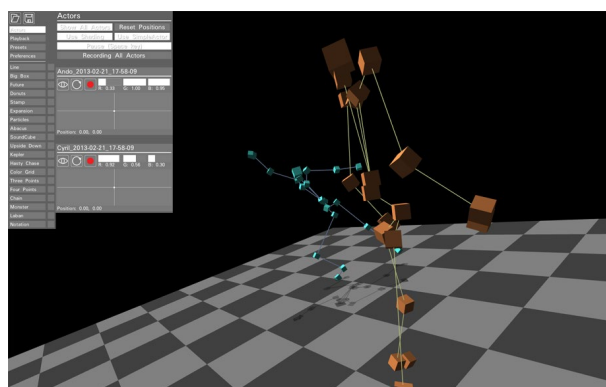**Yamaguchi Center for Arts and Media [YCAM] Research and Development**

YCAM InterLab + Yoko Ando Joint Research and Development
"Reactor for Awareness in Motion"

Now available in Open Source
## "RAM Dance Toolkit" & "MOTIONER"

@ http://interlab.ycam.jp
From 2013/5/11 Sat

YCAM has taken part in the development of the hardware and software for the "future of dance". They will be made available on the internet.

Since 2010, Yamaguchi Center for Arts and Media (YCAM) has carried out "Reactor for Awareness in Motion (RAM)", a research project developing a tool for dance creation and education, with Yoko Ando, a dancer from The Forsythe Company. In order to illustrate a new way of dance by establishing multiple ongoing relationships between dancers and their surrounding environment, YCAM InterLab, YCAM's R&D department, and programmers and dancers from Japan and overseas have worked on the project over three years. The result is, "RAM Dance Toolkit" and the hardware, "MOTIONER". And we open-source our research outcomes so that anybody who wishes can access the information. These tools, given birth in the realm where art and technology inspire each other, not only advocates the latest in dance but also has the potential to be applied to purposes other than dance creation. Experience its possibility firsthand!
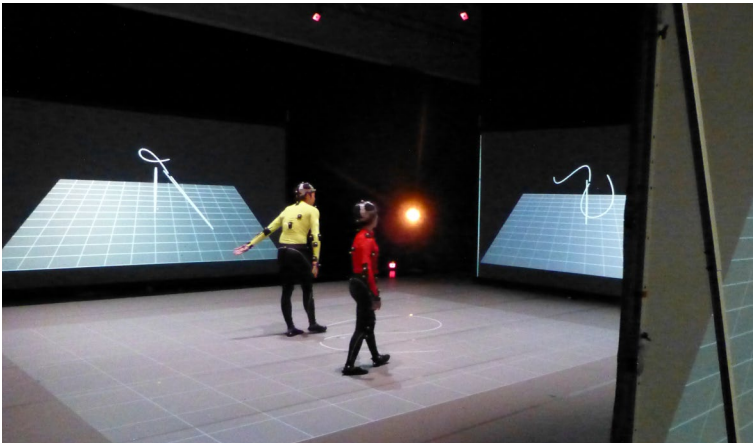

"RAM Dance Toolkit" software
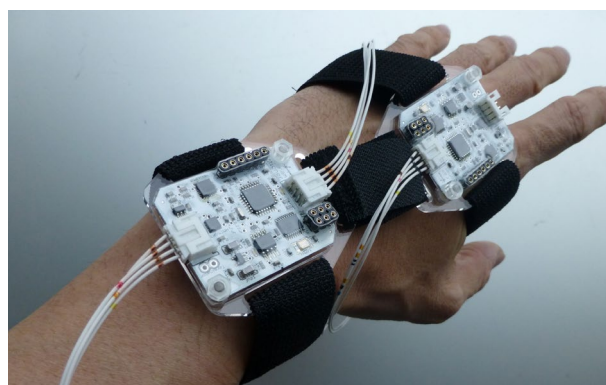
"MOTIONER" hardware

To inspire ideas in dance- "Reactive Device = RAM"

Work in progress (2012)

Imagine dance as a kind of game for dancers based on "rules" that define how they take in surrounding information and react to it. RAM is based on this concept, which Yoko Ando has developed through out her dance career. RAM explores the environment that activates dancers' perceptions and thoughts and the interrelationship between dancers and the environment in which, once they start moving in response, the software reciprocally produces a new environment. YCAMInterLab took the initiative for the entire research project.

Mechanism of RAM

Using devices such as motion capture systems or "Microsoft Kinect", a computer detects the movements of dancers, collects and converts various relevant information, and visualizes them in the context of the dancer's body. Processing everything in real time, it allows dancers to decide their next movement, in other words create their own "rule", based on visual, aural and haptic information. With RAM, creators can visually observe dancers' ideas and gain a real-time feedback of their movement from the environment. It provides a tool for creators to accelerate the trial and improvement process. RAM is a means to create, to clarify problems and to address deeper issues.

▌ Yoko Ando

Ando embarked on a career as a dancer after meeting Kuniko Kisaki in 1989, and appeared in numerous dance performances choreographed by Akira Kasai and Kota Yamazaki among others. While choreographing and performing her own solo pieces since 1997. Ando now enjoys a worldwide reputation as a leading dancer and central member of The Forsythe Company. In Japan, she continues to work on her own projects while collaborating with other dance companies as a guest performer or choreographer.

▌ YCAM InterLab

produces art and theater works within YCAM's commission works, as well as producing technological aspects of educational programs at YCAM, and acting as technical support for invited exhibitions and performances. YCAM Interlab not only collaborates with visiting artists and outside engineers, but also collaborate with other cultural facilities and research institutions, and pursue their own independent research and development projects.

