

# 國立交通大學

電子工程學系電子研究所碩士班

## 碩士論文

H.264 基線解調器之數位訊號處理平台實現以及  
四分域為基礎的抗錯與錯誤修補演算法



**H.264 Baseline Decoder Implementation and  
Quadro-Field Based Error Resilience and Error  
Concealment Techniques**

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中華民國九十四年九月

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## 摘要

在本文中，我們針對 H.264 視訊編碼的解調端實現在數位訊號處理平台上面，以及以四分域為基礎提出了新的錯誤抵抗與錯誤修補的技術。H.264 是 ITU-T 提出的一種新的影像編碼標準，主要是利用一些新加入的特徵以及功能，可以達到高壓縮率的效果。但是因為如此，所以會增加一些運算的時間以及複雜度。所以在本文中，我們有利用 CCS 來針對 H.264 基線的解調器作複雜度的分析，以及把 H.264 基線解調器有效率的實現在數位訊號處理平台上面。除此之外，因為現在無線網路傳輸的頻寬有限，而且變動很大，所以我們也提出了四分域的編碼方式，可以使得在解調後處理更加容易。在此編碼方式中，我們也提出了三種編碼的架構。為了減低彼此間的關連性，所以我們採用了其中關聯性以及壓縮率都可以接受的架構，並且也針對不同的錯誤情形做修補的討論。

# **H.264 Baseline Decoder Implementation and Quadro-Field Based Error Resilience and Error Concealment Techniques**

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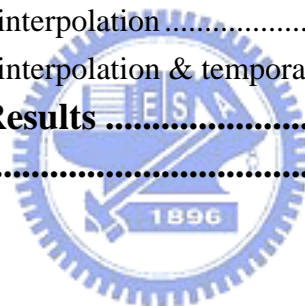
## **Abstract**

In this thesis, we implement the H.264/AVC Baseline decoder on a DSP board and propose a new Quadro-Field Based Error Resilience and Error Concealment Technique. H.264 is ITU-T's new video coding standard. H.264/AVC provides high coding efficiency through added new features and functionalities. These new features and functionalities will directly affect the cost of an H.264/AVC system. In this paper, we use Code Composer Studio (C.C.S) which is a DSP code environment provided by Texas Instruments to profile H.264/AVC computation complexity. Besides, in wireless communications, bandwidth is limited and varying. Here, we propose a Quadro-Field based coding technique and three prediction modes to deal with the error resilience problem and the error concealment problem.

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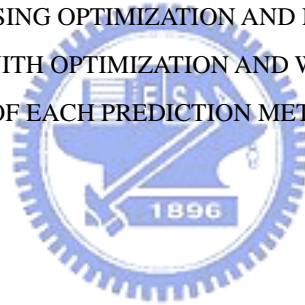
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# Chapter 1 Introduction

H.264/AVC video coding is a high coding efficiency video coding standard [1]. Although H.264/AVC is still based on block-based motion compensation and transform coding framework, it provides high coding efficiency through added new features and functionalities. These new features and functionalities will directly affect the cost of an H.264/AVC system. On the other hand, the demand for multimedia services over internet is steadily increasing, especially in wireless communication. In wireless communications, bandwidth is limited and varying. In order to improve the video quality, a robust error resilient video coding scheme is in need.

In this paper, we implement an H.264/AVC baseline decoder on the Video Parallel Programmable Platform (VP<sup>3</sup>) DSP board, and proposed a Quadro-Field based error resilience and error concealment technique. In Chapter 3, we introduce the VP<sup>3</sup> and the DSP TMS320DM642. Then in Chapter 4, we use Code Composer Studio (C.C.S), which is a DSP code environment provided by Texas Instruments to profile H.264/AVC computation complexity and use some optimization techniques specific to TMS320DM642 to accelerate our H.264/AVC decoder. We also implement the H.264/AVC decoder over two DSPs.

In Chapter 5, we proposed a Quadro-Field based coding technique and three prediction modes. The corresponding error concealment method for each Quadro-Field will be discussed. At the end of this thesis, conclusions are to be given.