

MUSI 6003 - Research Report - The Hub

EVAN B MURRAY, Georgia Institute of Technology, USA

MIR JEFFRES, Georgia Institute of Technology, USA

XINYU QIAN, Georgia Institute of Technology, USA

SHAN JIANG, Georgia Institute of Technology, USA

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1 INTRODUCTION

The hub was founded by a group of artists that builds their own software and hardware systems to create music. It's a computer music band. These computers are called the Hub, and they are dedicated to send messages to other players, which is the foundation of network music. It also stores all information that comes from all players, and all this information is available on each player's computer.

Artists that founded this band came from a group called The League of Automatic Music Composers, and of course most of their music pieces are based on automatic devices. The artist group was founded around 1977. During that time, automatic devices meant microcomputers. Thanks to microcomputers being more affordable, some even cheaper than synthesizers during that very early time, artists started using them to compose music or create effects that can only be achieved on mainframe machines before. In their case, artists are trying to get more surprising moments from unpredictability, which is very different from what most other people were trying to do, that is, trying to get more detailed control on more aspects of the music.

2 TECHNOLOGY

The Hub was made up of six computer musicians who had experience creating and performing in the computer music scene with microcomputers and synthesizers, at first allowing the microcomputers to generate the sound, and then sending control messages between computers and synthesizers to generate the sound. John Bischoff and Jim Horton were composing with microcomputers like the KIM-1 as early as 1977 [5]. The KIM-1 was one of the first commercial microcomputers that was accessible to the average person. One KIM-1 cost about \$250, while commercial synthesizers were often several thousand dollars, and the new personal computers (like the Apple 1) were large and more expensive

Authors' addresses: Evan B Murray, Georgia Institute of Technology, Atlanta, Georgia, USA; Mir Jeffres, Georgia Institute of Technology, Atlanta, Georgia, USA; Xinyu Qian, Georgia Institute of Technology, Atlanta, Georgia, USA; Shan Jiang, Georgia Institute of Technology, Atlanta, Georgia, USA.

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than a microcomputer the size of a modern laptop (12" x 8" x 3"). The KIM-1 was relatively simple to use over other previous microcomputers like the Altair or the IMSAI 88, which were programmable with switches and had to be manually booted and manually fed programs into memory, whereas the KIM-1 had a built in terminal interface system that booted automatically with the computer, so one could start programming immediately once it was powered on. It was specifically exciting for computer musicians because it was easily connected to other systems with its exposed output serial port and because it had baked-in nonlinearities in relation to audio playback [5]. The output port would pause when some functions were called or when the current memory location index would change somewhat randomly, which could introduce an exciting timbre similar to other computer, algorithmic, or tape music pieces which were popular in the field at the time.

The Hub had a double meaning - it was both the group of musicians and the hardware they used to combine their microcontrollers and synthesizers into a unified performance. The group's technology's main form of communication was via the serial output on their computers, sending control messages to each other's systems. In the liner notes on the first Hub CD, Bischoff states "Each of the six players runs a program of his own design which constitutes a self-sustaining musical process. Each program is configured so that it can send three changing variables important to its operation out to the Hub and also to receive three variables from other players. Each player reads the variables put out by three different performers, and sends out for use by three different performers as well." This type of network is what is known as a blackboard system [3], and the performers in the Hub called the shared memory in it the "Blob". Since each person's musical system was autonomous, pieces could be procedural, stochastic, or aleatoric and widely varying in technique. The main constant was the sharing of control data and the focus on live performance, and recordings were often cut down to fit nicely on albums.

As time progressed, the Hub members wanted to keep up with the latest music technologies, so as MIDI became more standardized and equipment was made for it, the Hub adopted the OpCode Studio 5, a new MIDI interface in 1990 [1]. It allowed each member to individually communicate with each other, which was previously not possible as they had only had one shared memory system. The group wrote several pieces that took advantage of this communication system, and the new MIDI-based Hub hardware was called "Hub 2". After implementing MIDI functionality, the Hub also started using software like Max and Grainwave in the 90s to synthesize the sounds, instead of DIY electronic hardware or standalone synthesizers, and attempted some Internet communication performances using early Max UDP objects [1]. One of the group's last performances was a distanced setup reminiscent of their first performance, which had half of the performers located across New York City sending control messages via phone lines in 1985. The original performance was a success because people were curious about musicians not needing to be in the same location, but the Hub members preferred being in the same place for both their musicianship as well as debugging any software/hardware problems. In 1997, utilizing MIDI and OSC to communicate over the Internet to do a distanced performance between three locations across the US. However, there were software issues with doing such a technical performance, and the Hub members were forced to explain what they wanted to be doing instead of just performing. At that time, "the technology had defeated the music" [1] and the group began to disband.

