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# SPACIAL POEM

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## A New Type of Experimental Visual Interaction in 3D Virtual Environment ↓

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**Summary** ~ SPACIAL POEM is a study about a new type of real-time visual interaction in a virtual game environment through a playful behavior like playing a musical instrument which relates to human emotions.

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**Abstract** ~ There is always a rhythm in our language and speech. As soon as we speech out, even just simple words and voice we make are edited as various emotions and information. Through this process we succeed or fail in our communication, and it becomes a fun communication or a monotonous delivery. Even with the same music, impression of the play can be different according to each musician's emotion and their understanding. We 'play' our language in the same way as that. However, I think, people are used to the variety, which is, in fact, the variation of a set format covered with hollow variety. People might have been living losing or limiting their own creative way to express themselves by that hollow variety.

SPACIAL POEM started from this point. This is a new type of 'real-time visual interaction' expressing our own creative narrative as real-time visual by playing a musical instrument which is an emotional human behavior. Producing many kinds of sound by playing musical instruments is the same behavior with which we express our emotions through.

There are sensors on each hole on the surface of the musical instrument. When you play it, sensors recognize that you have covered the holes. All sensors are connected to a keyboard, which means your playing behavior becomes a typing action on the keyboard. And I programmed the visual of your words to spread out in a virtual 3D space when you play the musical instrument. The behavior when you blow the instrument, to make sounds, changes into the energy that makes you walk ahead continuously in a virtual space. I used a microphone sensor for this. After all by playing musical instrument, we get back the emotion we forgot so far, and my voice is expressed with my own visual language in virtual space.

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**핵심어:** *Tangible Interaction, Physical computing, User Interface, Game Design and Play, Interactive narrative*

## 1. Human-like interaction

The more complicated society becomes, the more simple and clear way of thinking develops. Humans' wish a more emotional and personal behavior when interacting with tools they have made using high technology. Facing huge amounts of interfaces that quickly mushroom from industries and changes itself causes us to not only succeed in communication with the proper target, but also fail in it by technical or cognitive errors. This brings us to live in a society that continuously forces us to look for a more proper interface with human emotions.

*Humans deal with emotions on a continuous basis and emotion are intrinsically part of our intelligence, part of the social interaction and the ability to make decisions (Damasio, 1995).*

*Even with some basic interactions, several studies have shown that humans exhibit social behaviors when interacting with computers. (Reeves & Nass, 1996)*

It is hard to interpret and define human emotions. Even though emotional aspects have become one of the most important parts in human friendly interaction between human and environment, we have not yet studied thoroughly the relationship of human emotions and behavior. [1]

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### 1.1 Computing and tangible emotions

Many studies of human-media interaction say that people exhibit their social-emotional responses when they interact with media. Even designers considered interface design as the tools for better performance of tasks during the last long period, but what is clear is that people do not respond to interactive interfaces putting aside their social-emotional concerns any more.[2]

In this point of view, people's rich and complex emotional aspects should be considered as a core value to improve our media environment with future interfaces. High-tech advances are needed for that but should be hidden behind the surface to make people interact with media naturally using their own emotion. As mentioned, it is not easy to define what emotion is, but when we interact with the digital environment we at least can let our abstract emotions become tangible like visuals to be seen or sounds to be heard.

### 1.2 Gesture of use through interfaces of media

Human express their social-emotional concerns through their physical gestures like facial expression and a change of hand moving when manipulating through interfaces of media. For human-like interaction, thorough study about human gesture of use is necessary that leads to the successful and effective communication with media.

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## 2. Playful human communication

Meeting other people and sharing information is necessary to survive as a member of society, we call it a social activity which has been advanced in more playful ways. The same value with off-line communication has been expanded to on-line media and devices such as blog and trendy devices, and it is not a new aspect anymore. People like to create their own world where they can understand and can become a meaningful person in it by belonging to it. By that people always tend to make their own tribe with common sense based on social activity.

