

# [Information the output of the embeddor is](https://assignbuster.com/information-the-output-of-the-embeddor-is/)

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Informationhiding technique is a new kind of secret communication technology. The majorityof today’s information hiding systems uses multimedia objects like audio. Embedding secret messages in digital sound is usually a more difficult process. Varieties of techniques for embedding information in digital audio have beenestablished.

In this paper we will attend the general principles of hidingsecret information using audio technology, and an overview of functions andtechniques. 1. Introduction The fast improvement ofthe Internet and the digital information revolution caused major changes in theoverall culture. Flexible and simple-to-use software and decreasing prices ofdigital devices (e.

g. portable CD and mp3players, DVD players, CD and DVDrecorders, laptops, PDAs) have made it feasible for consumers from all over theworld to create, edit and exchange multimedia data. Broadband Internet connectionsalmost an errorless transmission of data helps people to distribute largemultimedia files and make identical digital copies of them. In moderncommunication system Data Hiding is most essential for Network Security issue. Sending sensitive messages and files over the Internet are transmitted in anunsecured form but everyone has got something to keep in secret.

Audio datahiding method is one of the most effective ways to protect your privacy. 2. Overview General principles ofdata hiding technology, as well as terminology adopted at the FirstInternational Workshop on Information Hiding, Cambridge, U. K. 1 areillustrated in Figure 1. A data message is hidden within a cover signal(object) in the block called embeddor using a stego key, which is a secret setof parameters of a known hiding algorithm. The output of the embeddor is calledstego signal (object).

After transmission, recording, and other signalprocessing which may contaminate and bend the stego signal, the embeddedmessage is retrieved using the appropriate stego key in the block calledextractor 2. A number of differentcover objects (signals) can be used to carry hidden messages. Data hiding inaudio signals exploits imperfection of human auditory system known as audiomasking. In presence of a loud signal (masker), another weaker signal may beinaudible, depending on spectral and temporal characteristics of both maskedsignal and masker 3 Masking models are extensively studied for perceptualcompression of audio signals 2 In the case of perceptual compression thequantization noise is hidden below the masking threshold, while in a datahiding application the embedded signal is hidden there. Data hiding in audiosignals is especially challenging, because the human auditory system operatesover a wide dynamic range. The human auditory system perceives over a range ofpower greater than one billion to one and a range of frequencies greater thanone thousand to one. Sensitivity to additive random noise is also acute. Theperturbations in a sound file can be detected as low as one part in ten million(80 dB below ambient level).

However, there are some “ holes” available. Whilethe human auditory system has a large dynamic range, it has a fairly smalldifferential range. As a result, loud sounds tend to mask out quiet sounds.

Additionally, the human auditory system is unable to perceive absolute phase, only relative phase. Finally, there are some environmental distortions socommon as to be ignored by the listener in most cases 4. Now we will discussmany of these methods of audio data hiding technology. 3.

Previousworks This section presentssome common methods used for hiding secret information in audio. Many softwareimplementations of these methods are available on the Web and are listed in therelatives section. Some of the latter methods require previous knowledge ofsignal processing techniques, Fourier analysis, and other areas of high levelmathematics. When developing a data-hiding method for audio, one of the firstconsiderations is the likely environments the sound signal will travel betweenencoding and decoding. There are two main areas of modification which we willconsider.

First, the storage environment, or digital representation of thesignal that will be used, and second the transmission pathway the signal mighttravel 4. 3. 1. Paritycoding One of the prior worksin audio data hiding technique is parity coding technique. Instead of breakinga signal down into individual samples, the parity coding method breaks a signaldown into separate regions of samples and encodes each bit from the secretmessage in a sample region’s parity bit.

If the parity bit of a selected regiondoes not match the secret bit to be encoded, the process flips the LSB of oneof the samples in the region. Thus, the sender has more of a choice in encodingthe secret bit, and the signal can be changed in a more unobtrusive fashion5. Figure 2, shows the parity coding procedure.

3. 2. Phase Coding The phase coding methodworks by substituting the phase of an initial audio segment with a referencephase that represents the data. The phase of subsequent segments is adjusted inorder to preserve the relative phase between segments. Phase coding, when itcan be used, is one of the most effective coding methods in terms of thesignal-to perceived noise ratio. When the phase relation between each frequencycomponent is dramatically changed, noticeable phase dispersion will occur. However, as long as the modification of the phase is sufficiently small (sufficientlysmall depends on the observer; professionals in broadcast radio can detectmodifications that are unperceivable to an average observer), an inaudiblecoding can be achieved 4. .

Phase coding relies on the fact that the phasecomponents of sound are not as perceptible to the human ear as noise is. Ratherthan introducing perturbations, the technique encodes the message bits as phaseshifts in the phase spectrum of a digital signal, achieving an inaudibleencoding in terms of signal-to-perceived noise ratio 5. Phase coding isexplained in the following procedure: a.

The original sound signal is broken upinto smaller segments whose lengths equal the size of the message to beencoded. b.    A Discrete Fourier Transform (DFT) isapplied to each segment to create a matrix of the phases and Fourier transformmagnitudes.

c.     Phasedifferences between adjacent segments are calculated.  d.    Phase shifts between consecutivesegments are easily detected. In other words, the absolute phases of thesegments can be changed but the relative phase differences Spread Spectrum In a normalcommunication channel, it is often desirable to concentrate the information inas narrow a region of the frequency spectrum as possible in order to conserveavailable bandwidth and to reduce power. The basic spread spectrum technique, on the other hand, is designed to encode a stream of information by spreadingthe encoded data across as much of the frequency spectrum as possible. Thisallows the signal reception, even if there is interference on some frequencies. While there are many variations on spread spectrum communication, weconcentrated on Direct Sequence Spread Spectrum encoding (DSSS).

