

RoboticMusic

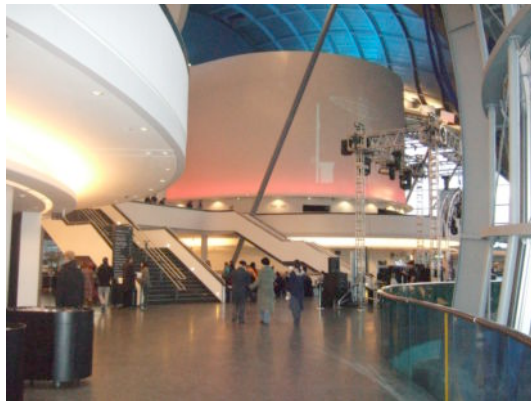
Suguru Goto

At AV Festival (2006.3.4-5)



1. Introduction

RoboticMusic was presented at AV Festival 06, which was the UK's newest, and largest, international festival of digital arts, music, and new media, on 3-4 March 2006, at The Sage Gateshead, in Newcastle.



During 2 days, approximately 3000 people visited to RoboticMusic. This was enthusiastically received by the large public, as well as the mass medias. RoboticMusic was always shown as Interactive Installation during the days and the concerts for 4 times at the fixed time in each day. RoboticMusic was commissioned by AV Festival and was given the first performance and the exhibition in England.



2. Introduction from the catalog of AV Festival

Saturday 4 March View other days

< PREVIOUS DAY LATER >

CELESTIAL RADIO Neil Bramwell & Sam Walker *Blind Type*

ROBOTICMUSIC by Suguru Goto

LIVE CONCERT & EMERSON / FAMILY LIFE

UK PREMIERE
18.00 & 19.00

Where: Northern Rock Foundation Hall, The Sage Gateshead
When: Saturday 4 & Sunday 5 March, open from 11.00 performances at intervals throughout the day
How: Music live. [Info](#) [Tickets](#) [FAQ](#)

This is your chance to see and hear robots playing their own music. You, read it again if you don't believe us — robots playing their own music. Suguru Goto is a composer and multi-media artist and he is gradually constructing an orchestra of virtual robotic instrumentalists whose performances have to be seen to be believed. His work has been seen at the Inter Communication Centre in Tokyo and the Pompidou Centre in Paris, but never before in the North East.

In **RoboticMusic** you will experience an ensemble of five percussive robots: a gong, bass drum, tom-toms, snare drum with cymbal and a pipe.

Suguru explains "Music we have never heard can be played by robots. Robots can play very complex rhythms at the same time and perform at different tempos, beyond the capability of humans. Without the constraints of biology, robots can also play without rest around 30 times faster than humans".

Most intriguing of all, despite their appearance, the robots' motion and interplay is fluid, accurately mimicking the gestures of a human musician. **RoboticMusic** poses intriguing questions. In our technological world, can we reproduce the unreplicated performance act, which is so based on the extensive training of the musician? Can we even exceed the capabilities of a human player? **RoboticMusic** will be in attendance throughout and will give a number of short performances at times to be advertised at The Sage Gateshead on the day. This project is a collaboration with Festival Versus at The Research Club.

RoboticMusic by Suguru Goto

Where: The Northern Rock Foundation Hall, The Sage Gateshead

When: Saturday 4 & Sunday 5 March, open from 11.00 performances at intervals throughout the day