According to Friedrich Schiller a German poet and philosopher, human desire of pursuing fun is elemental impulse that is considerable to direct human behavior. Humans tend to pursue fun through instinct without any instruction. Impulse wakens the desire of humans to meet the needs inside and encourage them to make it. Desire of humans for fun becomes the inherent power that makes people play.[3]

For that reason playful way of communication is the core thing that should be considered for a better human-like interaction. Humans do not respond to media by thinking of it as a mere machine or digital content.

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### 2.1 Game: experimental digital experience in narrative structure

Game that grew deeply in our daily life and became a culture has been developed as another giant industry. Types of game and tool for it have become various. That reflects exactly humans' needs for the culture variety. In this context, kinds of virtual reality and future input devices will be diverse and transformed in more exciting way. Moreover the demand for more creative talent has driven game companies to bring in artists from outside of what one would traditionally call the video game industry.[4] However, far from this variety and creativity, there exist a story driving through a game and narrative supporting it in the basis of all games. They are kinds of structures cause

fun and immersion in a game. Narrative is a sort of total experience structure that can be made inside game story as a way of undergoing. Creation of a new type of narrative has potential to lead to a new game genre that shows different interaction than before.

Game generation has now become next adult generation that moves society. In consequence of this, insight into a game and suggesting future narrative based on that are very important job. [5]



## 2.2 Digilog: Digital+Analog

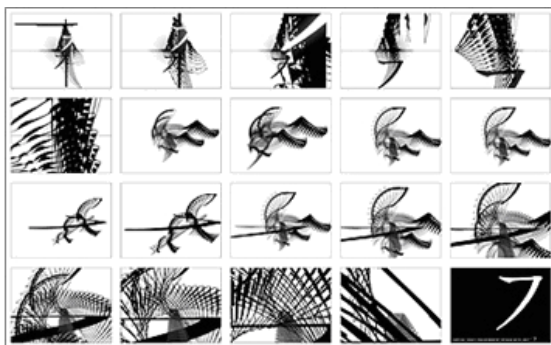
Digilog is the composite word of Digital and Analog which means the power made when the both components go together in the modern high-tech digital age. Digilog power has already been covering in all fields like industry, society, and culture by complementing digital products and services with analog emotion so that finds new opportunity in niche markets. It reflects, we can not pass the next digital generation with only IT power and advances in digital technology. People have been realizing that the best digital should be something more emotional and human-like which respect more human than technology.[6]



## 3. Playing Hangeul



1 Installation and performance



2 Visuals for virtual game environment made by Hangeul unit 'ㄱ'

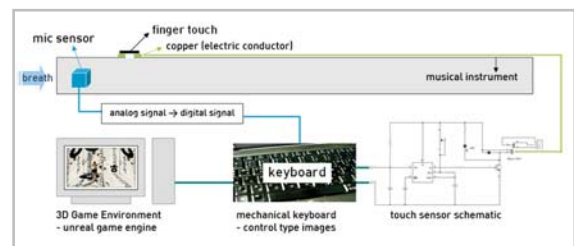


3 Concept movies by playing a short bamboo flute

Producing many kinds of sounds by playing musical instruments becomes the same behavior in which we express our emotions through speech. In this installation you can play your words by playing musical instrument and see your emotional rhythm through the real-time visual on a screen. I chose Hangeul as a visual component and Korean traditional musical instrument as a controller to play your words. When you voice your words by playing an instrument, the visual language is spread out in a 3D virtual environment.



