

UNIVERSITY OF FLORENCE

Faculty of Engineering

Master degree program in
COMPUTER ENGINEERING

Disparity coherent stereo video watermarking

Master Thesis of

Benedetta Barbetti, Michaela Servi

December 2015

Supervisor:

Prof. Alessandro Piva

Advisors:

Prof. Carlo Colombo
Dott. Pasquale Ferrara

Academic Year 2014/2015

Abstract

Contents

Introduction	1
1 Stereoscopic Video	4
Oris Model Rewards	4
3 Stereoscopic video watermarking: state of art	3
3.1 State of art	3
4 Disparity-coherent watermarking in the spatial domain	4
5 Disparity-coherent watermarking in the Fourier domain	5
6 Conclusions	6
Bibliografia	7

List of Figures

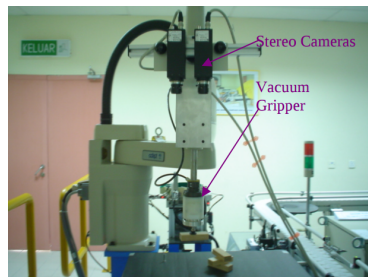
1	Stereoscopy in medical and industrial field	1
2	Stereoscopy application's fields	2
3	Stereoscopy in 3D video games	2

List of Tables

Introduction

In the last few years the stereoscopic technique has become a great part of the image and video processing.

In medical diagnosis and endoscopic surgery, fault detection in manufactory industry, army and arts multiview imaging is considered as a key enabler for professional added value services.



(a) In bin picking applications stereo vision helps to reconstruct the 3D environment and detect the part of the object to be robotically picked

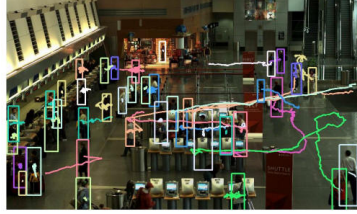


(b) Surgical robot *Da Vinci* is provided with a stereoscopic camera that allows a tridimensional view of the operative field.

Figure 1: Stereoscopy in medical and industrial field

Nowdays stereoscopic techniques are also used in people tracking and mobile robotics navigation for economic reasons and to improve performances.

Finally the worldwide success of movie releases and 3D video games and the deployment of 3D televisions made the nonprofessional user aware about



(a) In people tracking application stereo vision improves segmentation thanks to depth information and it's less sensible to light changes.



(b) In mobile robotics navigation stereo vision has become the first choice technology because it provides a lot of quality data for low costs.

Figure 2: Stereoscopy application's fields

a new type of multimedia entertainment experience.



(a) Stereo video frames, left and right.



(b) Overlap of the two frames.



(c) 3D view with specific glasses



(d) Polarized glasses for 3D view

Figure 3: Stereoscopy in 3D video games

The increase of production and distribution of these contents leads to the concerns over content copyright protection.

Digital watermarking can be considered as the most flexible property right protection technology, since it adds some information (a mark, i.e. copyright information) in the original content without altering its visual quality so that such a marked content can be further distributed/consumed by an-

other user without any restriction; still, the legitimate/illegitimate usage can be determined at any moment by detecting the mark. In same case the watermarking protection mechanism, instead of restricting the media copy/distribution/consumption, provides means for tracking the source of the content illegitimate usage.

Chapter 1

Stereoscopic Video

cao

Chapter 4

Disparity-coherent watermarking in the spatial domain

Chapter 5

Disparity-coherent watermarking in the Fourier domain

Chapter 6

Conclusions

Bibliography

- [1] Richard Hartley and Andrew Zisserman. Multiple View Geometry in Computer Vision, Cambridge University Press, 2000.
- [2] Lens Blur in the new Google Camera app
[http://googleresearch.blogspot.it/2014/04/
lens-blur-in-new-google-camera-app.html](http://googleresearch.blogspot.it/2014/04/lens-blur-in-new-google-camera-app.html)