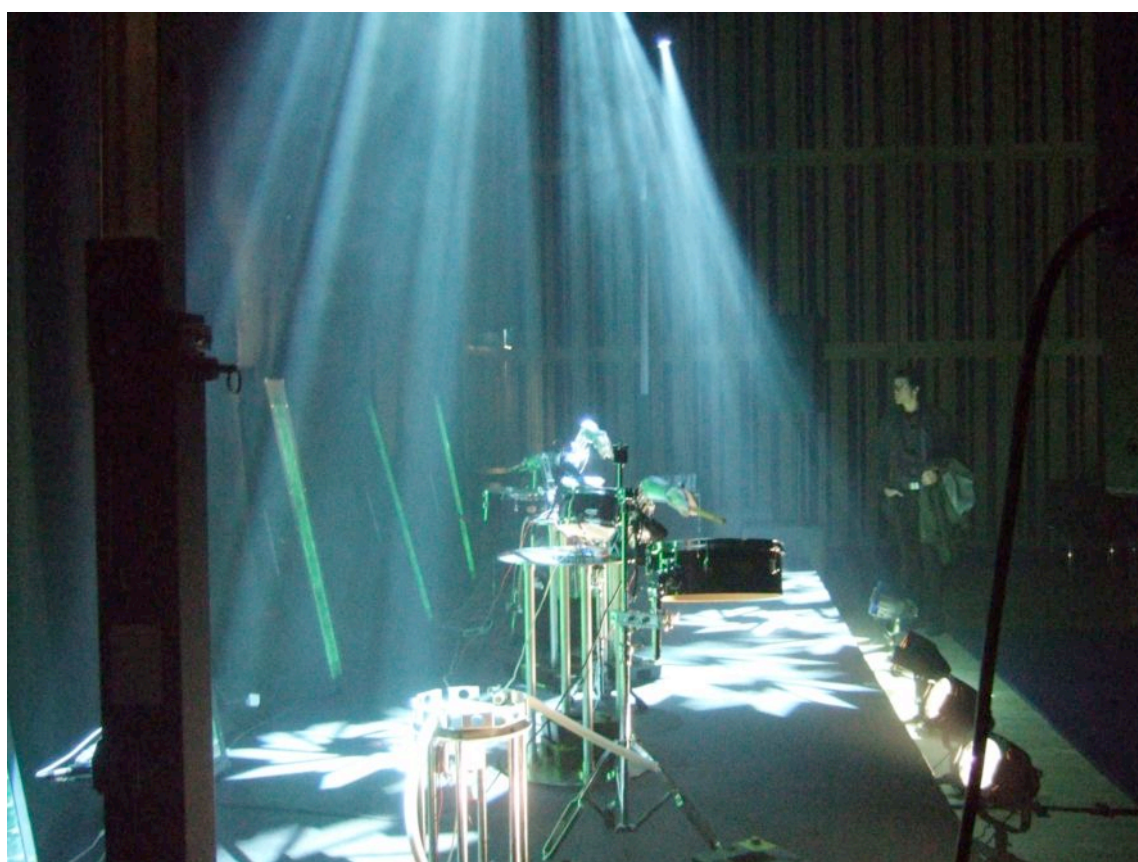
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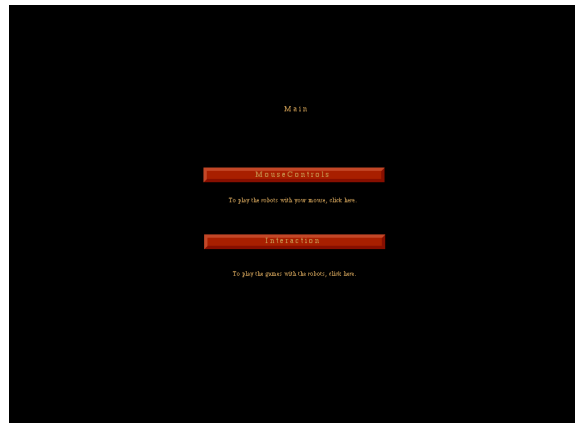
Most intriguing of all, despite their appearance, the robots' motion and interplay is lifelike, uncannily mimicking the gestures of a human musician. RoboticMusic poses intriguing questions. In our technologised world, can we reproduce the complicated performance act, which is so based on the extensive training of the musician? Can we even exceed the capabilities of a human player? Suguru Goto will be in attendance throughout and will give a number of short presentations at times to be advertised at The Sage Gateshead on the day.

This project is a collaboration with Fuminori Yamazaki at iXs Research Corp.