▌ RAM's conceptual diagram
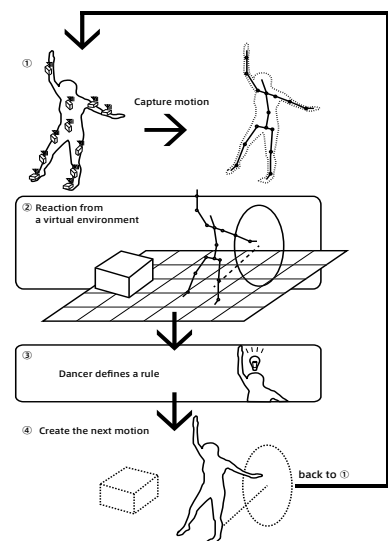
Low-cost Motion Capture System and Toolkit
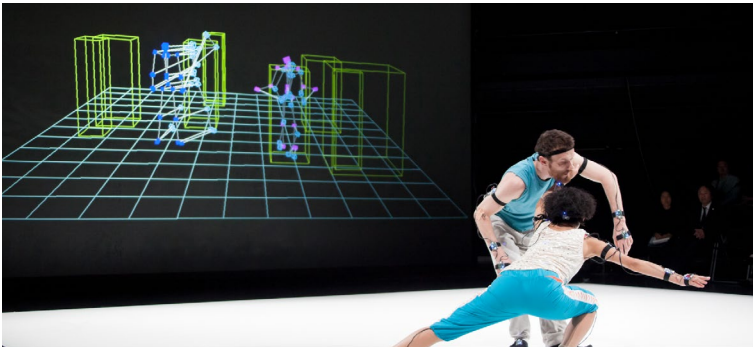
"MOTIONER" and "RAM Dance Toolkit" (Photo by Atsushi Tanabe)

As the result of 3 years research project, YCAM developed a program "RAM Dance Toolkit" and a motion capture system "MOTIONER"

RAM Dance Toolkit

RAM Dance Toolkit contains a GUI and functions to access, recognize, and process motion data, collected by "MOTIONER", Kinect and others. The fact that users can design the environment freely through programming supports creation of various kinds of feedback to dancers using code in an easy way. Toolkit uses openFrameworks, a software-development toolkit for artists. That means users can use functions from both RAM Dance Toolkit and openFrameworks. RAM Dance Toolkit will also be published as an application. Those who don't have experience in programming can also choreograph or rehearse based on the RAM concept, with previously programmed environmental conditions, which we call "scenes".

MOTIONER

MOTIONER is the inertial motion capture system which is low in cost and reasonably accurate. Via 18 small sensors and low-stress special straps, which allow the sensors to be installed properly regardless of the dancer's body shape, the computer captures the dancer's movements in low latency.

openFrameworks

openFrameworks is a free and open programming environment for creative coding, specialized in art and design. One can add a number of functions such as video effects and linkage with hardware using a compact library called "addons". YCAM invited Zach Lieberman and Theodore Watson, who developed openFrameworks, in 2008 and hosted a workshop while using the program for various artistic projects at YCAM.
http://www.openframeworks.cc/

Motion Capture System

Motion capture is the process of measuring the movement of objects or people and recording it on a computer. It is mainly used in filmmaking and video game development. Broadly-classified, there are two types of capture systems, optical and inertial. They both come with advantages and disadvantages. Most optical systems use markers coated with a retroreflective material, which are attached to the object to be measured and utilize data captured from image sensors to triangulate the 3D position of a subject between one or more cameras calibrated to provide overlapping projections. It is highly accurate. The margins of error are less than a few millimeters and the latency is very few. However, it is quite expensive and it can be several millions to tens of million yen.

Inertial systems use inertial sensors attached to the object to be measured. By calculating the angles and rate of acceleration of each body part, the system measures the movement. Unlike optical system, one can measure movements regardless of shielding objects such as walls. Sensors can be attached under clothing. However, the system can't measure the position of the object in space. In most cases, it requires additional systems to supplement the measuring for that reason. The price is similarly several millions to tens of million yen.

From a tool to an educational program: For the next phase of dance

Dancers' pilot demonstration at The Forsythe Company

Presentation of Results

2/23,24
Presentation & Workshop
@ Yamaguchi Center for Arts and Media [YCAM]

3/19, 20
Presentation
@ The Forsythe Company (Frankfurt, Germany)

In the coming years, YCAM aims to develop a new community for dance and technology by boosting the number of RAM users. For that, we will host demonstrations and workshops for dancers and creators. In addition, YCAM envisions developing and conducting an educational program in which the Ando's concept is explored for people to re-discover their own somesthesis. RAM is a revolutionary project in the sense that the technology is not only for theatrical effect, but also embodies one of the very natures of dance and communicates it with the world. We look forward to its future development, how it brings users in, and we hope you do, too.

Outline

YCAM InterLab **+** Yoko Ando Joint Research and Development "Reactor for Awareness in Motion"

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RAM Participants: Takayuki Ito (YCAM InterLab), Richi Owaki (YCAM InterLab), Yoko Ando (The Forsythe Company), Yoshito Onishi, Satoru Higa, Motoi Shimizu, Kyle McDonald, Akiko Takeshita (YCAM), Naoko Shiomi (YCAM)

* The both tools are open source. You can access them from the website above.
* The terms of license vary according to the tool. Please refer to the website.