THEESIS 2006

FUSION BAND

NEW HYPERINSTRUMENT BAND FOR CHILDREN'S MUSIC EDUCATION

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Abstract

This paper will describe the multi-user interactive audio and video installation named ‘Fusion Band’ which was developed by Jiyoung Kang.

By combining sensitive input devices and computer graphics imagery into an integrated musical and visual interface, up to fourteen maximum simultaneous players are able to participate in a collaborative approach to musical improvisation. I demonstrate that this interactive audio and video installation embraces both the novice and musically trained participants by taking advantage of their intuitive abilities and social interaction skills. In this paper, I present conclusions from user testing of this installation along with examples of interaction design methods and prototypes of interactive hyperinstruments.

Keywords:

Audio and video installation, hyperinstrument, collaborative, computer graphics, interactive music system, input device, children, music education, multi-user, novice, aural, visual and tactile art, rhythmical musical events, embed, ordinary life, music, art and technology, fusion
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Introduction
Personal Statement

Due to the great developments in technology, many things have been changed. New media brings many different forms of new art. Due to this, more and more virtual worlds will occupy our life. However, people won’t only want new things, but also yearn for old things. So even in the virtual world, people want to be able to touch things physically as they used to do. To satisfy those people, I came up with this idea that adding physical experience to the virtual world. This will give an interactive experience that will make a harmony of digital and analog world to the users. By adding this interactive experience to my project, I can get more attraction and interest from the people.

Since a childhood, I have had a diverse background. I love music, both playing and listening. I had learned playing the piano for six years and I took vocal lessens for two years and I had played flute for two years. Also, I have been loved drawing and painting since I started to learn those. Even though, I quit studying electron and electronic science, because it was too hard for me. I loved making electronic things. Like this, I am very open to various areas. For me, there is no distinction among those music, art and technology. In my opinion, those have to be enjoyed by people without any restriction. This is the personal reason that why I chose my thesis to fusion band. (I want to call my project like this, because it is a combination of music, art and technology all together at the same time.) I wanted to narrow the gap between music, art and technology through my thesis. In addition to that reason, since I was very young, I always wanted to be a teacher.
I really want to help people to enjoy learning. I don’t want people think learning as very hard and not enjoyable thing. Especially for children, I think we have to give them as many as chances that they can enjoy to learn. To accomplish this goal, I come up with my thesis which is an enjoyable music education tool for children. I want to children just enjoy music as itself without any fear of hard notes or compositions. I want them naturally enjoy sounds and rhythm.

Recent research demonstrates that we get more out of music if we absorb it, touch it, and shape it ourselves. This is especially important for children, since they are so well-suited to music-making (with boundless energy, emotional freedom, zeal to communicate, and flexible imagination); they often have no chance to create music because of music’s difficulties. The reason is that musical instruments are hard to play and take years to learn. Most musical interfaces today are hard and tough, from ivory piano keys to taut drum heads, to vibrating metallic violin strings. Music notation is difficult for many people to read. These complex things make the children can’t create and enjoy music easily and even avoid learning it. Some children get scared before they learn it because of those difficulties.
Examples of Existing Music Toys

To solve these problems, there are many various music toys like these. I know a bit about electronic toys. I've had my hand in coverage of consumer technology. I have watched children become completely absorbed in video games. I myself am easily addicted to them.

I'm convinced that electronic entertainment can cast a sort of mist over the physical world human beings have bumped around in for so long, making it seem slow and out of focus, compared with the new flat screens.

Even if some game skills are transferable to life apart from the computer, including enhanced visual attention and peripheral vision, as reported in a study in Nature on
Thursday by Dr. Daphne Bavelier and colleagues at the University of Rochester, the games create a world, as does television, which in some ways is more appealing than the physical one.

Through this research, I came up with this idea of combining electronic and physical entertainments. I decided to make new instruments for children to play and enjoy music freely. I wanted to make music not a hard thing to create but a part of everyday life. I think that traditional music training for children gave very little room for creativity.
Newly created technology-enhanced instruments can be supplementary tools for children's creative music making.

