

Hahoe KAIST robot

- 1. The robot face/head should be related to Korean tradition. Korean robot from Korea is a more interesting product for an American than an American robot from Korea or Korean robot from America. Korea does not show her pride in traditions in Korean products on international markets, so far.
- 2. It seems that no other Korean theatre and folk art traditions would be better suited for our task than the Hahoe masks which I propose to use.
- 3. Below we will analyze Hahoe and discuss how to build a Hahoe KAIST robot.
- 4. I will give Hahoe background found on Internet and next ideas about the robots.
- 5. These masks are known world-wide as a specifically Korean cultural artifact and are one of the oldest in the world.
- 6. They represent Korean myths and archetypes more than any other non-religious object (the masks were religious in its origin as well, but lost this aspect with time so they can be used for robot building).
- 7. It seems after Internet studies that nobody so far came with the idea of building Hahoe robot. We can be first and will make a new symbol of Korea – mixing its old art with its newest technology.
- 8. If successful, we can make this way a world-wide known toy and teaching tool that people will associate positively both with Korean culture and Korean technology.

THE ORIGIN OF HAHOE T'AL

- The origin of the Hahoe T'al (masks), the oldest wooden masks in Korea, dates back to the 12th century A. D.
- The masks were hand-crafted at Hahoe-maul, Andong, Korea.
- Of the two legends on the mask making, the story of Ho-doryong, an unmarried young nobleman, is well known at the village.
- The legend says that the young man had a special talent for mask making.
- One day the young man received a revelation in a dream from the village god to confine himself to a secluded place, and devote himself to making masks without seeing anyone or being seen by anyone until he completed all the masks.
- Despite the divine order, his girlfriend, who missed him very much, could not refrain from peeping at him through a small hole made in the paper door by a touch of her wet finger.
- The instant he was seen, he began spitting up blood and died on the spot.
- It is said that his sudden death left the last mask, Imae, unfinished without a chin.

- The masks were carved out of alderwood, covered with Korean paper made from tak-namu (a type of paper mulberry), and then lacquered heavily and painted with natural pigments.
- One of the distinctions of these masks is their preservation; they were used repeatedly over a long period of time in the mask dance drama.
- The Hahoe masks were considered as sacred and kept in a holy place until the next performance. Most other masks in other regions were, and still are burned once they are used in the performance of a mask dance.
- It is said there were 14 masks originally, but three have been lost.
- The remaining eleven masks are: Kakshi (a bride), Yangban (an aristocrat), Sonbi (a scholar), Pune (a flirtatious young woman), Ch'oraengi (a rash meddler), Paekchong (a butcher), Halmi (a granny), Chung (a buddhist monk), Imae (a foolish person), and two Chujis (two lions).
- One of their characteristics is that each mask is made in such a way that a perfectly harmonized face is revealed no matter how the mask is worn.
- If the dancer looks upright while wearing the mask, a happy and bright expression appears, but if the dancer looks downward, a sad and dark expression is seen.
- Each of the masks has its own artistic value, and each has its own exquisite expression of human emotion, depending on the direction from which the spectators observe the mask.

- Some of the masks (the characters of Yangban, Sonbi, Chung, and Paekchong) are peculiar in that the jaw is separated from the upper part of each mask and fastened together with a piece of string on both sides of the jaw, permitting the lower jaw to move up and down as the performer speaks and thus expressing a wider range of emotion.
- Some other masks (Kakshi, Pune and Halmi) have small mouths or no nostrils, representing their social status and the social aspects of their times.
- **The masks were used in the village ritual of Pyolshin-gut T'al-nori, a shaman rite for exorcising evil spirits, which was performed in early January in the lunar calendar in order to pray for an abundant harvest and peace at Hahoe Maul (Hahoe Folk Village) in Andong.**
- The original eleven masks still exist and are now preserved in the Korean National Museum in Seoul.
- In 1964, the masks are designated as National Treasure No. 121 for their highly artistic value.

From Dr. Hyun Tae-duck, 1996

- Below I present the particular **original Hahoe mask collection** which is internationally known
- Next I present some of Hahoe imitations plus other traditional Korean masks that can be used for building the robot.

KakshiT'al (The Bride Mask)

The Bride Mask has very small eyes to show her shyness and a tiny mouth indicating that she should not talk much.

It has a white powdered face with round circles of rouge on her cheeks and brow.