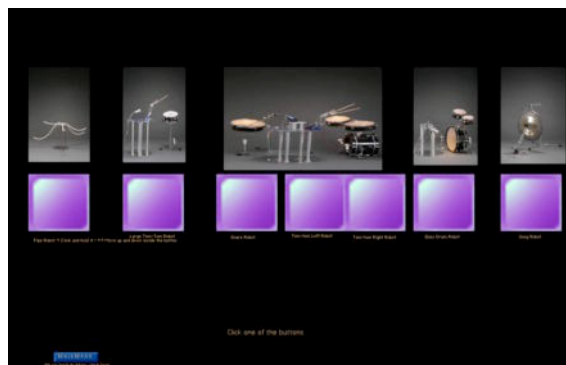
3. Interactive Installation



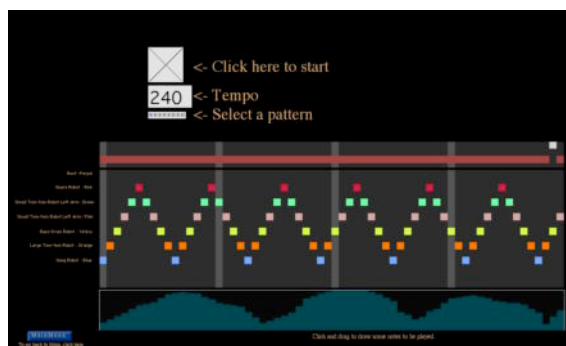
The robots are remained on the stage; a computer is placed in the middle of hall. A public can access to this computer, and can control the robots with its mouse and the screen. There are basically two modes to perform these robots.



One is to play the robots with a click on the mouse.



Another is to play the robots as playing a game. One may choose either the “Step Sequencer” or the “Bouncing Balls.” On the “Step Sequencer,” one may draw a diagram to fill out the table. The metronome in this “Step Sequencer” proceeds step by step on the timeline, and plays the robots, which are vertically corresponded to the positions in the table. One can also control Tempo and Dynamics in real time, as well. This is based upon an idea that a public can instinctively compose his own music and play his composition with the robots.



On the “Bouncing Balls,” one can take any balls and throw them within the screen. The balls start to move each other with the reactions of their gravities and bounce on the

walls (at the edge of the screen). When these bounce, each robot make sound according to color corresponded. This is a very interactive installation and like a game, while one can play the robots as musical instruments.



4. Concert



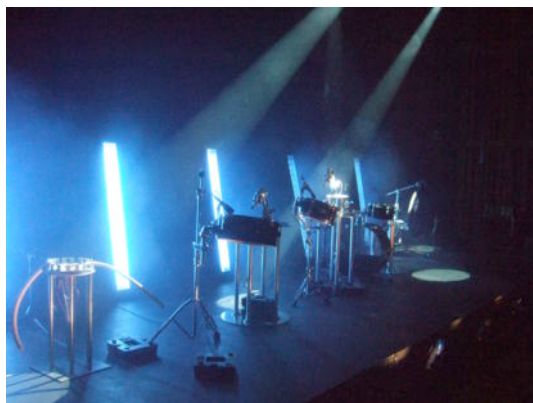
Due to Artificial Intelligence in the robots, these can be flexibly modified the way to be utilized and can adapt to any situations. Especially, these robots can show a lot of potentialities in the concert. These robots remained in the same place of installation, and the concerts were taken place 4 times in a day during AV Festival. The robots can certainly perform faster and more accurate than human players. There is no problem to

play complex rhythm and can perform eternally without any rests. The music was specially explored in order to see what only these robots could particularly play. Therefore, the compositions are something we have never heard before. For instances, the mechanical aspects in the musical expressions are quite interesting, instead of trying to imitate traditional expressions by human performers. Since there are 5 robots in RoboticMusic, one can assign different tempo to each robot. However, the robots can perform this difficult composition as one ensemble and can exactly play together. The other possibilities are that the robots can improvise and compose by themselves in real time during their performances with an aide of computer's algorithm. During these performances, there sometimes played with computer-generated sounds at the same time. While Suguru Goto played a laptop, the robots accompanied with him. In these performances, the lights were much emphasized, as well. As the robots changed their performances, the automated lights communicated with them via MIDI. The music, their gestures on the stage, and the visual elements of the lights were integrated into one whole stage performance in RoboticMusic.