Most people love music, so they enjoy music by hearing and making it. However, our culture’s involvement with music is increasingly passive, not active. There are so many sounds which are around us. We can hear them anywhere like in schools, parks, theaters, phones and streets. People just can’t easily recognize their existence. Even though there is more music in our ordinary life, but fewer of us actually play music, sing music, or make our own music. Music rests in the periphery, like background wallpaper, tickling our senses but not engaging our intelligence.

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well-suited to music-making (with boundless energy, emotional freedom, zeal to communicate, and flexible imagination); they often have no chance to create music because of music’s difficulties. The reason is that musical instruments are hard to play and take years to learn. Music notation is difficult for many people to read. Musical ‘language’ is specialized, and the complex rules of harmony, counterpoint, rhythm, structure and form are only metaphorically connected to our common sense and day-to-day knowledge. These complex things make the children can’t create and enjoy music easily and even avoid learning it. Children get scared before they learn it because of those difficulties.

I also experienced these difficulties when I was learning playing the piano. At first, I was very excited about starting learning to play the piano. However, I soon got many troubles. It was so hard to read complex notes and playing the piano at the same time. I used to grumble about piano lessons, and finally I had to quit it. It was very stressful and fearful experience.

What if we could unlock the expressive mysteries of music first, before learning the technical foundations, if we could help children and also others fall in love with the joys of music first? Once they found that creating music is so fascinating and not that difficult, they can learn and enjoy music fearlessly. To accomplish this, I come up with creating new instruments.

Moreover, the newly created technology enhanced instruments (Hyperinstruments) are not like musical toys that have been existed. There are electronic toy keyboards and games like Dance Dance Revolution. These are fun and attractive to play, but those are not real instruments. Children can’t create music freely with those tools.
On the other hand, through using hyperinstruments, children or any other users can easily compose their own music, and express their own feeling. Hyperinstruments are not just providing fun, but also enable users actually create their own composition without any difficulties.

Music is a great way to engage young children because it is a natural and enjoyable part of their everyday lives. Children hear music or sing while watching television, riding in the car, at school, and as part of bedtime rituals. We often hear children creating their own songs and incorporating music in their play. Music is a socially engaging way to learn, and especially appropriate for the developmental levels of young children. Music supports self-expression, cooperative play, creativity, emotional well being, and development of social, cognitive, communication, and motor skills.

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The games can even, it seems, put a veil between mind and body. The Cartesian mind/body division is no longer accepted by science, but video games are
Descartes’ revenge. The eyes and fingers are allowed in the game, but the rest of the body becomes dead weight - meat, as William Gibson described it in the science fiction novel "Neuromancer."

Canadian novelist Robertson Davies, who wrote that "the hand speaks to the brain as surely as the brain speaks to the hand." You have to wonder, when the hand is clicking a mouse for a couple of hours, what does it have to say? Not much of interest I would think. But music is something different. Learning to make music on traditional instruments, even in a limited, amateurish way, draws on body and mind together. They function in intimate communion, as they should. You can't make music without thinking and feeling and training your hands. The connection of muscle and motion to rhythm and melody is fundamental.

That's why I was predisposed to doubt the value - not for music, but for human development - of Mr. Machover’s instruments. When asked whether there wasn't some value to the training in a traditional instrument in which motor skills, muscle memory, thinking, emotion and creativity all came into play, Mr. Machover said that he thought that traditional training for children gave very little room for creativity, which is what he was trying to provide.
Concept
The idea of **hyperinstruments** was to develop computer systems that could monitor and eventually "understand" every nuance of musical performance, so that the musician's interpretation and feeling could lead to an enhanced and expanded performance.

Our interactive technology should encourage this goal, by creating situations which invite people to participate in significant ways through eliminating every unnecessary barrier, while making sure that the experience offered enhances and expands life experience instead of being a mindless drug.