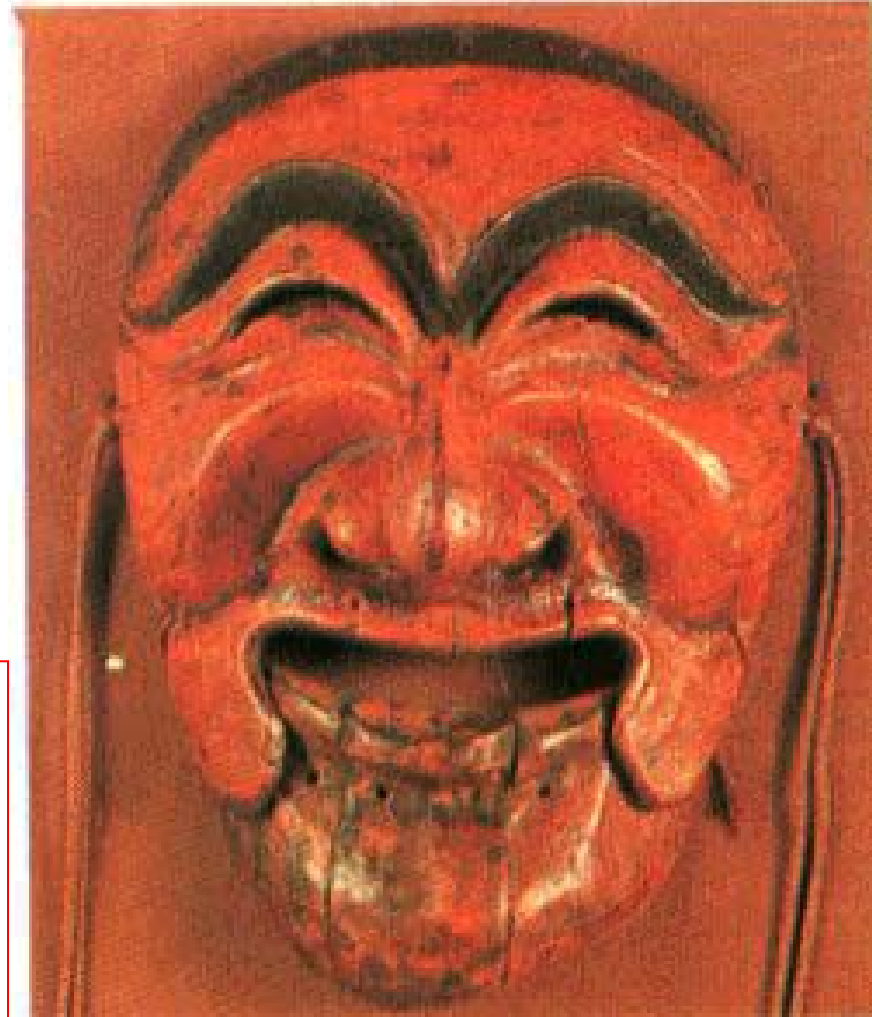
She plays the role of the local goddess in the first act and the bride in the last.



In our robot the eyes must be extended and moveable, the same with the mouth. I perceive four degrees of freedom for the mouth and four for each eye. This is not the best candidate for the robot

YangbanT'al (The Aristocrat Mask)

- The Aristocrat Mask has a long black beard to show his dignity, and has an expressive smile to show his generosity and arrogance.
- If the player looks upright while wearing this mask, a happy and bright expression with laughter is revealed, but if he looks downward an angry and dark expression with a closed mouth appears
- This mask is said to best represent the highly artistic value of the Hahoe Masks.
- This is one of two masks that are world-famous and is a synonyme for Hahoe.



In our robot the yes must be extended and moveable. The mouth has already very good moveability and will use at least 5 servos. I perceive four degrees of freedom for each eye (may be 5) and additional eyebrows with 2 degrees each. This is the best candidate for robot face.

SonbiT'al (The Scholar Mask)

- The Scholar Mask has a wide nose and well-developed cheek bones to show that he is a sonbi.
- The mask shows a discontented scholar who is poorly adjusted to society.
- The mask also reveals the dignity of a scholar and a lofty air which is unbecoming to a scholar.
- A sonbi was a scholar who did not hold any government position.
- Sonbis were supposed to spend their time studying the Chinese classics or writing poetry, but in reality, a lot of these people only human faked scholarship.

Similar to the previous. The eyes are even larger, so this face is very good for animation.



PuneT'al (The Flirtatious Young Woman Mask)

