Sensor Grid Design For High Resolution 3D Acoustic Measurements Of Musical Instruments.

Conference or Workshop Item

Sensor grid design for high resolution 3D acoustic measurements of musical instruments

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Much of the research undertaken in the field of musical acoustic analysis involves (electro)mechanical actuation of the instruments under measurement conditions without the musician present. This has the benefit of repeatability, so that apparatus can be designed in order to make asynchronous measurements at different points in 3D space. It also means that the instrument is analysed in its pure form without any acoustic aberrations presented by a human performer. However it has been found that when a musician performs on the instrument, this repeatability is absent (despite the musician's self-belief in their own consistency) and an alternative approach must be taken to make 3-dimensional acoustic measurements with the musician present. Musicians could of course be present during actuated musical instrument analysis but this is not (yet) a common approach. The research project described in this paper is ongoing and recent developments of sensor grid geometry are presented here along with some promising initial results. The sensor array geometry has been investigated with respect to: optimal spacing, minimising errors in data interpolation at high frequency, and practicality for construction and actual use. Some preliminary data from a section of the array grid has been obtained and is presented here in order to demonstrate the robustness of the data at high frequencies. There is some discussion of the likely errors in interpolation of the data and some further ideas are explored regarding the manipulation of the recorded data.