

## **2004 TAIWAN INTERNATIONAL SCIENCE FAIR**

**CATEGORY : Computer Science**

**PROJECT : Digital Video Compression  
Enhancement With Reduced  
Psychovisual Redundancy**

**AWARDS : Computer Science Second Award**

**SCHOOL : Smjk Chung Ling Penang**

**FINALISTS : Chin Wooi Meng**

**COUNTRY : Malaysia**

# DIGITAL VIDEO COMPRESSION ENHANCEMENT WITH REDUCED PSYCHOVISUAL REDUNDANCY

CHIN WOOL MING

Video compression is indispensable to web streaming and memory storage. Most video compression technology has difficulty to achieve high quality video at lower bit rates. Apparently, limited transmission bandwidth and network resources often degrade video signals. Thus the goal of my research was to enhance video compression performance and to improve visual quality. It is hypothesized that the reduction in neighboring pixels coding, and humans perceptual mechanisms (psychovisual) redundancy could produce a low-complexity geometry streams for animated visual objects. A set of algorithms is developed to parse bidirectional interpolation pixels into their characteristic cells, which vary in spectral energy and wavelength. The bits contained in these cells are vectorized and transformed recursively to identify lower correlations among vector arrays for blocks filtering. DCT function calculates energy ratios between high spatial frequency and low spatial frequency, to devote most of the highest spatial frequency bits with the calculated energy ratios. A variable quantization method is used to measure the sensitivity of colors and its intensity ratios to restore any missing high spatial frequency pixels, presented in mathematical intrinsic. This approach leads to the ability to compress video data that normally require a large amount of memory to store and high bandwidth to transmit. Results from the enhanced video compression experiment have attained 0.1bpp (256kbps, 25fps) without noticeable effects comparable to the video compression technique that achieved 0.5bpp (1.5Mbps, 25fps) in use today.