

STEGANOGRAPHY

The practice of concealing messages or information within other non-secret text or data.

Welcome

- Who am I?
 - Jonathan A Burt BSc Cert Mgmt HND FIAP IEng MBCS CITP
 - Bachelor of Science Degree (Open)
 - Professional Certificate in Management
 - Higher National Diploma in Computing
 - Fellow of the Institute of Analysts and Programmers
 - Incorporated Engineer with the Engineering Council
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 - Chartered IT Professional
 - 25+ years experience of working in IT.
 - Long time member of the Isle of Wight PC User Group!



Important!

- I cannot guarantee that all of the programs discussed are safe, and they are used at your own risk. I recommend that you investigate options based on your needs before using any software.
- Encryption is not fool-proof, and can failed. So always have backups of important data.
- Digital files which utilise Steganography can fail to reproduce the original message (if any) if they are edited, cropped, etc.
- Don't do anything illegal! 😊

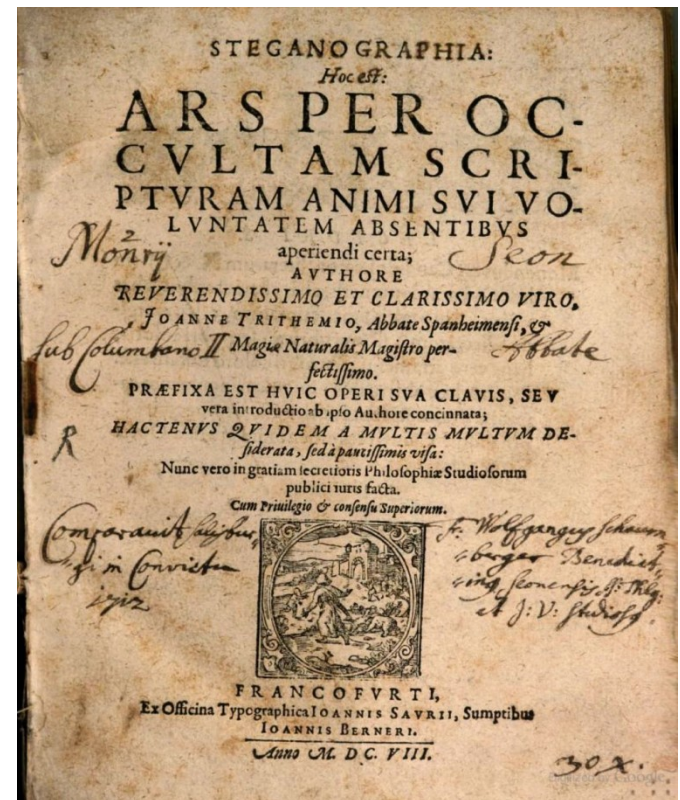


What is Steganography?

- Steganography is the practice of concealing information in plain sight, within other types of information.
 - For example, concealing a file, message, image, or video within another file, message, image, or video.
- The word *steganography* combines the Greek words *steganos* (στεγανός), meaning "covered, concealed, or protected", and *graphein* (γράφειν) meaning "writing".

First use of the term Steganography

- The first recorded use of the term was in 1499 by Johannes Trithemius in his book *Steganographia*, a treatise on cryptography and steganography.



First known use

- The first recorded uses of steganography can be traced back to 440 BC when Herodotus mentions two examples in his Histories:
 - Demaratus sent a warning about a forthcoming attack to Greece by writing it directly on the wooden backing of a wax tablet before applying its beeswax surface. Wax tablets were in common use then as reusable writing surfaces.



First known use

- Herodotus also tells the story of a message tattooed on the shaved head of a slave of Histiaeus, hidden by the hair that afterwards grew over it, and exposed by shaving the head. The message allegedly carried a warning to Greece about Persian invasion plans.
- This method has obvious drawbacks, such as delayed transmission while waiting for the slave's hair to grow, and restrictions on the number and size of messages that can be encoded on one person's scalp.



