

# **Configuration Manual**

MSc Academic Cyber Security

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#### National College of Ireland Project Submission Sheet School of Computing



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# **1. Introduction**

This configuration manual consists of an article about the whole proposed prototype that has been executed using different tools and applications. The proposed method of securing confidential data using Dual Image Steganography with Huffman Parity Coding uses 256bits Advanced Encryption System in order to convert the plain text to ciphertext, to hide the secret data (ciphertext) in an image will be used in order to convert it into a stego image and then the Haar Discrete Wavelet Transformation (HDWT) will be applied on that Stego Image and then for the integrity of the data Huffman Parity coding will be applied. This whole implementation will be implemented on MATLAB R2020a. Then Dual Image Steganography is performed using Ubuntu Linux and Python 2.7.

## 2. System Configuration

## 2.1. Hardware Configuration

- Operating System: Windows 10
- Processor: i5 9<sup>th</sup> Gen
- System: 64 bits
- Hard Drive: 1TB
- RAM: 16 GB

## 2.2. Software Configuration

This table below describes all the tools and applications that we have used for building the prototype.

Tools	Version	Description
MATLAB	R2020a Update 4	MATLAB is a programming language and an application used for Image processing and other technical computing. Some other tools have been used for Steganography.
		<ul> <li>Wavelet Toolbox V5.4</li> <li>Communication Toolbox V9.10</li> <li>Image Processing Toolbox V11.1</li> </ul>
Linux Ubuntu	18.04.5 LTS	For performing the use of Python.

Python	V2.7	Python	v2.7	is	used	to
		perform	D	ual	Ima	age
		Steganog	graphy	•		

#### **Table 1: Applications**

- 1. https://uk.mathworks.com/downloads/
- 2. https://ubuntu.com/download/desktop
- 3. https://www.python.org/download/releases/2.7/

# 3. Configuration

This manual includes step by step procedures and methods in order to install and configure necessary applications and tools for the prototype that is proposed.

**Installation of Software's** 

> Download MATLAB form MATLAB's official site

https://uk.mathworks.com/downloads/



MATLAB requires a subscription to be paid, but they also give a 30-days free trial to users.

> Download other tools and add-ons that are required to run Steganography.

📣 Add-On I	Manager				
Installed	Updates			Ge	t Add-Ons
					Q
	Name	Туре	Author	Install Date 🔻	
Trial	Wavelet Toolbox version 5.4 (21 days remaining on trial)	📣 MathWorks Toolbox		7 August 2020	I
Trial	DSP System Toolbox version 9.10 (21 days remaining on trial)	📣 MathWorks Toolbox		7 August 2020	1
Trial	Communications Toolbox version 7.3 (21 days remaining on trial)	📣 MathWorks Toolbox		7 August 2020	I.
Trial 74	Statistics and Machine Learning Toolbox version 11.7 (21 days remaining on trial)	📣 MathWorks Toolbox		7 August 2020	I
Trial	Signal Processing Toolbox version 8.4 (21 days remaining on trial)	📣 MathWorks Toolbox		7 August 2020	1
Trial	Parallel Computing Toolbox version 7.2 (21 days remaining on trial)	A MathWorks Toolbox		7 August 2020	1
Trial	Mapping Toolbox version 4.10 (21 days remaining on trial)	📣 MathWorks Toolbox		7 August 2020	I
Trial	Image Processing Toolbox version 11.1 (21 days remaining on trial)	📣 MathWorks Toolbox		7 August 2020	I
Trial	Image Acquisition Toolbox version 6.2 (21 days remaining on trial)	A MathWorks Toolbox		7 August 2020	1
Trial	Computer Vision Toolbox version 9.2 (21 days remaining on trial)	A MathWorks Toolbox		7 August 2020	1

Wavelet Toolbox, Communication Toolbox, Image Processing Toolbox are some of the toolboxes that are required to run the steganography prototype.

CAN®NICAL							Р	roducts ~
ubuntu®	Enterprise	~ Deve	eloper ~ C	ommunity ~	Download	~	Search	Q
Downloads	Overview	Cloud	IoT Raspberr	y Pi Server	Desktop	Alternative downloa	ds Ubuntu flav	/ours
Down	noad		untu	Deski	lop			
Ubuntu	20.04	1.1 LT	S					
Download the la	atest LTS vers	ion of Ubu	ntu. for deskto	p PCs and lapt	ODS, LTS		Developed	
stands for long-	term support	- which r	neans five year	s, until April 20	025, of free		Download	
Libustu 20.0412	ricenance up	has 🖉	anteed.			For other versi	ons of Ubuntu Des	sktop
Decementaria	is release no					list of local mir	rors, and past rele	ases see
Recommended	systemiequi	rements.				our alternative	downloads.	
<ul> <li>2 GHz dual</li> <li>better</li> </ul>	core process	огог	Intern	et access is he	lpful			
<ul> <li>4 GB system</li> </ul>	n memory		<ul> <li>Either</li> <li>for the</li> </ul>	a DVD drive o e installer med	r a USB port lia			
25 GB of free	ee hard drive	space						
				6				

Ubuntu Linux can be run on the host machine using dual boot configuration or using a Virtual Machine.

