

The Modified Cello

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Abstract. With this paper I would like to propose a performance with the modified cello. The development of this instrument aims to achieve a tighter integration between acoustic and electronic technologies whilst expanding the sonic capabilities of the cello and performer. A combination of sensors, audio analysis and DSP software are used to provide a more expressive, accessible and intuitive control over the dynamics and subtleties of digital sounds and processes.

Keywords: Augmented, Cello, Audio Analysis, Unpredictability, Mapping, Interdependent, Interface Design, Tangible Interaction

Modification of the Cello

The sensors were mounted on the body of the cello and positioned in order to compliment the pre-existing gestures used whilst playing the cello in a traditional manner. In particular, a series of sliders were placed parallel to the strings facilitating sequential and simultaneous interaction with the acoustic and electronic interface elements. Similarly, a large endless encoder was placed adjacent to the bridge, allowing manipulation with the bow. In this way, the addition of sensors to the cello encourages the development of new gestures and techniques whilst revealing new possibilities regarding sound and structure.



Figure 1: Playing the Modified Cello

Expanding the Physical Capabilities of the Performer

The software uses delays and buffers to allow the performer to operate on multiple time scales and explore the rhythmic interplay between machine and human time domains. Such processes often result in iterative transformations and structures in which subtle timbral modifications of the cello sound are layered to create evolving textures of varying density.

The development of this instrument was focused around the composition of interdependencies between the cello, computer and performer. The implementation of gestural and audio analysis aims to capture the behavioral characteristics (tendencies and movements) of the performer and produce complementary or contrasting reactions within the processing of the cello sound. More specifically, the analysis data is used as a modulation source within the software which pushes and pulls against the parameter positions set by the sliders. This data is also recorded during the performance and used to create probabilistic responses which relate to the performer's input.



Figure 2: Details of the Modified Cello

Unpredictability, Risk and Effort

The use of probabilistic processes combined with the unpredictability and subtle fluctuation inherent in acoustic interactions introduces the possibility of miscommunication and interference between gestural intent and the instrument's response. This blurring of causality allows the instrument to suggest possible direction for sonic exploration, inspiring the performer and encouraging a more engaging and serendipitous playing experience. During the 15 minute performance, the dualism between precision and ambiguity will be explored, highlighting elements of risk, effort and failure as the subtlety of human expression is amplified and juxtaposed with the more precise and quantised nature of digital technology.



Figure 3: Playing the Modified Cello

Biography

Dan Gibson is an English musician and sound artist. In 2011 he completed a Ba (Hons) Degree in Creative Music Technology at the University Centre Doncaster and recently completed an MA in 'Instruments and Interfaces' at Sonology and STEIM in the Netherlands. Gibson's work incorporates experimentation and improvisation and aims to explore the sonic subtlety, textural nuance and dynamic intensity found in the natural soundscape through the embodied practice of playing and building investigative hardware and software instruments.

Gibson's recent work at STEIM focused around the augmentation of acoustic and physical objects in order to provide intuitive and tangible interfaces for real-time exploration, manipulation and organisation of sound. The aim is to provide the spontaneous and expressive control required in improvisational contexts through the use of gestural interfaces and dynamic mapping techniques.