### 3.1 SCENARIO: Playing HANGEUL with musical instrument in 3D virtual space



4 Schematic



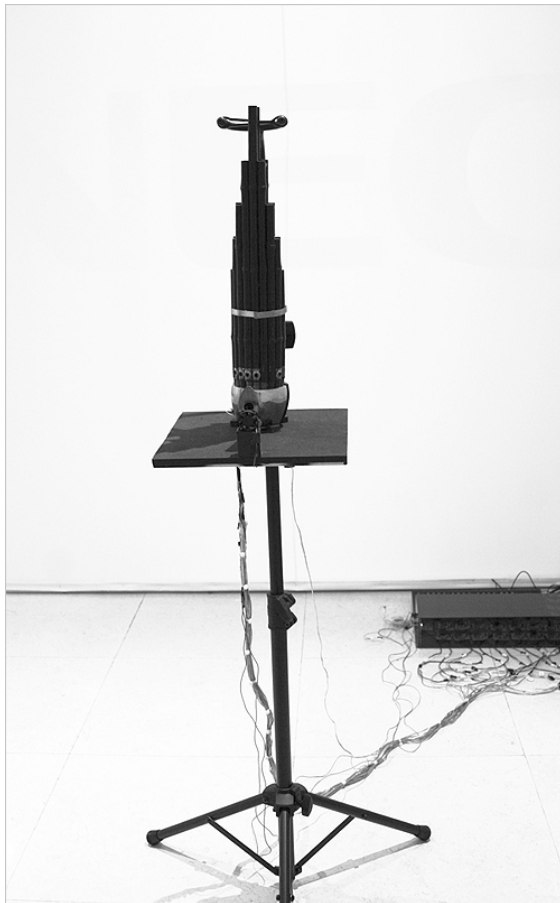
5 Hardware

There are several holes on the surface of a musical instrument to make sounds. I used some sensors to recognize specific Hangeul letters on each hole by connecting it with a mechanical keyboard so that it

can produce Hangeul visual by playing. When I breathe through the entrance hole, that behavior becomes the energy for the game player to go ahead. Covering the holes during the play has the same function as a typing keyboard so that I can produce visuals planned to put on each. Controller can be any musical instrument that has holes in it, and visual can not only be letters but also letter combinations. By playing this musical instrument I can create my very own visual environment inside the game.



### 3.2 Digilog Controller



6 SangHwang as a controller for computer game

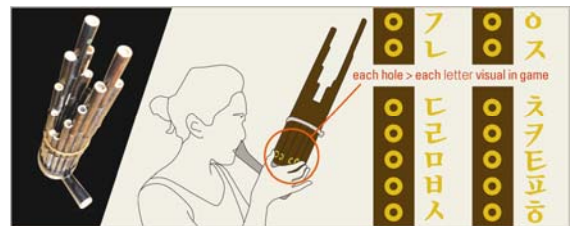
Users play the game by playing a musical instrument and the electric apparatus is installed and hidden behind the instrument. This brings users to feel an artificial technology if compared to usual game devices like a mouse and keyboard. I used SangHwang as a controller. SangHwang is an ideal instrument as a controller to express various visuals inside game with quite a lot of holes in it. When you start to play SangHwang, the game starts by going ahead on the screen. When you cover a hole during the play, the sensor being put on becomes active and sends the

signal to the computer. That brings a dynamic visual processing in a 3D virtual environment.