3 AESTHETIC

One significant aesthetic involved with music performance is empathy between performers involved during the performance. In the words of Stanley Crouch, renowned jazz critic, "jazz appreciates everyone's individuality, but its success is the result of the empathy that all these individuals have to each other," [2]. It is performances, such as *'Round Midnight*, where this empathy can be heard and observed. At 6:00 in the recording, performers can be seen leaning in closer and

listening to each other. At 6:14, Charlie Rouse hits a high note on his saxophone [8]. The rest of the performers respond with a large dynamic change followed by a dramatic cadence to close the performance. The nature of this empathy leads to a connection in the music which creates a unique rendition of that performance people have not heard before. The first “network music” piece, *Rain Forest*, by David Tudor shares a similar aesthetic because the performers involved in it were working towards a common goal: to create unique sounds using real world objects (i.e., suspended objects with speakers attached to them). Each performer was posed with the task of setting up their instrument, following the instructions of the composer, then interacting real-time with the other performers around them to create the sound of the exhibit [3]. The aesthetics of network music differ from jazz due to the nature of the score and the ways each musician interacts with one another. For example, some of the scores may be represented as the material themselves with the patch cables and settings of the switches in the computers, as discussed in the previous section of this paper. In addition to this, players involved with “The Hub” had the ability to send signals to each other through their network which would influence the decisions of other musicians. For example, Tim Perkins created a set of rules to exchange notes between various players involved in the performance of *Waxlips* [3].

4 IMPACT

It is difficult to discuss The Hub’s impact, as its influence on subsequent works is more gradual and indirect, and this influence cannot be simply described in a formulaic and quantitative way. However, it is possible to elaborate on it in at least the following ways.

First, it is difficult to characterize such a collection of musical works, which brought together so many advanced technologies of the time, into a single domain. They used USART and built a network system for music performance before the Internet became widespread, which counts as a pioneer of network music performance. They also practiced synchronous off-site programming of multiple synthesizers, which was the prototype of live coding. Some of the most famous projects that followed had a touch of The Hub. In the field of live-coding, SuperCollider [7] is dedicated to providing a computer syntax library with implementation interactivity, ChuckK [9] uses a concise syntax to implement multithreaded synchronization for synthesizer, and Tidal Cycles even creates a separate live-coding computer language based on the Haskell framework. computer language based on the Haskell framework.

Secondly, The Hub was a challenge to the traditional concept of music composition by music technology, and this work was a milestone in the new musical thinking of the West Coast at the time, and it had an unparalleled cultural impact. As Chris Brown and John Bischoff put it in *Indigenous To The Net: Early Network Music Bands In The San Francisco Bay Area* [1]: “As yet unnamed, the Silicon Valley was springing to life from the garages and bedrooms where the potentials of solid-state electronic devices as building blocks for information systems could be investigated by individuals working in the shadows of the mainframe-dominated electronic industry.” Imagine being in a time when personal computers were becoming commonplace, and realizing that Cage’s chance, Xenakis’ stochastic [6], and Reich’s minimalist [4] theories of composition could be applied to the practice of music composition for the first time, what a thrill it is.

5 CONCLUSION

The Hub was founded by musicians that are also engineers, and embraces the culture in the bay area. They took advantage of the very first personal microcomputer, and with such powerful tools, they are allowed to innovate a lot and use many new technologies to do things that would be either too expensive or just impossible to do. They created

network music before the internet was available; Their synchronous synthesizer programming is the prototype of live coding; and they embrace stochastic and minimalism. They had a great impact on many aspects in both music and technology.

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