

# Liquid Media: The Ripple of Emotion

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## Abstract

*Liquid Media is an artistic experiment to combine visual art with spatial sound to construct a new form of multimedia. We try to link a series of liquid images to computer-generated liquid sounds both in digital and analog media on real-time. To achieve it, we designed a special human-computer interface and a multimedia system which can create liquid images and sounds. At first, we constructed an installation enabling to create big water ripples and ripple sounds. The installation is connected with a MIDI signal generator which is possibly utilized like a MIDI keyboard, thereby initiating ripple sounds and ripple images by playing. Also, this work can be a group of interactive installations and a kind of human-computer interfaces for an audio-visual performance. Accordingly, public may participate in playing these instruments on this audio-visual installation, and they had an adventurous experience while their performance.*

## 1 Concept

*Liquid Media* was motivated from a simple idea that the image of sound is analogous with the properties of liquid like water, so the metaphor for associating image with sound is liquid. As liquid ‘visually’ flows, undulates, vibrates and diffuses by outer forces over time, so does sound. This idea led us to map the visual properties of liquid, especially water, to those of sound. Specially, we are focusing on the qualities of ripple and diffusion in this project but we will be able to extend our focus to more various properties of liquid.

## 2 Interface: Water Ripple Generator

The water ripple generator (WRG) is a special installation enabling to simultaneously generate real water ripples, water ripple images, and ripple sounds on real-time.

As seen in Fig0, WRG is composed of several parts: an input part (a keyboard), two output parts (an image output and sound outputs), a water tank, a ripple generator, a specially designed microcomputer board, and two or more computers (for image and sound).

**Input (MIDI signal generator):** The input will be basically a MIDI signal generator like a musical keyboard. The MIDI signal generator can generate MIDI signal to make ripple

sounds and to control the ripple generator. The signal from the generator (or keyboard) is transmitted to the microcomputer board. Actually, we can use any other input devices instead of the keyboard.

**Outputs:** The image output is a beam project output and the sound output is four or more channel speakers.

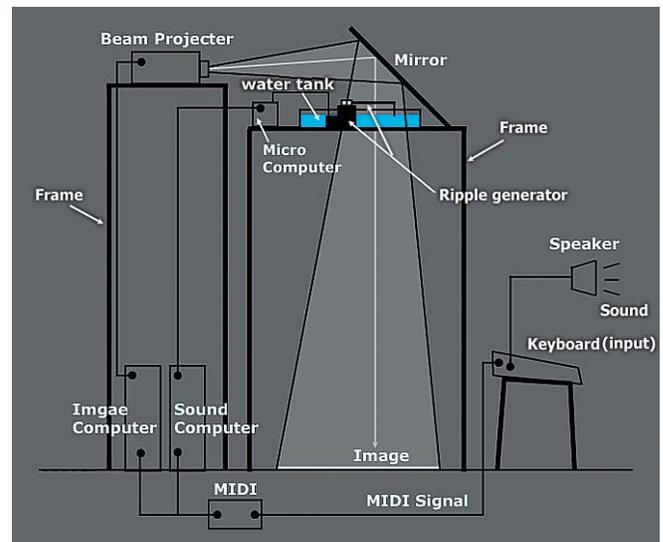


Fig0: The overall structure of WRG

**Microcomputer board:** It is a specially designed board to receive the MIDI signal and then to decode another signal to control the ripple generators. (Fig1)



Fig1: Microcomputer-board

**Ripple generator:** It is roughly composed of a motor and a vibrator (Fig2). The decoded signal controls the motor and vibrator through the microcomputer board. The signal determines the rotational angle of the motor and amplitude of the vibrator. This motor locates the vibrator to a certain position in the water container, and the vibrator can

undulate the surface of water. Therefore when the user play a MIDI signal generator, the light (or image) from the beam projector, which passes through water, can vary according to the ripples concurrently with the ripple music. We made two ripple generators at the same time to create various forms of ripple images (Fig3).

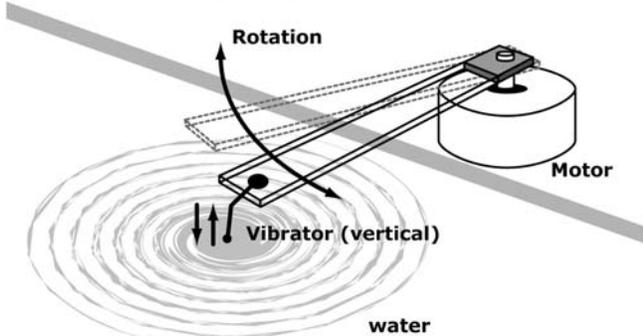


Fig2: The structure of the ripple generator



Fig3: two ripple generators

**Water tank:** It is made out of the transparency plastics or glass to pass through the image or light from the beam projector.

**Image:** The final result images are on the floor. We can add some various colors to the images. Or we can make some preprogrammed digital images and then project them on the surface of water in the water tank (Fig4).

**Sound:** The sound can be mainly generated by MAX/MSP which is a real-time interactive audio processing, modulation, and synthesis environment. It can be so sufficient to hear spatial sounds and to represent the diffusion and vibration of the sounds that the audiences can feel the dynamic movement of sounds through 4 or more channel speakers. As the spatial sounds create visible images, the visual sounds are associated with audible vision in this synesthetic expression.

**Image computer:** Simultaneously processing digital image and sound by only one computer needs such many operations that the computer cannot handle them promptly.

We will need one or two image computers to process digital images on real-time.

**Sound computer:** Together with the image computer(s), another sound computer will be necessary for processing rich digital audio sounds.



Fig4: examples of the ripple images on the floor

### 3 Materials and Development

**Input(s):** a musical MIDI keyboard (like Ensoniq TS-12 Synthesizer) or specially designed MIDI signal generators

**Outputs:** four or more channel speakers for sound, two or more beam projectors for image

**Microcomputer board:** Atmel ATmega16 microcontroller (8-bit), a bunch of electronic components, and MIDI communication IO ports

**Ripple generator(s):** two step motors, two solenoids for vibrators, small transparent plastic beams

**Water tank:** a transparent glass or plastic box (about 1 x 1 x 0.3 m) and metal frames to support and fix the tank

**Image and sound computers:** Two Power Mac G3 with 600Mhz or higher and 512 M ram and an IBM PC with Intel Pentium4 1.2 Ghz or higher and 512 M ram)

**Extra sound systems:** an 8 input MIDI interface, an 882 Protocols audio digital interface, a 16 channel audio console, an audio amplifier

**Development tools:**

hardware programming: GNU compiler for C or C++

image programming: Microsoft Visual C++ 6.0 (MFC Windows Programming)

sound programming: MAX/MSP

image design: Adobe Photoshop, Adobe Illustrator, Adobe Premiere, Adobe After Effect.