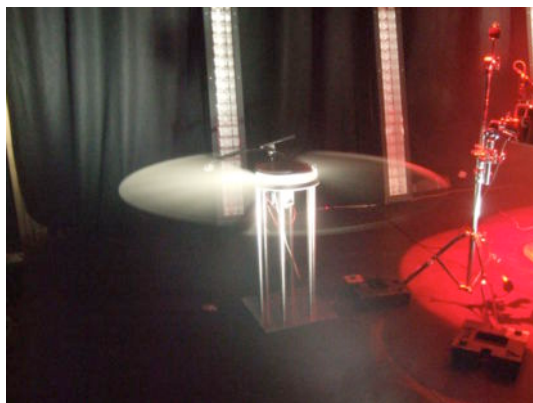


5. Detailed Description of Percussion Robots - "RoboticMusic"

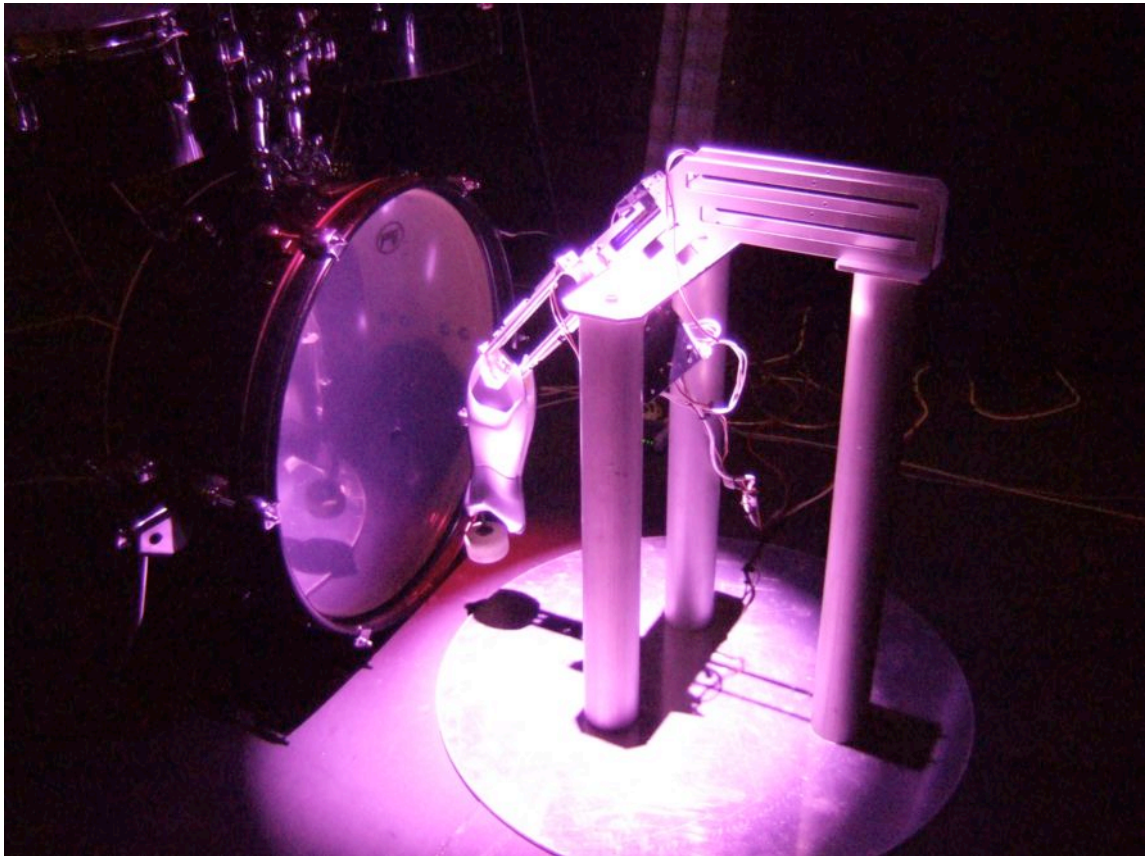
RoboticMusic contains 5 robots, which play percussion instruments, such as a Gong, Bass Drum, Snare Drum, Tom-Tom, or Cymbal. These instruments can be replaced as long as the instruments can be played with Mallets.