So, the situation is in fact paradoxical. We DO have to find increasing ways to make music a part of everyday life, by building "instruments" of expression into our everyday environment, into furniture, clothing, toys, walls, everything - but must do this so that our lives become richer, more REAL, and not synthetically plastic and "virtual."

Children learn music by doing music by interacting with musical material in meaningful ways as composers, performers and listeners. The challenge for me is to present children with appropriate objects, activities and situations to stimulate their natural creativity and enable them to express it freely.

I don't think my new instruments will be the primary music education tools, but I think those can support children to get interests in music and create music without any fear or difficulty, and give more creativity. Compare to the traditional instruments, they are easy to play, give more chances for creativity and attractive visually, auditory and physically.
Context
Research on Music Teaching and Learning During Elementary School Years

Diane C. Persellin
Trinity University

Music is its own discipline and need not to be justified to strengthen other skills or understandings. The learning of music, however, may also have a broader effect, one beyond the aesthetic merit of music, for example, the effect of music instruction on spatial skills. Music instruction can supply intellectual, emotional, and physical components critical to children’s development. During the last ten years, investigators have suggested that music instruction may have an effect on spatial skills or the ability to visualize an object from different perspectives. Hetland (2000), in a meta-analysis, examined 15 studies relating music instruction and spatial skills. These studies were conducted by a variety of research teams using various treatments. Hetland found that active instruction in music appears to have a small but significant effect on spatial skills for preschool and elementary-aged children lasting as long as instruction continues up to two years. Effects of music training, however, did not persist for long after music instruction ceased. The testing instruments used in these assessments are imperfect; low reliability of the testing measures used in many of these studies continues to be a concern. More research in this area is needed.

The effect of piano instruction on self-esteem. A McGill University study (Costa-Giomi, 1999) found that children who had taken three years of piano instruction had significantly higher self-esteem than children who were not enrolled in piano lessons. These results were not related to family income, sex, family structure, or parental employment. In addition to piano lessons, students in this study owned a
new piano, played in recitals, and received individual attention from a caring teacher. While these elements could also have had an impact on the improvement in self-esteem, the overall effect of piano instruction could not be disputed.

Conclusion. This is an exciting time to explore research on musical development and music instruction of children. Interest in how children learn and value music has increased dramatically in parents, educators, and the music industry in the past twenty years. As investigators continue to conduct new studies and to replicate current studies, a strong foundation of musical understanding will be developed which will strengthen music education for generations to come.

THE NEW YORK TIMES

June 3, 2003

Playing Music as a Toy, and a Toy as Music

by James Gorman

Tod Machover - composer, inventor, cellist and educator - has made it clear to me that I am a Puritan. This has nothing to do with sex. It's about another sort of seduction, the lure of electronics and computer technology, the easy pleasure of video games, the ultimately hollow virtual world.

Mr. Machover, professor of music and media at the M.I.T. Media Lab, is devoting considerable energy to luring children into the electronic world. He has invented electronic instruments that allow anyone, skilled or not, to enjoy the kind of creativity and collaboration available only to the most advanced players of traditional instruments.
Mr. Machover has not ignored those advanced players. He has, in the past, helped develop instruments like the hypercello, which Yo-Yo Ma used to perform one of Mr. Machover's compositions. But now, Mr. Machover has turned his hand to musical toys, or instruments for children.

He recently came to New York for a performance of his Toy Symphony and to conduct workshops at the Cooper-Hewitt, National Design Museum. Hyperscore, a composing tool he and his colleagues developed, is on display there as part of the National Design Triennial. The workshops allowed children to work with Hyperscore and play two electronic instruments called Beatbugs and Music Shapers.

I went to talk to him and to see and touch the two performance toys because of my curmudgeonly conviction that electronics, even in the service of creativity, could not be good for children, or anyone else for that matter.

