

Three Hours

UNIVERSITY OF MANCHESTER
INSTITUTE OF SCIENCE AND TECHNOLOGY

CT348/CT448 Multimedia Systems

For candidates taking:

BSc IN COMPUTING SCIENCE
FINAL EXAMINATION

BSc IN ARTIFICIAL INTELLIGENCE
FINAL EXAMINATION

BSc IN COMPUTATIONAL LINGUISTICS
FINAL EXAMINATION

MEng IN SOFTWARE ENGINEERING
FINAL EXAMINATION

MEng IN COMPUTER SYSTEMS ENGINEERING
FINAL EXAMINATION

MSc IN MULTIMEDIA TECHNOLOGIES
FINAL EXAMINATION

MEnt IN COMPUTATION
FINAL EXAMINATION

Thursday 24 January 2002

9.30-12.30

Answer **three** questions

The use of electronic calculators is NOT permitted

Note: Do not answer more than the required number of questions. Clearly cross out anything you do not wish to be marked.

PTO

(2)

- 1) What factors must be taken into account when specifying a sampling rate for the capture of audio data?

(5 marks)

With regard to these factors, estimate the amount of data required to store ten seconds of CD quality audio (stereo), without compression.

(3 marks)

Given that this is a large amount of data to store, what properties of the signal will allow it to be compressed and restored to the original values?

(4 marks)

Outline an algorithm that performs this compression.

(6 marks)

What effects are heard if the compression algorithm is forced to compress the data further?

(2 marks)

- 2) Identify the hardware and software required for a portable system able to convert text to sign language and sign language to text. Your system must be non-contact.

(6 marks)

Outline the methods by which the sign language will be recognised by the system and translated to text.

(6 marks)

Outline the methods by which the reverse process will occur (i.e. text to sign language).

(6 marks)

How might the system be adapted for other languages (spoken or signed)?

(2 marks)

(3)

- 3) You have been asked to specify part of a computer system that will change its behaviour according to the user's perceived mood (i.e. as expressed by tone of voice and facial expression). This part will give a label to the user's mood (e.g. angry, sad, happy, etc.).

Discuss what hardware is needed and how it should be set up. Your proposed solution should not involve anything that requires contact with the user.

(3 marks)

State the functional requirements of the software.

(8 marks)

Outline a proposed solution.

(6 marks)

Describe how you will test your implementation.

(3 marks)

- 4) Five properties are required of an interactive multimedia system. List and describe them.

(10 marks)

Illustrate how the requirements are fulfilled by a proposed home automation interface which is intended to use visual and audio input for the control of various home appliances.

(10 marks)

(4)

- 5) Many methods of interacting with computers have been suggested, apart from using the keyboard and mouse. Lipreading is one of these. Assuming that a sequence of images of a speaker's face is available, describe the steps that must be followed to determine what is being said.

(14 marks)

What additional information could be used to improve the reliability of the interpreted speech and how may this be integrated with the visual data?

(6 marks)

END OF PAPER