Known uses during WWII

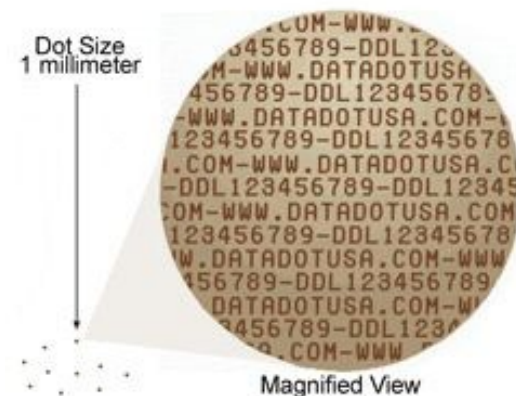
- During World War II, the French Resistance sent some messages written on the backs of couriers in invisible ink.
- Hidden messages on paper written in secret/invisible inks, under other messages or on the blank parts of other messages.
- Messages written on envelopes in the area covered by postage stamps.

Known uses during WWII

- Messages written in Morse code on yarn and then knitted into a piece of clothing worn by a courier.
- In occupied Belgium MI6 employed old ladies who sat in their houses that happened to have windows that overlooked railway marshalling yards and they would do their knitting and they'd drop one for a troop train, purl one for an artillery train and so on and so on.

Known uses during WWII

- Espionage agents used photographically produced microdots to send information back and forth.
 - Microdots were typically minute (less than the size of the full-stop produced by a typewriter).
 - World War II microdots were embedded in the paper and covered with an adhesive, such as collodion (this was reflective, and thus detectable by viewing against glancing light).
 - Alternative techniques included inserting microdots into slits cut into the edge of post cards.



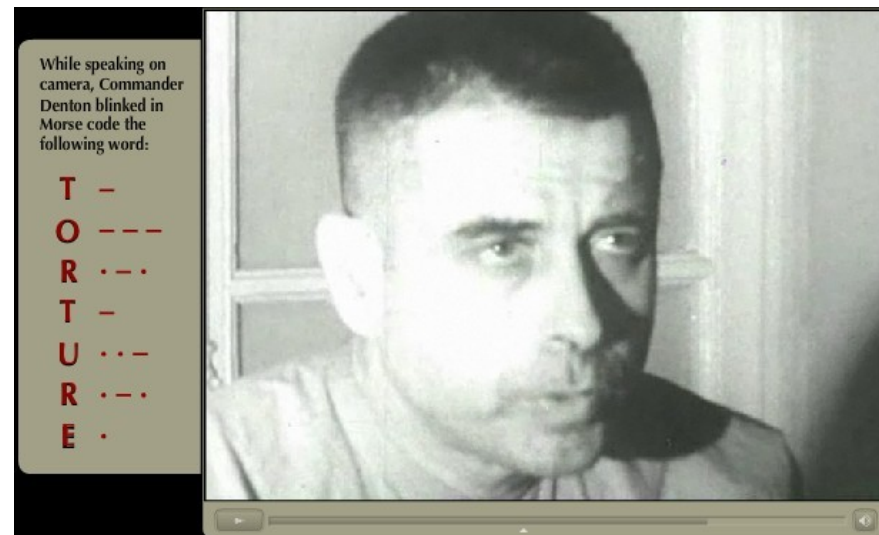
Known uses during WWII

- Velvalee Dickinson, a spy for Japan in New York City, sent information about US Naval Forces to accommodation addresses in neutral South America.
 - She was a dealer in dolls, and her letters discussed the quantity and type of doll to ship.
 - The stegotext was the doll orders, while the concealed "plaintext" was itself encoded and gave information about ship movements, etc.
 - Her case became somewhat famous and she became known as the Doll Woman.