I know a bit about electronic toys. I've had my hand in coverage of consumer technology. I have watched children (frequently mine) become completely absorbed in video games. I myself am easily addicted to them. Consequently, in my anti-technology moments, I have the moral fervor of a sinner.

I'm convinced that electronic entertainment can cast a sort of mist over the physical world human beings have bumped around in for so long, making it seem slow and out of focus, compared with the new flat screens.

Even if some game skills are transferable to life apart from the computer, including enhanced visual attention and peripheral vision, as reported in a study in Nature on Thursday by Dr. Daphne Bavelier and colleagues at the University of Rochester, the games create a world, as does television, which in some ways is more appealing than the physical one.
The games can even, it seems, put a veil between mind and body. The Cartesian mind/body division is no longer accepted by science, but video games are Descartes's revenge. The eyes and fingers are allowed in the game, but the rest of the body becomes dead weight - meat, as William Gibson described it in the science fiction novel "Neuromancer."

And yet, researchers in artificial intelligence and behavioral sciences often talk now about embodied intelligence. Dr. Antonio R. Damasio, a neurobiologist at the University of Iowa, who is the author of "Descartes's Error" and more recently "Looking for Spinoza," has argued that the mind contains a model of the human body and that the actions of the body inform the brain. "The mind exists," he writes in "Spinoza," "because there is a body to furnish it with contents."

In "The Hand," written several years ago, Dr. Frank R. Wilson, a clinical professor of neurology at Stanford, suggests that the hand has molded human language and consciousness during the course of evolution and that its activities are powerfully connected to the development of the individual.

To capture the essence of his argument, he quotes the Canadian novelist Robertson Davies, who wrote that "the hand speaks to the brain as surely as the brain speaks to the hand." You have to wonder, when the hand is clicking a mouse for a couple of hours, what does it have to say?

Not much of interest I would think. But music is something different. Learning to make music on traditional instruments, even in a limited, amateurish way, draws on body and mind together. They function in intimate communion, as they should. You can't make music without thinking and feeling and training your hands. The connection of muscle and motion to rhythm and melody is fundamental.
That's why I was predisposed to doubt the value - not for music, but for human development - of Mr. Machover's instruments. When asked whether there wasn't some value to the training in a traditional instrument in which motor skills, muscle memory, thinking, emotion and creativity all came into play, Mr. Machover said that he thought that traditional training for children gave very little room for creativity, which is what he was trying to provide.

"It's so difficult, physically to learn a traditional musical instrument," he said. "The smartest kids take a lot of time just to master the interface - to say nothing of creativity - before you're expressing something, and way before you is expressing something individual.

"I think that what I've tried to do in all this work is to emphasize creativity over virtuosity." Not that he is against traditional training. One of his daughters is learning the violin.

NEWSDAY

The Sounds of Play: Tod Machover is trying to revolutionize the way kids learn to make music with digital technology

Author: Justin Davidson

When he was a child, [Tod Machover]'s mother, a music teacher, would send the boy and his friends on scavenger hunts for objects with which to make interesting sounds, then organized chamber music sessions with their found instruments. Nine years ago, when he became a parent, Machover realized just how exceptional that
sort of activity was. Struck by the paucity of organized, creative music-making for young children, Machover embarked on a three-year, $3 million international project he calls "Toy Symphony," which in New York culminates next Saturday with a free concert performed by professionals and kids in the Winter Garden of the World Financial Center. In the meantime, groups of New York City public school children are busily learning to use Machover's toys: an antennaeed rhythm box called a "beatbug," a squishy "shaper" that produces a range of digital honks and rustles, and Hyperscore, the kid composer's first software.

"My goal," Machover said, "was to put together a suite of musical activities that children can do with other children and with grown-ups and that could end up in a concert." Some of the pieces that children produce in these weeks will be performed by a professional orchestra, along with Machover's own "Toy Symphony" for beatbugs, shapers and strings.

