

# Understanding the Mechanism of *Sonzai-Kan*

ATR Intelligent Robotics and Communication  
Laboratories

Where does the *Sonzai-Kan*, the feeling of one's presence, such as the atmosphere, the authority, come from? How can it be captured, revived, and transmitted?

We developed a new real-person based android, "*Geminoid*", which owns its researcher as its archetype, but also is tightly-connected with its master being. *Geminoid* was developed for studying the science and technology of *Sonzai-Kan*.



**Geminoid HI-1**

# The Effect of Semi-Autonomous Remote Control

Robots' artificial intelligence have still not reached the level of adult mankind. With *Geminoid's* remote controlling function, it is possible to avoid this problem, and conduct various researches toward the implementation on high-level human interaction, including the study on *Sonzai-Kan*.



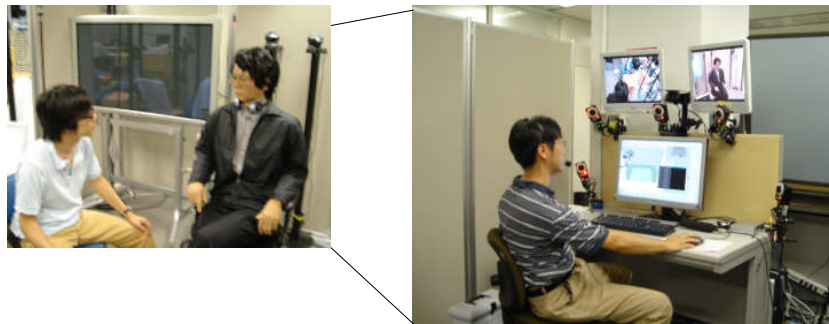
## Reason to make a researcher's copy

Research using androids requires various information on the “master”: from physical natures to social relationships, in detail. With Geminoid, whose “master” is a researcher, acceleration in scientific investigations on understanding human nature can be expected.



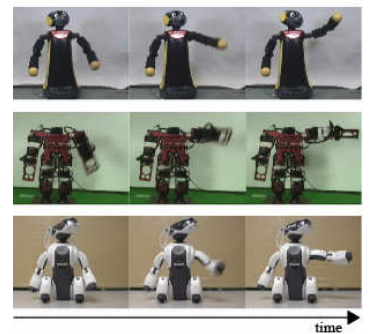
# Appropriate teleoperation methods

It is necessary to study the method to tele-operate an android in order to convey "presence", which is quite different with traditional teleoperation for mobile robots and industrial robots. We will study a method to autonomously control an android by transferring a motion of an operator measured by a motion capturing system. Also, a method to autonomously control eye-gaze and small motion will be investigated.



## Previous accomplishments

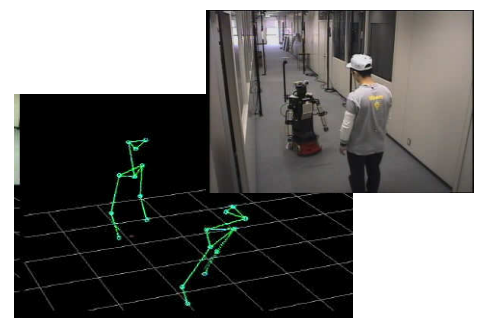
### Motion generalization among different robots