### Download This is a production release. Please report any bugs you encounter. We currently support these formats for download: Gzipped source tar ball (2.7.0) (sig) Bzipped source tar ball (2.7.0) (sig) • Windows x86 MSI Installer (2.7.0) (sig) Windows X86-64 MSI Installer (2.7.0) [1] (sig) Mac Installer disk image (2.7.0) for OS X 10.5 and later (sig). It contains code for PPC, i386, and x86-64. • 32-bit Mac Installer disk image (2.7.0) for OS X 10.3 and later (sig). · Windows help file (sig) The source tarballs are signed with Benjamin Peterson's key (fingerprint: 12EF 3DC3 8047 DA38 2D18 A5B9 99CD EA9D A413 5B38). The Windows installer was signed by Martin von Löwis' public key, which has a key id of 7D9DC8D2. The Mac installers were signed with Ronald Oussoren's key, which has a key id of E6DF025C. The public keys are located on the download page. MD5 checksums and sizes of the released files: 35f56b092ecf39a6bd59d64f142aae0f 14026384 Python-2.7.tgz 0e8c9ec32abf5b732bea7d91b38c3339 11735195 Python-2.7.tar.bz2 bd0dc174cbefbc37064ea81db1f669b7 16247296 python-2.7.amd64.msi 1719febcbc0e0af3a6d3a47ba5fbf851 15913472 python-2.7.msi 759077d3763134b3272f0e04ea082bd9 21420655 python-2.7-macosx10.3.dmg bb3d6f1e300da7fbc2730f1af9317d99 21509961 python-2.7-macosx10.5.dmg 575156d33dc71b6581865a374f5c7ad2 5754439 python27.chm

Python 2.7 is used for Dual Image Steganography.



In order to run the Dual Image Steganography module. We will have to install two packages known as "Click and Image."

File Edit View Search Terminal Help elliot@ubuntu:~/Documents/steganography-master\$ python steganography.py merge --img1=res/img1.jpg --img2=res/img2.jpg --output=res/output.png

Using the above python code, two images known as plain image and cover image can be merged in order to create a Dual Image Steganography.

elliot@ubuntu: ~/Documents/steganography-master

# 4. Working

1. The First Step is to convert the plaintext into ciphertext using 256-bits Advanced Encryption System.



2. The next step is to embed the secret of the data into the plain image in order to convert the plain image into a stego. Along with that, the Hiding Capacity, Peak to Signal Ratio (PSNR) value, and Mean-Square Value is also calculated. This can be done for both Single Image Steganography and Dual Image Steganography as well.



3. Then, apply Haar Discrete Wavelet Transformation (HDWT) on both Single Image Steganography and Dual Image Steganography.



4. The next step is to apply Haar Discrete Wavelet in order to maintain the integrity of the secret data inside the image. Applies for both Single Image Steganography and Dual Image Steganography as well. The Variance, Average Length, Entropy, and Efficiency is also calculated.



2. City (Dual Image Steganography – embedded with Skyscrapers image –, please refer my report)



5. Once the entire process is done, the embedded data, which is a ciphertext, is then extracted from the stego image for Single and Dual Image Steganography as well.

	Data Extraction (Receiver Side)					
	Extracted Data (AES encrypted)					
Browse the image from which you want to extract the Data Browse Stego image	accihbidjipocoxed cifedocococor (hgbxxaccihbidjipocoxed cifedocococorg) fa foxa ccihbidjipocoxed cifedocococorg) fa foxac difabeghocococed cifedocococorg) fa foxa accihbidjipocoxed e (pitoxocococ) (fogdoxaccihbidjipocococg) gabgipocococor (fogbx xaccihbidjipococog) gabgipocococor (fogboxacd fabeghocococg) gabgipocococor gbxxacd fabeghocococed (cifedocococor) (cifedocococ) xox (cgddoxaicbiage feocococed cifedocococor) xox (cgddoxaicbiage feocococed cifedocococor) xococ (fogb					
Enter the button below to extract data from Stein Image	Decrypt Data           Binary Text:           1           1           1           0           0           1           1           1           1           1           1           1           0           1           1           1           1           1           0           1           1           1           1           1           0           1					
Extract Data	0 1 0 1 1 0 0 0 0 0 1 0 1 1 0 1 0 0 0 0					
LAttact Data	Binary to Text Conve					
	Original Message :					
	Hello World!					

6. Here is the MATLAB path of the prototype.

