COMPUTER MUSIC AT THE UNIVERSITY OF BRADFORD

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ABSTRACT: Computer Music at the University of Bradford is represented by three groups which work collaboratively but in different areas. In the E.I.M.C. Unit (Electronic Imaging and Media Communications Unit) music is an important component of both education and research in media production and multimedia activities. Research and design in the M.M.R.U. (Microcomputer Music Research Unit) concentrates upon sound creation, and in S.I.T.R.G. (Sound Information Technology Research Group), research centres on compositional environments.

1. Introduction

The University of Bradford received its Royal Charter in 1966, but in its origins lies deep in the last century. Bradford Technical College grew out of Schools of Weaving, Design, and Building, which reflected the textile industry's needs of the 1890s. Concentrating on professional qualifications, especially in the technological field, it became a College of Advanced Technology in 1957/58.

The present University has more than doubled in size and range of course since gaining University status. The field of Computer Music is a relatively new one and is represented (as three different units in the University: E.I.M.C. Unit was first established in 1975; while M.M.R.U. started in 1974, and S.I.T.R.G. was formed around 1991. The three groups integrate both in education and in research.

2. Electronic Imaging and Media Communications Unit (E.I.M.C. Unit)

The E.I.M.C. Unit, part of the electrical Engineering Department, together with the Bradford and Bingley Community College, and the National Museum of Photography, Film, and Television (NMPFT), created a multidisciplinary B.Sc. course which gives both the technical background and practical and creative understanding of the use of images (television, film, music, or advertising) in society[2]. Both three-year B.Sc. courses offered (one in Electronic Imaging and Media Communications and the other in Media Technology and Production) give an integrative combination of arts and sciences which demonstrates clearly the involvement of modern technology in the creativity and artistic works needed in journalism, television, radio music, photography, production and post-production, animation, and multimedia.

Electronic Music is an important component in EIMCU as an interaction with visual imagery in film and video productions or multimedia applications. The EIMCU Unit, together with the NMPFT, have a set of three studios for sound creation, recording, manipulation, mixing, and editing. All the facilities are used by both undergraduate and postgraduate students for diverse activities such as composition, studio recordings, video productions, and television, and music controlled animation.

The main studio teaching modules (sometimes combined with similar image or video techniques) include:

- Image, sound, and text (early cinema, silent era, film talking, movies, world cinema)
- Audio-Visual systems (overview of all the different audio and video equipment on the market)
- Soundscapes (the development of sound recording, early electronic instruments, sound and the moving image)
- Sound and Visual identity (the interaction of visual imagery and sound)
- Computers and Music (digital editing, sound synthesis, MIDI, hard/disk recording, algorithmic composition)
- Sound Processing (audio production and post-production, audio compression techniques)

This module is also available to final year undergraduates from the Computing Department.
Final year students are expected to undertake a project of their choice which on the music side might be a composition produced on a CD together with a promotional video and lettres to advertise it, or a CD-ROM on sound processing techniques, or review of software and hardware systems most commonly used including desktop examples, or even a music magazine. Current research is focused on comparing properties from different disciplines like signal processing, electronic music, multimedia, and animation, on computer platforms like 486 PCs, Macs, and Silicon Graphics systems.

3. Microcomputer Music Research Unit (M.M.R.U.)
The emphasis in the M.M.R.U., based in the Computing Department, is on sound creation, both in research activities and in design and development work. Three members of University staff are attached to the Unit. The M.M.R.U. was responsible for the design of the Bradford Musical Instrument Simulator (BMIS)[3], which has been commercially successful in the classical organ field.

The M.M.R.U. works on a consultancy basis with industrial partners on the on-site testing and designing of some of the instruments based on the simulator. In this way, the Unit has been responsible for the voicing of organs at British Cathedrals and Abbeys, as well as at churches, schools, and other venues. Each building presents individual acoustic challenges for the organ voice, and it is the unique flexibility of the Bradford simulator which allows these varied conditions and requirements to be taken into account. By means of such consultancy work, the M.M.R.U. has built up practical as well as theoretical knowledge of the use of their invention, and has accrued research funds to the University.

A new generation of the Simulator has been developed in association with industry. This development was assisted by a large governmental grant for promoting industrial training for young graduates, which allowed additional members of staff to be taken on. Many new features are incorporated, and there is a sophisticated Windows-based graphical interface for the definition of musical instrument simulations.

M.M.R.U. research includes work on new architectures and algorithms for additive synthesis, resource allocation in musical sound generating systems, musical sound perception, including the perception degree of ensemble in organ tone: musical instrument sound synthesis: and musical sound transient analysis/synthesis.

S.I.T.R.G. is also centred in the Computing Department and is researching in collaboration with specialists in composition and DSP in other institutions. Primarily, this collaboration has involved Tamas Ungvary and Peter Luddon (Royal Institute of Technology, Stockholm), Bernhard Faltes (Technical University, Berlin), and Boet Vertegaal (Twente University). The work at Bradford has focused on support environments for music composition. The group has defined an architecture to support and integrate composition tools[4], and is researching associated issues, including bit-wise reduction of audio signals, a design database for composition tools identification strategies, and timer-space interfaces for direct manipulation of sounds. These ideas are currently being evaluated through prototype implementations in which Closing and also Peter Luddon’s SoundTools system are being integrated with the setup.

S.I.T.R.G.’s research is biased towards computer science, with computer music being chosen as a demonstrator application due to the group’s interest in the field. The facilities reflect this bias - prototyping work has been in a Unix environment on Sun Sparkstations, audio I/O facilities are currently through Datmax equipment.

5. Conclusion
The three groups together promote an all round approach to Computer Music at the University of Bradford.

References