Date: May 11, 2003

Technology and Creative Expression

Tod Machover

October, 1995

The idea of hyperinstruments was to develop computer systems that could monitor and eventually "understand" every nuance of musical performance, so that the musician's interpretation and feeling could lead to an enhanced and expanded
performance. My idea was always to try to capture the most complete and integrated sense of the musician's meaning and intention, rather than to collect a set of unrelated "parameters" from performance which could then be "mapped" to independent features of a synthesizer or automated composition system. I always want the musician to imagine a musical result in its totality, to use highly developed musical skills and talents, and then to have the machine do the work to translate this into a desired and predictable result.

So I think that we must strive now for a music which can stand on its own against the other media - emphasizing its ability to create mysteriously deep emotional and mental experiences, encouraging listeners to "fill in the blanks" - while combining a seriousness of purpose and depth of content with a colloquial and non-elitist expression.

Our interactive technology should encourage this goal, by creating situations which invite people to participate in significant ways through eliminating every unnecessary barrier, while making sure that the experience offered enhances and expands life experience instead of being a mindless drug.

So, the situation is in fact paradoxical. We DO have to find increasing ways to make music a part of everyday life, by building "instruments" of expression into our everyday environment, into furniture, clothing, toys, walls, everything - but must do this so that our lives become richer, more REAL, and not synthetically plastic and "virtual."
The Music Toys developed by Tod Machover and his team at the MIT Media Lab for Toy Symphony are very sophisticated instruments designed simply to be played by any person with the desire to make music, with the specific needs and capabilities of young people in mind. There is no skill prerequisite-only the willingness to participate. There are three principal instruments used in the work for general audiences, and a fourth instrument for a more sophisticated musician. Through the use of Music Toys, children and adults alike can shape and modify musical lines...
with expressive gesture and delicate touch (Beatbugs, Shapers); use special software to draw lines that turn into musical compositions (HyperScore); and also learn about the Hyperviolin, the latest in a series of enhanced expert performance instruments devised by the team. Each toy has a very specific musical and pedagogical function.

"Toy Symphony" is an international music performance and education project that empowers children and adults alike, giving realization to modes of musical creativity and expression through the use of new concepts and technologies. It is a concert that is the climax of weeks of process in each city where it is performed, and the process is revolutionary: It teaches very young children that music is not just something to listen to, but also something to play and even create yourself. The means for doing this are new "music toys" invented in MIT's Media Lab - the beatbug, a percussion instrument developed by Gil Weinberg and Roberto Aimi; the shaper, which controls other musical parameters such as speed, volume, phrasing, and color (developed by Aimi, Tristan Jehan, Maggie Orth, and Hugo Solis); and Hyper score, a computer program that makes it possible to compose music by moving colors and graphic elements around a screen (Mary Farbood and Egon Pasztor designed it).

SPARKLER by Tod Machover

Play Performance (1.7MB MP3)
MATRIX

Multipurpose Array of Tactile Rods for Interactive eXpression

Dan Overholt
The MATRIX is a new musical instrument that gives users a 3-dimensional tactile interface to control sound with their hand(s). It can be used as either a stand alone instrument or in conjunction with a traditional musical keyboard or microphone. The MATRIX generates musical output by mapping a performer's expressive gestures to a variety of sonic parameters. It acts as an input device that directly manipulates the parameters of a synthesis engine (eg. additive, granular, wave-terrain...), or an effect algorithm (eg. delay, reverb, filter-banks...) in response to the changing shape of the interactive surface. In this way, the MATRIX provides a very intuitive method of manipulating sound with an amount of control that has never before been implemented in real-time.

One mapping uses the individual rods of the MATRIX to directly control the digital waveform of a sound, thereby "sonically sculpting" the timbre of the sound. An example of this technique is shown below in the excerpt from one of my compositions titled Dactylonomy. It is a duet for MIDI keyboard and MATRIX, and utilizes a custom synthesis technique that is actually a cross between Wave-terrain and Scanned synthesis (see "New Musical Mappings for the MATRIX" for more information). The video below shows the last 1:30 of the piece, which premiered August 17th, 2002 at the Woodstockhausen Electronic Music Festival in Santa Cruz, California.