### Teleoperation of communication robots



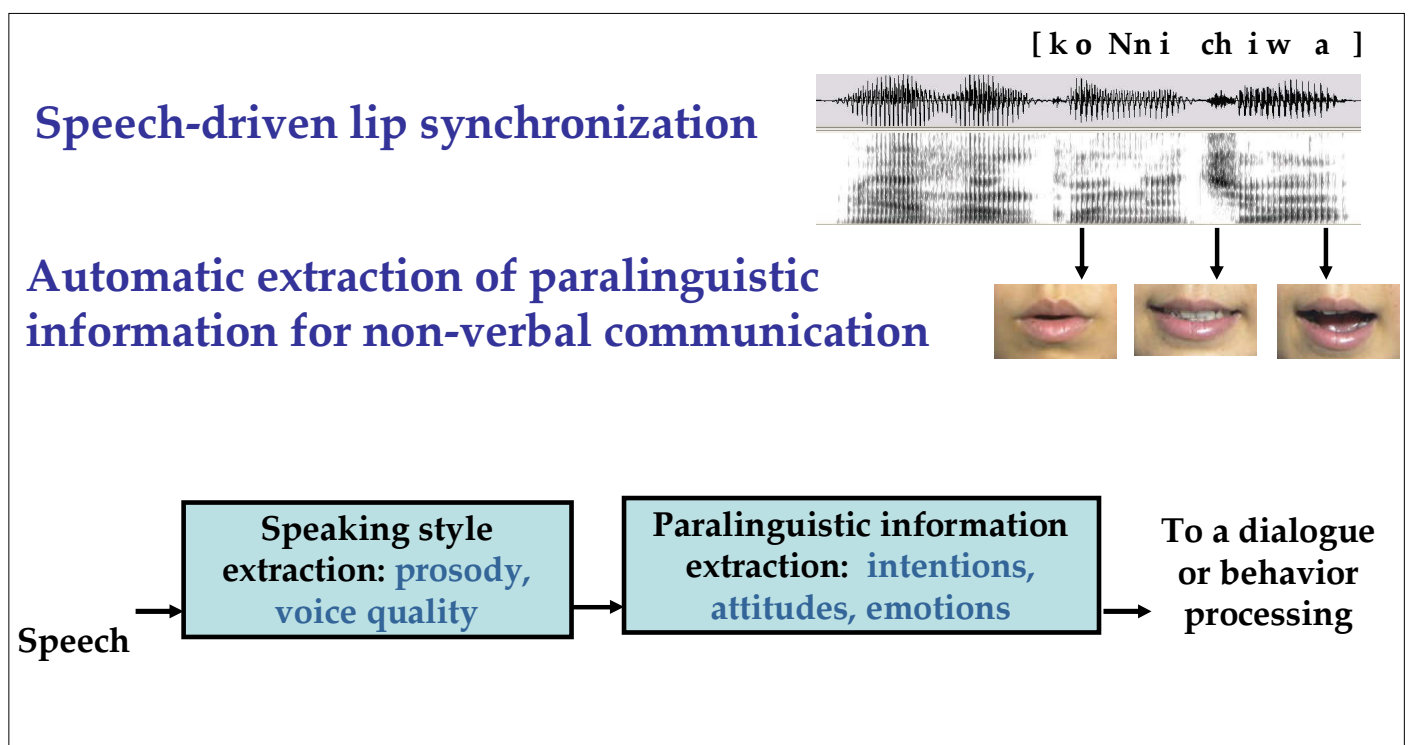
### Autonomous control of body movements



# Natural behavior production matched with speech utterances on teleoperation

We will investigate how to produce natural behaviors during speech utterances, in order to transmit “presence” by tele-operation of an android. Besides the information transmitted by words during speech utterances, we will study the effects on non-verbal communication, by investigating not only synchronization of speech and lip movements, but also the effects of facial expressions, head and even the whole body movements.

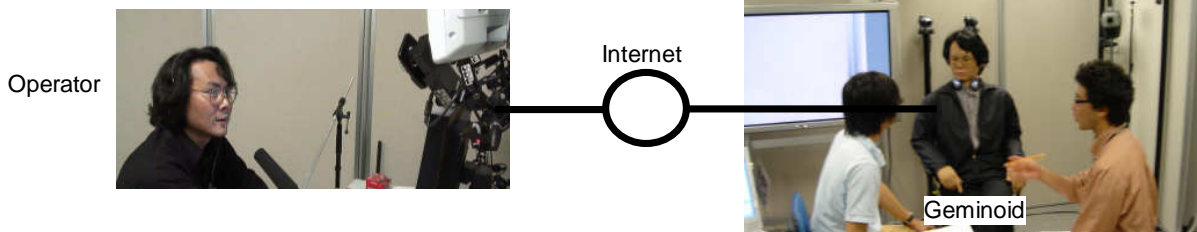
## Previous accomplishments





# Understanding and transmitting *Sonzai-Kan*

We will investigate the effect of transmitting "*Sonzai-Kan*" from a remote place, such as participating to a meeting instead of the person himself. Moreover, we will investigate "what is presence" through experiments. For example, we will study whether the android can represent authority of the person himself, by comparing the person himself and the android.



Previous accomplishments

## Analysis of humanoid appearances

Do people react in same manner to robots with different appearances? We found that, in simple reactive behaviors as greetings, the response time differs.



## Showing of inter-robot communication

