

# Expression control in automated organs and its perspectives for preservation of the past

abstract

Godfried-Willem Raes

post-doctoral researcher  
Ghent University College & Logos Foundation  
2010



The practice of automating musical instruments is in no way recent, and in fact might very well be about as old as the history of that class of musical instruments where many mechanical parts, levers, wheels, bellows, hammers are used to control the actual sound sources. We all know watchmakers and their skills in the construction of musical clocks. On a very large scale – the principles being the same – we can also refer to the vast tradition of carillons in our belfries and some church towers. Before the advent of electronic circuitry, musical automata, orchestrions and barrel organs were built using mechanical or pneumatic principles. Until the 19th century, the pinned barrel was the device of choice to program the music into the automaton. With the 19th century came the advent of pneumatic principles. All the automatic instruments made at that time (the antique Limonaire organs, Pianolas, Mortier organs, Decaps and many more) use paper rolls or cardboard books for programming and are pneumatic. By nature they are, just like their purely mechanical ancestors, binary machines: a punched hole in the roll is a note-on, no hole is a note-off. Musical expression – apart from the precise placement of tones in time, or overall control of the wind pressure – is left out altogether from these designs which is what explains the very mechanical character of the music produced. Although it is not impossible to implement gradual and nuanced control using pneumatic technology (and many attempts to do so have been made, sometimes with reasonable results), it is only since the advent of electromechanical or electropneumatic devices, and particularly microcontrollers, that this has become common practice amongst modern automated instrument builders. Instrument automation has been keeping us busy since the early 1970s, and in this paper we will concentrate on some aspects of expression control applied to organ building. We will try to give a broad overview of technologies and approaches applicable to organ-type musical automates with expressive possibilities way beyond the simple, if by no means trivial, note-on, note-off that has plagued automata for way too long. All the technologies described above have been put into practice in one or another of the 46 musical robots – not all organs of course – that currently make up the <M&M> robot orchestra.

We point out the potential of these technologies even when it comes to the valorisation and preservation of dead historical organs for which complete reconstruction is not an option. Almost all churches have or used to have a pipe organ. By no means all of these instruments have characteristics that justify their preservation, let alone their restoration. And even if they do have the required characteristics, it may not be a very rational or economic decision to invest the considerable funds required into the restoration because the use of the instruments can in no way be guaranteed. The future of churches as

churches is far from self-evident.

For those churches that serve a function as a monument and do attract visitors, it is an option to reconstruct the essential parts of the organ using the technologies described here, such that the sound of the instrument can be heard whenever required. We stress the fact that automating such instruments is fully reversible on the one hand, and on the other does not render normal manual playing impossible.

---

Last revision: December 14, 2010

dr.Godfried-Willem Raes

[godfriedwillem.raes@logosfoundation.org](mailto:godfriedwillem.raes@logosfoundation.org)