Beginnings

The Electronic Music Studio within the Department of Music at the University of York, founded by Richard Orton in 1967, is one of the earliest university-based electroacoustic music facilities in the UK. As such, many pieces based on analogue--tape techniques have originated from York and we are proud of the large number of York trained people who have gone on to positions in facilities elsewhere, often having been involved in initiating them. A privately--produced set of three records, Electronic Music From York (1974), documents some of the analogue work from these early years. We were, however, relatively late to use computers seriously for synthesis. Apart from an abortive attempt to run Music 5 on the central mainframe computer, some experiments with an IM6100 (PDP8) microcomputer and the use of S100 based machines for control purposes, we produced no significant computer based music until the acquisition, in 1980, of a second--hand PDP--11 with 10MB (!) of hard disk storage. We implemented Music--11 on this machine (with help from Durham University) and were soon producing music.

We rapidly became dissatisfied with this system, despite an added floating point accelerator, and one of the authors, David Malham, began work on a purpose built 24 bit, 10 MIPS DSP module. As this project neared completion, two things happened which changed our direction significantly. The Interface group of York electroacoustic composers, frustrated with the limited access they had to computing facilities, began thinking about ways in which they could acquire computer music systems for themselves, at a sensible cost. Also, it became clear from personal contacts between members of the Music Department and members of the then newly--established Electronics Department at the University that there was a considerable degree of mutual interest in the subject of Music Technology.

From the Interface group grew the concept of the Composers' Desktop Project, which was to be based around a cheap personal computer, the Atari ST. At the same time, the contacts between the two departments had led to the creation of a joint Masters course in Music Technology. The idea was to require students with either a science or an arts first degree to take identical course units on the fundamentals of music technology -- music, composition, signal processing, computer programming, studio techniques, computer music techniques -- but to award either an MA or an MSc depending primarily on the nature and content of their final project. We felt that if we always attempted to have a good mix of Arts and Science students that there would be a good deal of "bootstrap", with engineering students helping musicians over the technical units and vice--versa. This in turn meant that we could cram a two year course content into one year! This has, in fact, happened -- a very demanding but popular course has resulted. Within four years student numbers reached the limits of what we could safely handle with the physical resources available in a relatively small university.

At the beginning of the first year of the Masters course in 1986/7, the computer music sections were being taught on the PDP--11, but by half way into the year and with a fair amount of input from the students on the course, we were running Csound on CDP workstations. From this early beginning, with two CDP workstations with 80 Mflops (1) hard disks, we have built up to ten main CDP workstations with 380 Mb disks, two standby/research systems and three more staff systems. The main workstations are in two rooms dedicated to the Music Technology course, one in the Electronics Department, the other in the Music Department. The Masters students have access to all the facilities of both departments, including the use of the Electronic Music Studio which contains equipment ranging from Moog modules and VCS3's up to S1000 samplers, DATs and a CDP workstation with a 1.2 Gigabyte disk drive, running not only the entire CDP software suite but also Avalon, Cubase and the SoundMaestro digital editing system. It also has facilities for Ambisonic recording and sound manipulation. Undergraduates in the Music Department can also opt for Electroacoustic music as part of their course -- about a third do now -- and they also have access to studio facilities.

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The Heslington Foundation for Music and Related Arts, with Lord Harewood as its patron, has been established with the express intent of fund-raising for those successful Music Department enterprises which can and should receive external support in order to advance the development of music at York. The Foundation has been instrumental in raising funds for Phase I of a two-part building programme, which will provide resources for Music Theatre and Ethnomusicology when it opens in October 1991. Phase II of this programme is targeted for resources in Music Technology, to include accommodation for electroacoustic and recording studios, which will incorporate new developments in Digital Signal Processing systems, as described below, and a dedicated Ambisonics performance space.

The provision of these new facilities will make possible an expansion of both engineering and musical research. It will also provide sufficient accommodation to support a new course at Undergraduate level, which will start in October 1992.

The Masters course has generated a number of research programmes, so we have a good number of students staying on to do research degrees in Music Technology and also in other disciplines, such as Computer Science and Engineering. Some of those research programmes are described below.

Ambisonics.

As published elsewhere in these Proceedings, one of our main interests is in developing both the technology and the compositional use of three-dimensional sound diffusion tested largely on Ambisonics. We have a programmable decoder which can drive up to sixteen loudspeakers in a three-dimensional array and this has been used to good effect in several concerts, as well for research in improved diffusion techniques. We have facilities for manipulating sounds Ambisonically using both analogue technology and non-real-time digital technology on the current CDP workstations. We are now implementing a real-time version using DSP devices, as detailed elsewhere in these Proceedings. A number of composers are producing pieces using Ambisonics. We are developing ways of incorporating other technologies such as computer head and body tracking within the Ambisonic format.

Composers' Desktop Project

We continue to support the Composers' Desktop Project, both in the provision of new programs, and maintenance and extension of existing facilities. We maintain developer centre status for CDP along with University of Keele and some continental colleges. The CDP now contains: CSound, CMusic, Phase Vocoder, a comprehensive set of signal processing routines under the name 'Kroucho' and a graphic environment for mixing, filtering, recording and playback of sound files. Alternative synthesis environments include Freerhand described elsewhere in these Proceedings, ADSYN DRAW, and Orchestrator, a graphical patch editor for CSound orchestra. The present system runs on the Atari ST range of computers and has recently been ported to the 8030 TI Atari machine. Work is in hand to create a compatible environment for IBM 386–upwards compatible PCs.

MIDIGRID, Cellular Automata, Phase Vocoder Graphics, Soundilation, E–SCAPE.....

Development of a Cellular Automata workstation has taken place and is described in greater detail elsewhere in these Proceedings. The compositional link between graphics and sound is being explored in this and a variety of other projects. Anna Katranis's research is focussing on graphical descriptions of Phase Vocoder resynthesis files (see paper elsewhere in these Proceedings!), while Sean Waterson is working on the Soundilation system, which will provide an integrated environment for the composition of electroacoustic music and animated images. Meanwhile, Tim Anderson has continued the development of the E–SCAPE system described at ICMC Glasgow 1990 over the last year.

Another emphasis is on the development of live performance tools in the field of electroacoustic music. MIDIGRID® is in the process of expansion to enable it to control the MIDAS system (see below) and thus give the user access to electroacoustic transformations in real time.

MIDAS

Many of the projects above – Freerhand, E–SCAPE, Phase Vocoder, Soundilation and Cellular Automata are intended to be implemented on the MIDAS® multi–processor array system. Support has been obtained recently to augment the MIDAS system so that it will contain multiple 96000 DSP devices. This will considerably enhance the power available. We are also examining the possibility of expanding MIDAS into
a multi-user system so that the augmented system can form the basis of a distributed electroacoustic composition and performance environment. This will then become the prime provision for the teaching of the courses described above, as well as providing advanced facilities for home and visiting composers.

References