Known uses during the Vietnam war

- Jeremiah Denton repeatedly blinked his eyes in Morse Code during the 1966 televised press conference that he was forced into as an American PoW by his North Vietnamese captors, spelling out "T-O-R-T-U-R-E". This confirmed for the first time to the U.S. Military (naval intelligence) and Americans that the North Vietnamese were torturing American POWs.



Cold War counter-propaganda

- In 1968, crew members of the USS Pueblo intelligence ship held as prisoners by North Korea, communicated in sign language during staged photo opportunities, informing the United States they were not defectors, but captives of the North Koreans.
- In other photos presented to the US, crew members gave "the finger" to the unsuspecting North Koreans, in an attempt to discredit photos that showed them smiling and comfortable.



The North Koreans are having a hard time proving to the world that the captive crewmen of the U.S.S. Pueblo are a contrite and cooperative lot. Last week Pyongyang's flacks tried again—and lost

to the U.S. Navy. In this class-reunion picture, three of the crewmen have managed to use the medium for a message, furtively getting off the U.S. hand signal of obscene derisiveness and contempt.

Modern Times

- Modern steganography entered the world in 1985 with the advent of personal computers being applied to classical steganography problems.
- Development following that was very slow, but has since taken off, going by the large number of steganography software available.
- A lot of steganography tools also use encryption. Thus offering double-protection.

Digital Watermarking

- A digital watermark is a kind of marker covertly embedded in a noise-tolerant document such as an audio, video or image data.
- It is typically used to identify ownership of the copyright of such document.
- Digital watermarks may be used to verify the authenticity or integrity of the carrier signal or to show the identity of its owners. It is prominently used for tracing copyright infringements.

Null Cipher Example

- One common, almost obvious, form of steganography is called a null cipher. Consider this cablegram that was sent by a German spy from the U.S. to Europe during World War I:
 - Apparently neutral's protest is thoroughly discounted and ignored. Isman hard hit. Blockade issue affects pretext for embargo on by products, ejecting suets and vegetable oils.
- Taking the second letter in each word the following message emerges:
 - Pershing sails from NY June 1.

Template Example

- Another form of steganography uses a template (e.g., a piece of paper with holes cut in it) or a set of preselected locations on the page to hide a message.
 - THE MOST COMMON WORK ANIMAL IS THE HORSE. THEY CAN BE USED TO FERRY EQUIPMENT TO AND FROM WORKERS OR TO PULL A PLOW. BE CAREFUL, THOUGH, BECAUSE SOME HAVE SANK UP TO THEIR KNEES IN MUD OR SAND, SUCH AS AN INCIDENT AT THE BURLINGTON FACTORY LAST YEAR. BUT HORSES REMAIN A SIGNIFICANT FIND. ON A FARM, AN ALTERNATE WORK ANIMAL MIGHT BE A BURRO BUT THEY ARE NOT AS COMFORTABLE AS A TRANSPORT ANIMAL.

HTML Example

- Hidden text on websites!
 - You can hide text on a webpage via a couple of different means:
 - Use the ` ` command to set the colour of Text to the same colour as the page background.
 - Use the `<!-- -->` command to place a comment (message) in a web page which isn't displayed.
- This is not a secure way of hiding data, as the data can be easily seen by right-clicking and select View source.

Steganography Tools Examples

- Our Secret
 - <http://securekit.net/>
- mp3stegz
 - <https://sourceforge.net/projects/mp3stegz/>
- DeEgger Embedder
 - <http://www.zasi.org/DeEgger-Embedder.php>
- Alamoan Watermark
 - <http://alamoon.com/watermark-editor.html>



Further Information

- Information Hiding: Steganography & Digital Watermarking, by Neil F. Johnson Ph.D.
 - <http://www.jjtc.com/Steganography/>
- Steganography, by Wikipedia
 - <https://en.wikipedia.org/wiki/Steganography>
- Digital Watermarking, by Wikipedia
 - https://en.wikipedia.org/wiki/Digital_watermarking



Questions?

Does anyone have any questions?