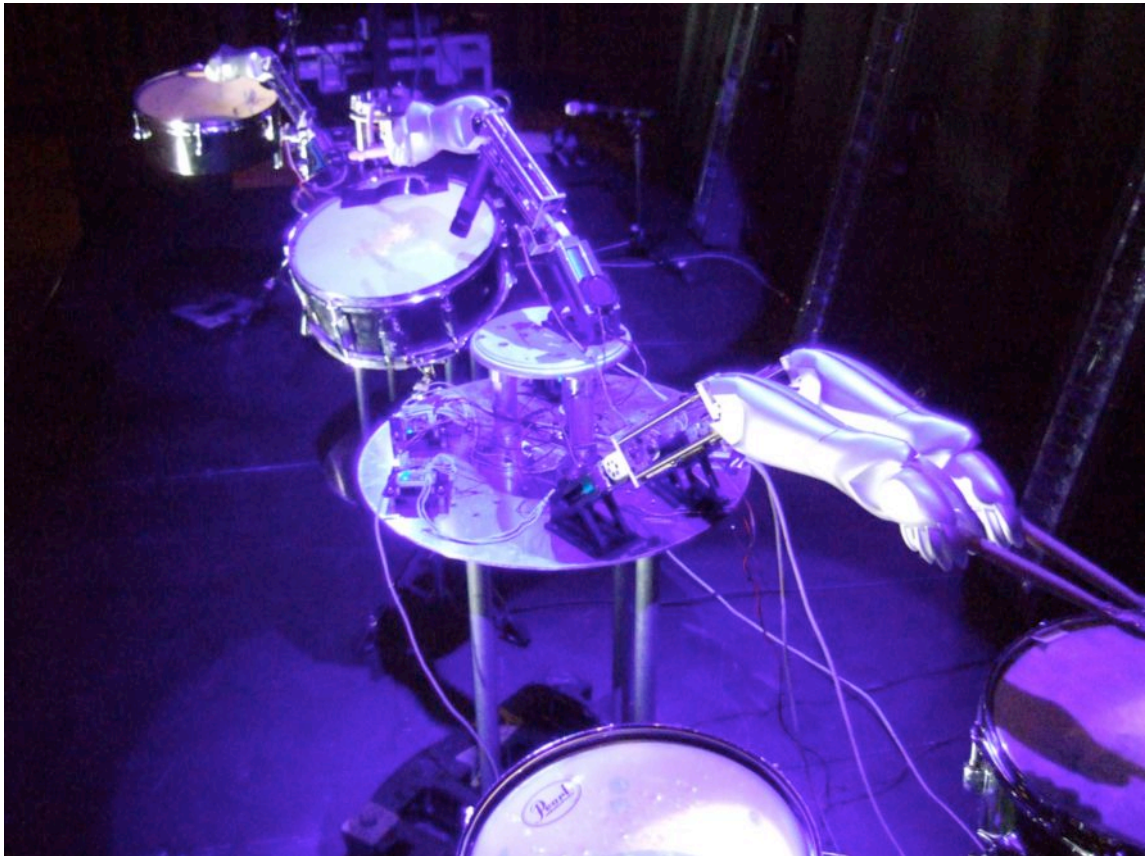
One of robots plays numerous pipes, and rapidly spins to create Flute-like sounds, which are generated while the air goes through them. These pipes are different lengths according to the pitches one desires. As it spins faster, the pitches become higher as following an overtone series.



The latest technology of humanoid robots is applied to this, but "RoboticMusic" doesn't walk by two feet, nor does it contain eyes, a mouth, etc. "RoboticMusic" does contain robot's arms. The gesture of a human percussionist is modeled in order to have musical sound and expression. Yet a robot can perform without any rest, more precisely and faster than a human being.



Max, Cycling'74 is utilized as an interface and to generate musical data. With this, one can also send basic parameters to the robots, such as a position of the robot's arm, an offset position, intensity (how hard it hits) and so on. This sends the signals to another computer with Linux via UDP. This software in Linux is developed by iXs Research Corporation. This has an important roll, since it controls the movement of robot. From the computer with Linux to the robots, these are connected via USB. Each robot has its own interface, which is connected with an actuator and a sensor.



The robot has a special sort of springs to imitate a human muscle. Each holds a mallet at the end of his arm.



The major advantage to "RoboticMusic" is that it interactively plays an acoustic instrument with the aide of a computer. There is no problem to play complex rhythm and it easily goes beyond the limit of human performance capabilities. Therefore, it gives new potentialities in a composition for acoustic instruments.

