

The Cello of the future

An instrument which is played like a cello and is optically controlled by laser technology. The signals in the instrument are converted to MIDI, the language of the electronic music industry. The cello is an instrument which is handled with a lot of feeling and close body contact. The relationship between man/machine is central to this instrument, in which the entire range of dynamic movement of the cello is used. The person playing puts his or her personal seal upon the synthetic sound. In most cases, synthetic sound is generated by means of a keyboard and buttons, rather than by feelings.

The project

The cello project was started in December 1993 as a thesis project at the University College of Arts, Crafts & Design in Stockholm. The goal was to question the only alternative then available, the piano keyboard, as a tool or interface for electronic music generation. The problem was defined as a sophisticated man/machine relationship, which should result in an inspiring tool for creative work. The cello was selected as a suitable instrument and an analysis of the range of movement was initiated in collaboration with a cellist. The result was used to decide what should be detected, and how the original expressiveness could be retained. An interesting collaboration was initiated between researchers at the Royal School of Engineering, KTH, and experts on electronic music. Sponsors provided material, and on the 14 July, the project had come so far that the cello could already control a synthesizer. As confirmation of the interest generated by the laser cello, this was reported in the media, a television news magazine and the radio channel 3 music journal.

The technology

The technical design is based on stepless detection of the pitch by optical means. A 5 mW laser diode illuminates the fingerboard from underneath. When the player puts his or her fingers on the fingerboard, a red spot is visible on his fingers. The position of the spot is read off by means of a SiTek one-dimension position sensing detectors. The signal is used to define exactly where the finger is and for how long it rests there. At the same time, a bow is used, just as with a conventional cello, but using a pressure-sensitive sensor to measure the pressure applied by the bow. In this configuration, one detector per "string" is required, which can probably be simplified. The laser cello is now being developed further, by rationalising the detector configuration to a single two-dimensional detector, which thus only needs one lens.



Jonas Ericsson created the laser cello as his thesis project at the University College of Arts, Crafts & Design in Stockholm. He is a partner at NO PICNIC, the industrial design company, which is now managing the project.