The DSSSmethod spreads the signal by multiplying it by a chip, a maximal lengthpseudorandom sequence modulated at a known rate. Since the host signals are indiscrete-time format, we can use the sampling rate as the chip rate for coding. The result is that the most difficult problem in DSSS receiving, that ofestablishing the correct start and end of the chip quanta for phase lockingpurposes, is taken care of by the discrete nature of the signal. Consequently, a much higher chiprate, and therefore a higher associated data rate, is possible. Without this, avariety of signal locking algorithms may be used, but these are computationallyexpensive 4. Procedure: In DSSS, akey is needed to encode the information and the same key is needed to decodeit.

The key is pseudorandom noise that ideally has flat frequency response overthe frequency range, i. e., white noise. The key is applied to the coded informationto modulate the sequence into a spread spectrum sequence. The DSSS method: Thecode is multiplied by the carrier wave and the pseudorandom noise sequence, which has a wide frequency spectrum. As a consequence, the spectrum of the datais spread over the available band.

Then, the spread data sequence is attenuatedand added to the original file as additive random noise (see Figure 4). DSSSemploys bi-phase shift keying since the phase of the signal alternates eachtime the modulated code alternates (see Figure 5). For decoding, phase valuesf0 and f0 + p are interpreted as a “ 0” or a “ 1,” which is a coded binary string4.

Spread Spectrum is shown in Figure 5. In the decoding stage, thefollowing is assumed: a.     The pseudorandom key is maximal (it hasas many combinations as possible and does not repeat for as long as possible). Consequently it has a relatively flat frequency spectrum.  b.

The key stream for the encoding is knownby the receiver. Signal synchronization is done, and the start/stop point ofthe spread data is known.  c.     The following parameters are known bythe receiver: chip rate, data rate, and carrier frequency.  3. 4. EchoHiding In echo hiding, information is embedded in a sound file by introducing an echo into thediscrete signal. Like the spread spectrum method, it too provides advantages inthat it allows for a high data transmission rate and provides superiorrobustness when compared to the noise inducing methods.

If only one echo wasproduced from the original signal, only one bit of information could beencoded. Therefore, the original signal is broken down into blocks,  before the encodingprocess begins. Once the encoding process is completed, the blocks areconcatenated back together to create the final signal 5. Echo Hiding is shownin Figure 6. Also, a message can beencoded using musical tones with a substitution scheme.

For example, a Fistonewill represent a 0 and a C tone represents a 1. A normal musical piece can nowbe composed around the secret message or an existing piece can be selectedtogether with an encoding scheme that will represent a message 7, 8.   4. Proposed work Here we will discussthe disadvantages of the previous procedure and how those are different withpresent method. There are two main disadvantages associated with the use ofmethods like parity coding. The human ear is very sensitive and can oftendetect even the slightest bit of noise introduced into a sound file, althoughthe parity coding method does comemuch closer to making the introduced noise inaudible.

Another problem isrobustness. One disadvantage associated with phase coding is a low datatransmission rate due to the fact that the secret message is encoded in thefirst signal segment only. Phase coding method is used when only a small amountof data needs to be considered. Least significant bit(LSB) coding is the simplest way to embed information in a digital audio file. By substituting the least significant bit of each sampling point with a binarymessage, LSB coding allows for a large amount of data to be encoded. Among manydifferent data hiding techniques proposed to embed secret message within audiofile, the LSB data hiding technique is one of the simplest methods forinserting data into digital signals in noise free environments, which merelyembeds secret message-bits in a subset of the LSB planes of the audio stream. The following steps are: a.

Receivesthe audio file in the form of bytes and converted in to bit pattern.  b.    Eachcharacter in the message is converted in bit pattern.  c.     Replacesthe LSB bit from audio with LSB bit from character in the message.  This proposed system isto provide a good, efficient method for hiding the data from hackers and sentto the destination in a safe manner. This proposed system will not change thesize of the file even after encoding and also suitable for any type of audiofile format. Encryption and Decryption techniques have been used to make thesecurity system robust.

Low-bit encoding embedssecret data into the least significant bit (LSB) of the audio file. The channelcapacity is 1KB per second per kilohertz (44 kbps for a 44 KHz sampledsequence). This method is easy to incorporate.

5. Applications Audio data hiding canbe used anytime you want to hide data. There are many reasons to hide data butmost important is to prevent unauthorized persons from becoming aware of theexistence of a message. In the business world Audio data hiding can be used tohide a secret chemical formula or plans for a new invention. Audio data hidingcan also be used in corporate world. Audio data hiding canalso be used in the noncommercial sector to hide information that someone wantsto keep private.

Terrorists can also use Audio data hiding to keep theircommunications secret and to coordinate attacks. In the project ARTUS1 whichaims to embed animation parameters into audio and video contents 10. Datahiding in video and audio, is of interest for the protection of copyrighteddigital media, and to the government for information systems security and for covertcommunications. It can also be used in forensic applications for insertinghidden data into audio files for the authentication of spoken words and othersounds, and in the music business for the monitoring of the songs overbroadcast radio. 6. ConclusionIn this paper we haveintroduced a robust method of imperceptible audio data hiding. This system isto provide a good, efficient method for hiding the data from hackers and sentto the destination in a safe manner. This proposed system will not change thesize of the file even after encoding and also suitable for any type of audiofile format.

Thus we conclude that audio data hiding techniques can be used fora number of purposes other than covert communication or deniable data storage , information tracing and finger printing, tamper detection. As the sky is notlimit so is not for the development. Man is now pushing away its own boundariesto make every thought possible. So similarly these operations described abovecan be further modified as it is in the world of Information Technology. After designing any operation every developer has athought in his mind that he could develop it by adding more features to it.