

Design and Development of the Reverse Action Piano Harp

The Reverse Action Piano Harp (Raph) is a novel musical instrument interface. It consists of a bespoke zither, with playing enhanced through a secondary damping interface. Current prototypes incorporate a traditional keyboard, which provides reverse damping from individual keys, to each octave occurrence of a pitch on the string surface. The interface is designed from a conception of an ideal playing position that provides optimum access for the left hand to address the keyboard and the right hand to address the string surface.

This project has been informed through periods of practice based research alternating between design and build (and analysis of the results), and performance, composition and arranging (with similar reflective analysis informing the subsequent design and build phase). The project dates from 2008 and includes a patent (secured 2012) and successful PhD (completed 2015).

This submission documents the design work upon the instrument covering the relevant period for REF submission; this includes analysis of performance practice and distillation into design principles, detailed planning of prototyping process, including three dimensional renderings and documenting of prototyping processes and products.

The submission focuses in detail upon the design conceptions to be incorporated in prototype six, the re-tooling necessary to complete this build and to move towards a repeatable sequence with limited variation suitable for an individual luthier. The areas of design under particular scrutiny during this sequence are;

1. The design of the zither body to allow for incorporation of function bridge effectively placed on a suitable top plate
2. Consideration of the string face; the number of strings and their pitches

3. Effective damping; evaluating positioning in relation to string (and pitch) and individual damper design
4. Design of the pulley system and access for maintenance
5. Keyboard design and range of variation of keyboards