Play Movie
My Past Projects

VIRTUAL FLOWER
Virtual flower incorporates physical experiences and virtual world. It is an interactive audio and video installation which is a combination of image processing and physical computing. There is a board that people can step on. People can give a physical input by doing the stepping and it controls virtual flower’s motion and sound. Through this piece, people can experience various senses such as seeing, touching and hearing.

See Movie

More on this project
1) Subtle, soothing and EASY interaction

2) organic composition

3) give life, light and joy

A wall of lights that illuminates your passing.

More on this project
Wonder Painter is a combination of Jitter and Serial Communication. A webcam which is connected to Jitter detect the color of the brush that is hold by a performer. We use green for the detected color, because it is the most rear color around. Then, the detected movement of the performer’s information makes shapes (circles, squares) with imitating the movement on the screen. The pallet that we created is the device to send data to Jitter. By sending several numbers to Jitter, it can control functions like changing colors and change shapes. In addition to this, we added sound effects to each shapes. When they are created, they are making different notes. For more fun, when the performer makes loud sound, all shaped will move to one direction.
Prototype Design Treatment
Project Description

You've done it at least once: Played air guitar to your favorite song -- alone, in a crowd, or in your car. Music connects us in some way to a thought, an idea, or a memory. But actually learning how to play an instrument or compose an original tune is hard. However, imagine if you were 10 years old and you could play a musical instrument, without spending years in music lessons.

By creating a whole set of new instruments, I am trying to turned to technology to design special musical instruments that eliminate years of scales and struggles with fingering. The new instruments are for children to perform and compose music, create and compose music. Also, a group of people can play the instruments.
together. Kids can learn to work together to compose a sound. Many great ideas can come through this group collaboration.

These new type of instruments can be intuitive. They are easy to learn for children, but also deep enough and rich enough for professional performers to try to figure out what is exactly going on by playing with the new instruments. Through these instruments, I can give children who might not have access to music a chance to explore their creative side. It by no means replaces traditional music education, but serves as a supplementary tool. This is a world where music and technology merge, a world often without clefs, quarter-notes and other conventions of music notation, a world accessible to young novices and accomplished musicians. With the new instruments, I am going to create an installation 'Fusion Band'.

'Fusion Band' is an audio and video installation which is a combination of sensing experiences which are seeing, touching and hearing. There are two different instruments which are not existing ones. These are sophisticated hyperinstruments, designed for children and non-professional musicians. I will create new kind of instruments that will be played by touching light balls and pressing the touch pad. While performers are playing, a computer which will be connected to them by using the Bluetooth is also generating sounds. Both of these different instruments will have sensors in themselves, so they are sending data to the Jitter. Jitter will create different effects on the 3 dimensional animations that will be playing on a screen.
**Instruments Design**

**Touchable Rainbow**

Touchable Rainbow is an instrument which allow the creation, manipulation and sharing of melodic motives through a simple interface. Multiple Aluminum balls are connected to touch sensors, so the players can play and share creative music composition and generating animation. Each ball represents each note from a scale. For example, the first ball will sound 'Do', the second for 'Re' and so on. At the same time, each ball will generate individual animations on the screen.
Touchable Jello

Touchable Jello is soft and squishy instruments, which allow players to press the Jello like buttons and explore musical material and compositions. Using Force Sensing Registers underneath the Jelly buttons to measure the pressing gesture, Touchable Jello allows children access to high-level musical parameters such as composing creative music. The effect is that of "conducting" musical phrases and forms in a very tactile, visceral and enjoyable way.

These are multiple-person, sophisticated hyperinstruments, designed for children and non-professional musicians. Part of a musical texture or fragment is provided by a computational system, and is then modified, personalized, or "touched" by the player. Especially these instruments are made for touching, a wide range of materials are being explored, including foam balls, plastic balls, rubber balls and wood. Such interfaces are proving to be useful for children and students, giving direct tactile control over complex sound systems, but will also be sophisticated
enough for use by sophisticated musicians and music-lovers.

