite may be used to transmit the video signals. By using the telemetry transmitter, the full operation of the switch architecture within the satellite need not be operational. This allows the solar panel, for example, to be observed during deployment. An advantage of the invention is that the video signal is compressed, thus allowing the signal to be transmitted without being a significant burden on the bandwidth of the telemetry signal. Another advantage of the invention is the use of commonly existing telemetry circuitry in a satellite.

III. METHODOLOGY

Success of this technique depends on the satellite’s ability to receive the radio signals from the of 19 kbytes(160 *120 8-bits) to around 1 kbyte(160*120 24-bits) with a compression ratio of about 19.The resulting compression frame can then be transmitted in about 1 second to the

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server system.For Audio signals Audio Codec is employed to give a data rate of 1 kb/s.(8khz,mono,8200 baud).

In one aspect of the invention, a video telemetry system for monitoring the deployment of an apparatus coupled to a satellite body includes a camera that produces a video signal. A video compressor is coupled to the camera and digitally compresses the video signal into a digitally compressed video signal. A modulator is coupled to the compressor for modulating the compressed video signal. An antenna and transmitter are coupled to the modulator for converting the compressed video signal into an RF video signal and transmitting the RF video signal to a ground station or other means for monitoring the signal, particularly during a deployment. In a further aspect of the invention, a method for observing an apparatus deployment on a satellite comprises the steps of: directing a camera to the apparatus; initiating the deployment of the apparatus; generating a video signal; compressing the video signal into a compressed video signal; modulating the compressed video signal; and converting the compressed video signal into an RF video signal; and transmitting the RF video signal. Researchers typically receive several locations each day, but this may decrease to several per week as the transmitter battery begins to expire. Such detailed information allows scientists to track telemetered animals daily and obtain clues about their behavior throughout migratory journeys.
The portable system for telemetry applications is a solution which gathers in a portable computer full functionalities and performances. Based on Data acquisition software, Portable Telemetry is an essential tool for the test engineer to run tests on site. Portable Telemetry system acquires, analyzes and visualizes data from PCM telemetry signal, whatever the format (IRIG, CCSDS, CE83). Portable Telemetry is defined in various configuration: laptop with PCMCIA cards, with PCI cards, or external USB modules. It provides all the functionality in the same working environment. transmitters. However, signals are not transmitted when the transmitter is underwater and cannot be received if the satellites are not within range. Each transmitter has a sensor that detects when the unit is above water and acts as the unit's "on/off" switch. Switching off while underwater preserves the battery by allowing transmissions only when the unit is above water and capable of communicating with satellites. Typically, a sea turtle's transmitter will be above water only when the turtle surfaces to breathe. This limitation is one of the main factors influencing the amount and accuracy of these positional data.
The distance between the transmitter and the satellites is calculated based on the transmitter signals, and the location of the transmitter on the ground is geometrically determined. Transmitters that have GPS receivers can collect more precise positional information than those derived from the radio frequencies alone. Transmitters can be equipped with additional sensors that measure depth, temperature, and light. Successful transmissions are relayed from the satellites to receiving stations on the ground where the data are processed and then provided daily to researchers via the internet.

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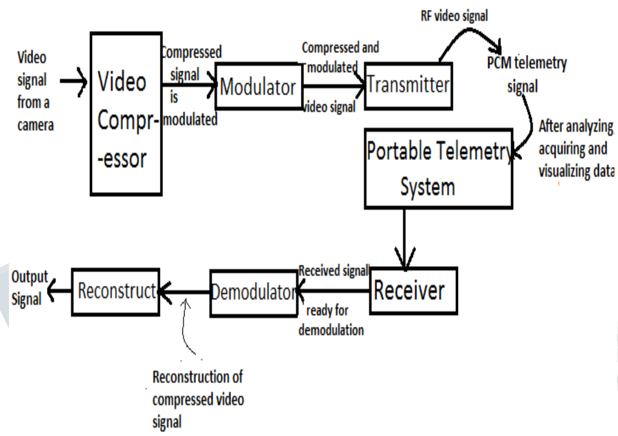

V. CONCLUSION

This paper proposes the possibility to use GSM and satellite telemetry for video compression. By making use of this we can reduce bandwidth requirements. Future work can include further optimization of compressing techniques

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