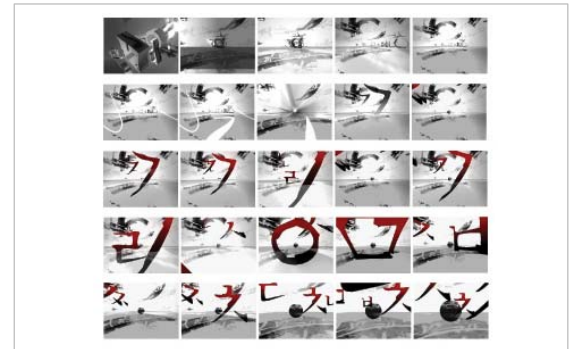


7 Playing game using SangHwang

### 3.3 Real-time game visual interaction in a playful way

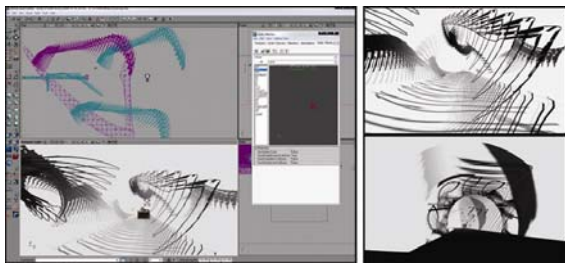


8 Each hole means each letter visual



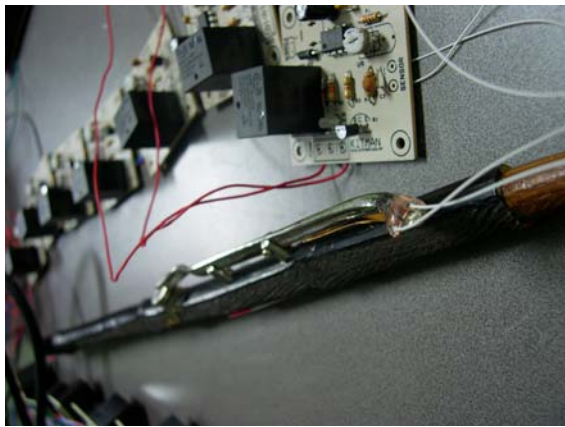
9 Real-time expression of letter visual in game by playing SangHwang

Each hole of the instrument is connected to a Korean letter shape of images that are already made inside in an unreal game engine. When users touch each hole, the image coming under them spreads out in the game space at the same time. If users play a cord, which means covering more than two holes at the same time, related images spread out together. Through this principal, user themselves make their own visual experience that is unexpected with a random composition of images and screen conversion through their manipulation. That brings to users themselves to go through elevated visual experience by playing a musical instrument meaning emotional behavior and not by manipulating mechanical devices.

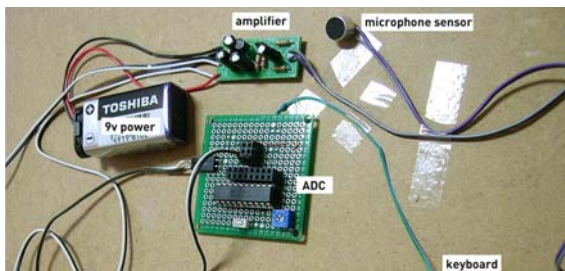


10 Unreal game engine editor and environment visuals

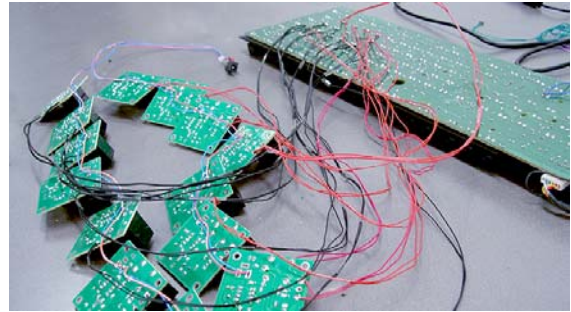
Visual and programming work for functional realization is accomplished like this: First, I register images made by 3D software 'MAYA' at section of Unreal game editor 'Static Meshes'. Then I make the root 'NewWeapon>classes' under program folder and save the 'uc' files inside. The 'uc' files are to import each image registered before. This 'uc' file has options to change characters like size and speed, etc. After I delete the file 'newweapon.u' located under the system folder of game engine, add the script 'EditPackages=NewWeapon' in the file 'ut2004.ini'. Then I compile files modified by run 'ucc make'. For the last step I modify the key mapping in the file 'user.ini' inside system folder.