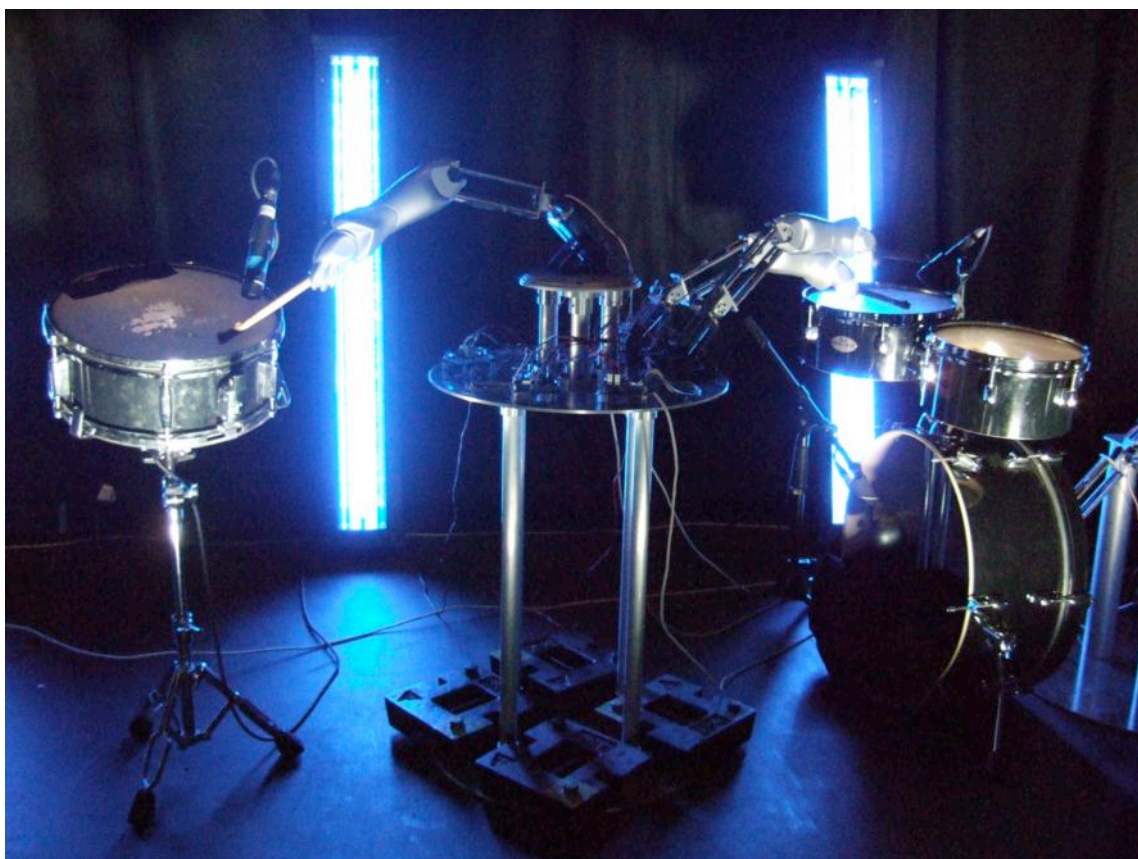
Another point is an acoustic sound. While a computer generated sound has many capabilities, an acoustic instrument has rich sonority and enormous possibilities of expression, especially from the point of view of a composer. When it is played on a stage, the vast possibilities of the acoustic aspect are obvious when compared to sound coming from speakers. Another benefit is that the audience may observe both sound and its gesture of performance.

To master one instrument is huge task for a musician, but to play together with others in an ensemble is another difficulty. Having 5 robots, one may extend the new possibilities of ensemble. For example, "RoboticMusic" allows 5 different tempos at the same time, or intricate accelerando and ralenando, but these are exactly synchronized in music.

There is not only an artistic advantage with "RoboticMusic", but also a research aspect. As one works more with a robot, which works with the gestures of a musician, one can discover how a human gesture contains complex movement, although it sometimes looks fairly simple, for instance, the gesture to hit a percussion instrument. A musician knows how to play an instrument, but he may find it difficult to explain exactly

how he controls each part of his muscles and bones, and how he increases and reduces speed and intensity instinctively within a very short instant.

When one hears the word, "robot", one is perhaps reminded of an industrial robot, or maybe sometimes a robot in a science fiction movie. However, it is not the case here. This is due to the latest development of artificial intelligence and is the case of application to hardware. This has a lot to do with the robot, which performs instruments with a human-like gesture. In particular it refers to the humanoid type of robot that contains sensors and advanced programming, which allows the robot to control itself automatically. It differs from the slave type robot in a factory, and at last we can profit from this in the field music. One may consider these robots as collaborators with humans.



6. Credits

Date: March 4-5, 2006

Place: The Sage Gateshead, Newcastle, England

AV Festival 06

www.avfest.co.uk

Compositions and Conception: Suguru Goto

Robot Technique: Fuminori Yamasaki (iXs Research Corporation)
www.ixs.co.jp

Festival Director: Honor Harger

Lights Technician: Neil Colebeck (The Sage Gateshead)
Assistant: Lisa McNab and Mark Pembrey
Press Relations: Clare Wilford

Special Thanks: Ros Rigby (The Sage Gateshead), Patrick Gyger (Utopiales festival),
Alain Terrier (IRCAM), Tamsin Austin (The Sage Gateshead)

RoboticMusic was commissioned by AV Festival 06.
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www.avfest.co.uk

