Trends in Gestural Control of Music

Introduction

Marcelo M. Wanderley & Marc Battier

This electronic publication presents invited articles on gestural control of music. They have been divided in two groups: papers that present a general overview of a certain topic and case studies, which are descriptions of specific technical and musical applications.

Althought the primary goal of this volume is an electronic presentation which includes multimedia content, such as video clips and sound excerpts, the reader will have the ability to print versions of the contributions formatted for this purpose.

Round table

The invited papers are preceded by a round table where nine of the key contributors on gestural control of music and on computer music — D. Buchla, W. Buxton, C. Chafe, T. Machover, M. Mathews, R. Moog, J.-C. Risset, L. Sonami and M. Waisvisz — have discussed their experience with gestural controllers, on what they consider to be the actual situation of this field and on how they anticipate its evolution. Very interesting and sometimes surprising and intellectually engaging points of view were expressed which shed new light on this domain.

Outline of divisions

We have coarsely separated the whole subject of gestural control in 4 parts: a) *Evolution*, b) *Definitions of gesture*, c) *Gestural acquisition and analysis, system design and ancillary topics*, and d) *Mapping, performance issues and case studies*. Although very few of the papers would completely fit only one of the sections, we have tried to place them either according to their main topic or to their interest related to the other papers in this electronic publication.

Evolution

The first section of the electronic book focuses on historical relationship between electronic music and the question of musical gesture. M. Battier evokes a number of experiments which are landmarks of the field. They span from the late XIXth century, where some early realizations offer surprisingly fresh views on new instrument design and control, up to latter-day developments. In the next article, J. Chadabe illustrates the evolution of gestural control with his own experience with musical controllers.

Definitions of gesture

The second part consists of theoretical articles, such as gesture classifications, meaning of gestures, etc. It starts with a contribution from C. Cadoz and M. M. Wanderley on gesture classifications and on instrumental gesture and music. It is followed by an article by F. Iazzetta on meaning of gestures in music. The last contribution in this section is by I. Choi and presents her work on gestural primitives in the context of virtual reality installations. This article makes the bridge between the section on gestures and the next, devoted to system design.

Gestural acquisition, analysis and control

The third part corresponds mainly to the description of the design of systems based on gestural control. This section starts with an article from B. Bongers on human-computer interaction and musical input device design. T. Ungvary and R. Vertegaal present a review of their previous work on musical cyberinstruments and gestural interface design, including a very interesting table on matching transducer type, feedback and musical function. In her second contribution, I. Choi discusses the technical description of her system. T. Marrin Nakra presents her own work on the analysis of physiological signals measured in conductors and their interpretation in a musical context. Next is a contribution by J. Rovan and V. Hayward on haptic feedback in musical performance. This is followed by the reprint of an article from A. Mulder, based on his thesis work on the choice of gestural constraints and also on his experience at Infusion systems.

Performance issues

The fourth section presents papers on diverse topics, such as mapping between gestural variables and sound synthesis variables and other performance issues. It starts by a paper from A. Tanaka on performance practice on sensor-based instruments, in which the author raises many questions relevant to the domain. A. Hunt and R. Kirk then present a study on mapping strategies for musical performance, an important contribution to a topic that has, in our opinion, not yet been enough studied. This is followed by an article on virtual musical instruments by S. Goto were he comments on many of his previous developments at Ircam and abroad. A. Camurri and R. Trocca present their work

on interactive systems for dance using Kansei theory for modeling emotions, including the use of robots in theater installations. The contribution by L. Pottier and O. Stalla raises issues on the gestural control of sound spatialization.

Case studies

The case studies start with M. Goldstein's contribution on mallet playing technique and the development of a new mallet controller, the Marimba Lumina, by Buchla and Associates. S. Serafin and R. Dudas then present a study on the control of a physical model of a bowed string instrument by alternate controllers, a graphical tablet in this case. E. Fléty describes an approach to sensing performance gestures using ultrasonic devices. His research led to the development of a 3D sensing device used in a recent piece described by composer R. Auzet in his article. D. Arfib and J. Dudon then present their work on photonic synthesis. S. de Laubier discusses his meta-instrument and comments on its application in a musical context. This is followed by P. Modler's contribution on hand gestures and mapping using data gloves and neural networks. The development of an ultrasonic tracking system for a percussionist is presented by R. Auzet in a follow-up to E. Fléty's article, in which the author shares his views on artistic issues based on his experience as a percussion performer and composer, through two recent projects. Finally, L. Tarabella presents a studio report on the interface developments at CNUCE, in Pisa, where several video clips show his alternate controllers.

Bibliography

A list of references covering the many aspects of gestural control is presented. It is a direct evolution of the list of references available form the *Gesture Research in Music* home page. While the bibliography does not aim at being exhaustive, we chose references that we feel are relevant to the very topic of this electronic publication. Many other references have been suggested by the authors and have also been included. We would like to express our gratitude to all them.

Resources

Finally, a list of companies and research institutes and Universities related to gestural control is introduced. We have tried to make it as complete as possible, again having in mind the directions present in this electronic publication. It is complemented with an Internet directory composed of addresses across the field. We hope it may be useful for the reader.

Acknowledgements

All papers have been thoroughly reviewed by the editors. We would like to acknowledge the assistance in the reviewing process from J. Rovan and M. Goldstein, who have each reviewed one article.

We would like to warmly acknowledge all authors for accepting to take part in this project, for their contributions, for their help all along the production stage. Of particular note are the suggestion, ideas, criticisms and help from J. Rovan, A. Tanaka, and R. Vertegaal during the initial stages of this project. The Resource sections has been greatly enhanced by suggestion from E. Fléty. The bibliography has received numerous additions from suggestions of the authors. We wish to thank W. Buxton and M. Mathews for their suggestions on the Round Table. We express our special gratitude to all at Ircam who supported this electronic publication. E. Morin have proofread several articles; she and N. Halpern have translated two articles into English. A. Scharrer helped with the Windows version. Finally, we particularly wish to thank V. Puig, without whom this project would never had left the ground, Ph. Depalle, X. Rodet, M.-H. Serra and H. Vinet.