

## **Real-time generation of music notation using algorithms and physical movement**

This paper, which includes practical demonstrations, seeks to draw together two research streams in digital music composition and performance.

The real-time generation and presentation of algorithmically generated notation has for some time presented challenges to composers and technologists. A variety of software environments have been developed that allow for the presentation of certain kinds of notation, and under certain circumstances, but compromises have been necessary: the use of pre-generated notation segments and other graphical materials, and a general avoidance of precise synchrony amongst multiple instruments, for instance.

At the same time it is clear that many are intrigued by the musical performer's real-time physical interaction with musical instruments.

This paper presents work, including original musical composition, involving the live presentation via computer of 'western' music notation created from algorithmically generated material. This notation may then be performed by a human musician with or without other computer generated material (or indeed other 'real' musicians). The process of generation of this material may utilise data obtained from bespoke physical devices which have been constructed to enable the use of gesture, movement and interaction as a fundamental part of this practice.

Technologies used include the SuperCollider audio programming environment, Arduino/mbed hardware systems and the INScore notation project; inter-programme communication is achieved via the OSC protocol. Apart from creative outcomes, investigations of the process and its methods highlight a number of issues. These include the relationship of predetermined forms to material generated in live and in real-time through algorithms and physical gestures, and the nature of time, timing and synchrony in the digital environment and performance.