11 Connection between musical instrument and touch sensor



12 A circuit to transform analog signal of microphone sensor into digital signal. (Work by Hong Sanghyuk)



13 A use of mechanical keyboard by connecting to a circuit of touch sensor

Copper tape located around the hole of instrument is connected to each key of mechanical keyboard through the electrical apparatus with touch sensors. Through playing the musical instrument, users are able to manipulate the keyboard and control the game environment. Microphone sensor located inside the entrance of instrument is connected to ADC so that the analog signal is transferred to a digital signal. The digital signal is delivered to the key '↑' on the mechanical keyboard through the amplifier equipment. This camera view of the game starts to move ahead with user's breathing when they start to play the musical instrument.

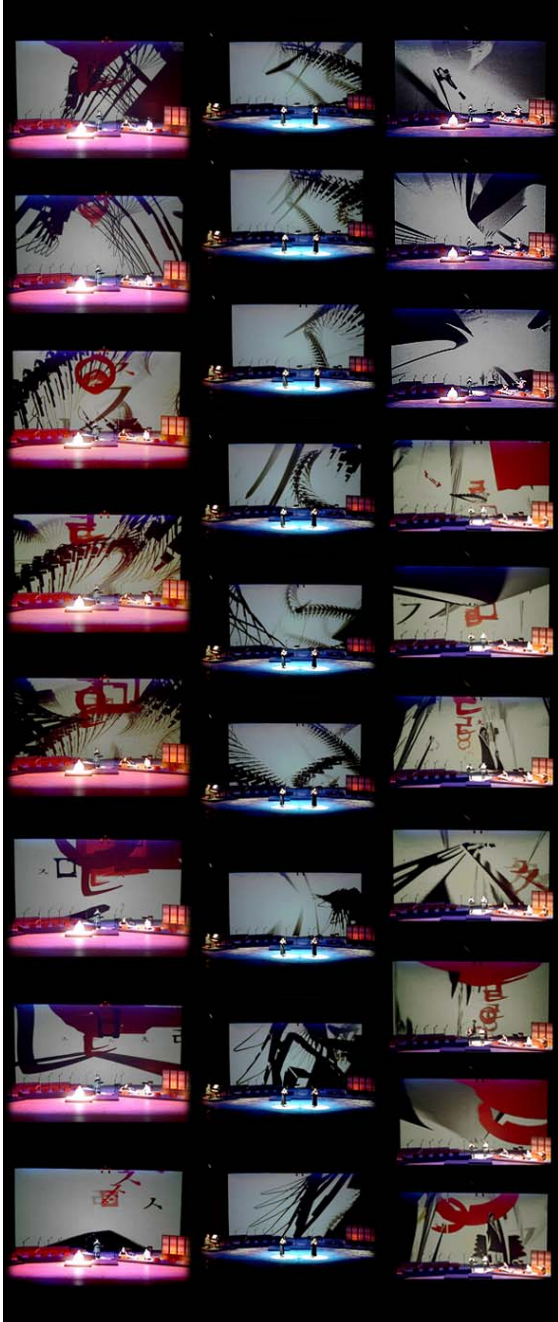
### 3.2 Experimental visual processing by user



14 Visual processing by inexperienced user's manipulating



15 Installation in public



16 Interactive music concert in The National Center for Korean Traditional Performing Arts

#### 4. Conclusion

The goal of my thesis is to create an experimental visual interaction in 3D a virtual environment. Through this work I wanted to show how an effective emotional communication may be realized into a human media communication. I studied many different design methods including technical issues in this

project to create an interactive digital media space and visual with a physical and human-like experience. The required affective reasoning naturally breaks down into two areas: emotional communication through human-like interface and affective virtual game environment. The idea of SPACIAL POEM project can be adapted into game, play and concept architecture. If this is developed more with sound effects on its original sound, it definitely can be expanded into other areas like film and music video as well as any other genre.

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#### References

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- [3] Hakjin Kim, et al., *Digital fun! Fun creates the value*, Samsung Economic Research Institute, Seoul, 2007, pp. 21~22
- [4] Crawford, Chris. *The Art of Computer Game Design*. 1982
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