The Fusion Band prototype design is incorporated with those two hyperinstruments and creating an immersive musical environment with a projection display on a wall. The design supports face-to-face audio and visual collaboration by enabling users to play instruments, simultaneously creating rhythmical musical events and visual effects.
3 Dimensional Animations

For Children

I have two versions of animation for this installation. First, for the children I will have an animation which is the scene of under the sea. Also, there is a girl who is singing a scale. Through this animation, I want children to be attracted by the visual effects.
Second version is for general use. This installation is not being just for children’s music education but also for general people. For these people, I will have another animation and sound which is very oriental and calm. This version can be installed in public or houses. People can just enjoy see the beautiful visuals. For this version, I will have completely different kind of sound from the first one which will be also very clam and oriental. I want to express the beauty of simplicity which is the basic
beauty of Korean art. People will have peaceful mind through this animation and sound.

**Inspiration**

When I was designing the new instruments, I was inspired by Korean traditional instruments like ‘Gayageum’ and ‘Jang Goo’ which are very physical.

I want to add this physical aspect of traditional instruments to the digital device (Jitter). Also, the instruments will have different kinds of sound. These very different styles of sounds will make a harmony. Performers can play the two instruments at the same time, and they can play in concert. Through these, I expect to accomplish the seamless music and art. My final goal for working with children is to bring them the delight of sound itself; the delight of gesture and physical engagement with music-making and performing in a group. In addition to this, I want to let the people experience the beauty of oriental art and music through my installation.
Implementation of Prototype
How to make Touchable Rainbow

QPROX Sensor for sensing

4 super bright LEDs for light source which are inside of the balls
Aluminum meshes around the transparent plastic balls

Final Figure
How to make Touchable Jello

FSR (Force sensing Register) for Sensing

Attach Jello feeling buttons over the sensors
Connect Oriental style lamp shade to the instrument

Stage Design
Why Lights?

The reason that I added light sources for my instruments:

- Embed instruments in our ordinary life.

- Lights that will light up the dark places.

- Visually attractive.
TIMELINE
12/2005

**Concept and Physical Design**


**Hardware Design and Development**


**Interaction Design**

**Mappings**

**Sound Experiments**

**Instruments Design**

**Graphics Design**


**Building instruments**

**3 Dimensional animations**

5/2006

**User testing**
Sketches

Touchable Rainbow

- Touch & Play
- 7 or 8 notes

Transparent plastic ball

Qprox (Touch Sensor)
Superbright LED

When a person touches the ball, the LED is lit and makes sound.

Qprox

Connected to PIC

Taking to Bluetooth

Send data to Max

Max: generating video footage
making sound
I chanced my mind afterwards, because I thought touching with children’s hands will give more variety of composing music.
Conclusion
Future Plan for the Fusion Band

More Various Instruments – I will add more various physical instruments for various sensing experience. For example, blowing the air, shouting their voice or

Larger Scale – I only have one scale of notes, so I want to have larger scale of notes for various music compositions.

Various Sound and Animation Options – For different target of performers, I want to have more various sound options and animations that the performers can choose. I want to make them choose their own sounds and animations freely for their own taste.
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Diana Young, Georg Essl (2003). NIME. HyperPuja

http://www.media.mit.edu/hyperin/papers/YoungEssl_NIME03.pdf


Related Work

Toy Symphony
http://www.toysymphony.net/
Multipurpose array of tactile rods for interactive expression
http://alumni.media.mit.edu/~dano/matrix/

My Project

Virtual flower
http://itp.nyu.edu/~csl283/itp/show/winter05/

Wonder painter
http://changsoo.com/itp/jitter/final/

Ludic
http://stage.itp.nyu.edu/~ah1121/ludic/