Immersion Music: a Progress Report

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ABSTRACT
This paper describes the artistic projects undertaken at Immersion Music, Inc. (www.immersionmusic.org) during its three-year existence. We detail work in interactive performance systems, computer-based training systems, and concert production.

Keywords
Interactive computer music systems, gestural interaction, Conductor's Jacket, Digital Baton

1. INTRODUCTION
Since January of 2000, I have been actively developing a new line of work with a nonprofit startup called Immersion Music. Our mission is to bring the high-tech interaction paradigm to classical and traditional musical performances. This report describes the projects that we have been working on for the past three years and the general themes and directions that have emerged during this time.

2. INITIAL DEVELOPMENT
While a graduate student at the MIT Media Lab, June 1994-October 1999, I developed a quantitative method of research into the phenomena of orchestral conducting. First with a device called the "Digital Baton"[11][12][13], and then with device called the "Conductor's Jacket"[5][7][8][9][10], I developed ways to capture the gestures and indications of professional musical conductors. Professors Tod Machover and Rosalind Picard guided my work and significantly influenced my thought processes during this time.

The technical basis of this work has been to analyze and leverage the gestures that musical performers make while practicing their craft and technique. While at the MIT Media Lab I also developed many performance applications for gestural interfaces. Ongoing research informed the performances, and a groundbreaking event was presented at a concert of the Boston Pops Orchestra in June of 1998, where my team presented a demonstration of interactive technology with conductor Keith Lockhart.

My experiences at the Media Lab inspired me to set out to create a structure within which I could continue both the research and artistic applications of my work. Immersion Music was created as a not-for-profit organization in 2000 to realize that purpose.

3. PROJECTS 2000-2003
The types of work that we have done at Immersion Music include interactive performance systems, computer-based training systems, and concert production. We have developed six different performance systems during the past three years, including solo, duo, and concerto formats. We have also assisted with the development of three different visual accompaniment systems for performers, including an interactive video system, an interactive lighting system, and a system for interactive animation.

3.1 Music Systems for Gesture Performers
Among the solo music systems that we have developed is a software environment for the Conductor's Jacket interface that runs Manfred Clynes' "Superconductor" software in real-time. We frequently present this system in performance in a "solo conductor" format with the Bach Brandenburg Concerto. Our first duet for gesture performers was developed by Lia Davis at Harvard University, where it was premiered during an Immersion Music residency in February 2002. Our largest performance format to-date has been a "Concerto for Conductor"[2], which we initiated and co-commissioned. The piece was written by composer John Oswald and presented by both the Boston Modern Orchestra Project at the Boston Cyberarts Festival (May 2001) and the American Composers Orchestra at the Orchestra Tech Festival in New York (October 2001), with generous funding from the LEF Foundation and the Canada Council for the Arts.

3.2 Gesturally-controlled visuals
We have also developed several performance pieces that are accompanied by responsive visuals. The first was a gesture performance system with interactive video processing and control. This was developed with Walter Wright, the inventor of the music video format and an active real-time video artist. Our piece, "SP/RING," developed in May 2000, uses the "solo conductor" performance format. The performer uses conducting-style gestures to simultaneously control both interactive music and video systems.

In addition, we have worked with the abstract elements of theatrical lighting instruments to develop an interactive lighting system. In May 2001 we premiered a new system in collaboration with lighting designer Herrick Goldman at the Boston Cyberarts Festival. The performer was violinist Joanna Kurkowicz, playing a sonata by Alfred Schnittke. The piece had no electronic music aside from some minor amplification, but since Joanna plays on a 1699 Guarnerius violin, the sensing of her gestures could not be done by means of instrumenting the violin. Therefore, using the Conductor's Jacket sensors was a good solution to allow her performance gestures to influence and control the aspects of a complex lighting design. We further advanced the lighting system in February 2002 with lighting designer Sarah Sidman during the Immersion Music residency at Harvard University. Using solo violin works by Bach and Paganini as the basis for the performance, we built several different responsive visual environments for the performing violinist.

In November 2002, we extended our visual repertoire to computer animation. Working with visual artists Dong-Keun Jang and Jan Kubasiewicz, we helped to develop a visual

response to "Fratres" by Arvo Paart. The work was presented as part of the Massaging Media conference.

3.3 Computer-based Music Training Systems

In collaboration with Professor Gary Hill and the Music Department at Arizona State University, we have designed and developed a Digital Conducting Laboratory. The system has enhanced the curriculum for more than fifty undergraduate music students during the past three years, and has also served as a platform for a few graduate research projects. This work has been described elsewhere in [6] and also at www.immersionmusic.org. Future work in this area is of increasing interest for the organization, and we see a great deal of scope for interesting new projects in computer-based interactive musical training.

3.4 Concert Production

It should also be mentioned that in addition to our technical and artistic activities, Immersion Music has been deeply involved in the production of several events in the Boston area during the past few years. For some time we ran a series called the "Immersion Music Salon" at a local art gallery, which brought together many local improvising artists using technology in interesting ways. We have also presented events at the Boston Cyberarts Festival and the Boston First Night Festival.

Our largest undertaking to-date has been the joint presentation of "Orchestral Music at the Technological Frontier," an event at Boston's Symphony Hall in May 2001. We provided nearly all the technical support for a 3-hour concert of technologically-enhanced orchestral music, co-presented with the Boston Modern Orchestra Project. This concert attracted nearly 2000 people, which is quite a large number for a concert of new music. Ellen Pfeifer of the Boston Globe praised our efforts, writing: "the free concert drew a large audience that appreciated innovation. Young and cool, middle-aged and hip, plugged-in, free-spirited, garbed in the many varieties of geek chic and la mode Bohemien, the demographic was the sort many conventional music organizations would kill for."

Our forays into concert production have been an integral part of our mission, and will continue to be important in our future work. Interaction with the public gives us much-needed feedback and helps us understand where the work can be improved.

4. ACKNOWLEDGEMENTS

I would like to acknowledge the incredible work of the members of the Board, Advisory Board, and volunteers at Immersion Music, all of whom have given generously of their time and talents to help realize a special vision together. We also are deeply indebted to the fantastic artists we've had the pleasure to collaborate with, especially the Boston Modern Orchestra Project and its director Gil Rose. Finally, none of this work would have been possible without the careful and caring guidance of my graduate advisors Tod Machover and Roz Picard of the MIT Media Lab, as well as my doctoral committee members John Harbison and David Wessel.

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