Multimedia Technologies – Summative Assignment

This assignment gives you an opportunity to analyse practical multimedia technologies based on what you have learnt in this module. Level 3 students should complete questions 1-5 [total 100 marks]. Level 4 students should complete questions 1-6 [total 150 marks]. You should submit your work as a pdf file.

Essential background reading

In additional to the lecture materials, you should also study the following references:

- [**Ref: MP3**, for ALL students] D. Pan, "Digital Audio Compression", *Digital Technical Journal*, vol. 5, no. 2, pp. 28-40, 1993, OR Chapter 14 of the textbook "*Fundamentals of Multimedia*".
- [**Ref: SVC**, for Level 4 students] H. Schwarz, M. Wien, "The scalable video coding extension of the H.264/AVC standard", *IEEE Signal Processing Mag.*, vol. 25, no. 2, pp. 135-141, Mar. 2008.

Assignment

1. Describe the main difference between the Human "Earscape" model (Ref: Lecture note 2) and the Audio Noise Masking model (Ref: MP3). Explain how these two models are applied to optimize signal quantization in the audio digitalization process. [20 Marks]

2. MPEG/Audio Layer I encoding divides an input audio signal into 32 sub-bands forming the inputs for audio digitalization. Justify whether this procedure improves or degrades audio signal quantization. (Ref: MP3) [20 Marks]

3. In your own words, explain the purpose of involving Discrete Cosine Transform (DCT) in MPEG/Audio Layer 3. Justify how this procedure improves the quality of audio digitalization in terms of both the audio signal preserved and file size produced. (Ref: MP3) [20 Marks]

4. Justify the suitability of replacing the DCT function in MPEG/Audio Layer 3 with Wavelet transform, explaining any requirement in choosing Wavelet transform functions and what changes have to make in MPEG/Audio Layer 3 components to allow such a replacement. (Ref: Lecture note and MP3) [20 Marks]

5. In your own words, explain four differences between applying DCT and Wavelet transform to compress an image, and justify their difference in supporting image decompression and transmission. (Ref: Lecture note) [20 Marks]

Level 4 students

6. Conducting a research in scalable video coding (SVC) in the H.264/AVC standard, write up your finding about how SVC is technically different from the original H.264/AVC standard, in terms of architecture, coding mechanism, functionalities, video representation and transmission. (Ref: Lecture note and SVC) [50 Marks]