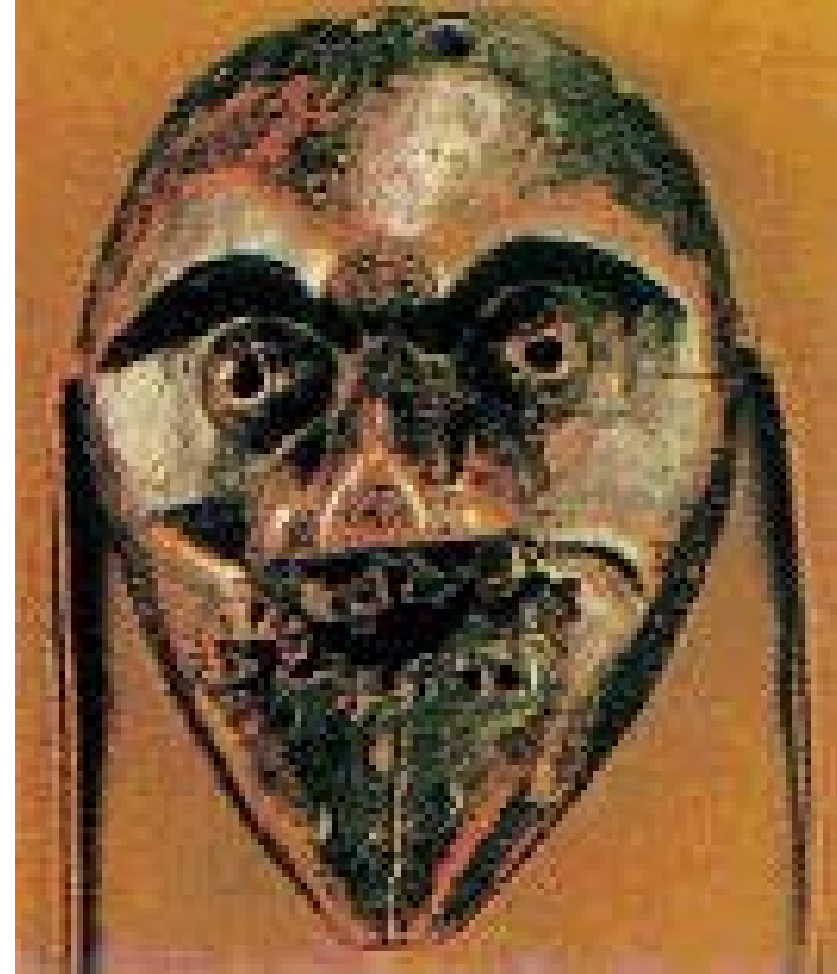
- The Flirtatious Young Woman Mask has a heavily made-up oval face with a smiling mouth, a high nose, and semicircular eye-brows.
- The smiling face is very attractive, seductive and flirtatious.
- She plays the role of a professional entertainer or a concubine of the Yangban.



This is one of two most famous masks. There is something very intriguing in this face from the point of view of robot animation and this face is a bigger challenge than the previous male faces. In our robot the eyes must be extended and moveable. Both the eyes and the mouth should be completely redesigned.

Ch'oraengi T'al (The Rash Meddler Mask)

- The Rash Meddler Mask has a tiny lop-sided brown face with buck teeth to show his discontent.
- His projected forehead means that he does not agree with his master and his short nose shows that he is rash.
- He simply can't resist meddling with everything happening around him.
- He plays the role of the Yangban's servant.

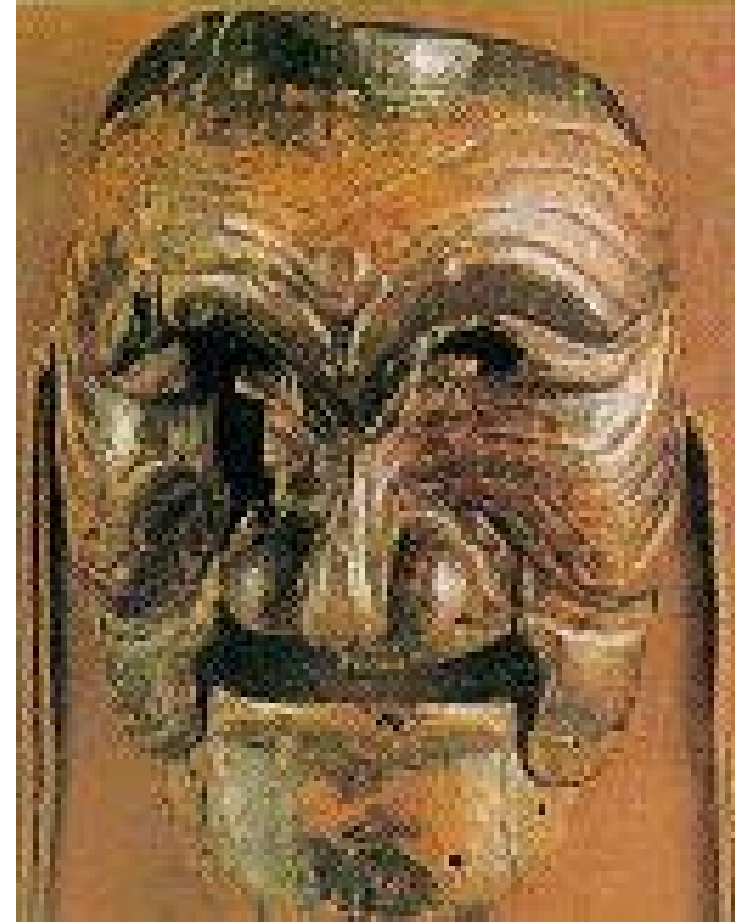


In our robot the yes must be extended and moveable, the same with the mouth. I perceive four degrees of freedom for the mouth and four for each eye. This is a good and not too difficult candidate for the robot, because of eyes and mouth shapes and sizes

PaekchongT'al (The Butcher Mask)

- The Butcher Mask has a coarse, lined brown face which has double expressions, depending on which way the mask is seen.
- If he looks up the mask appears to be grinning, mad with the sin of killing living creatures, and if he looks down, the mask shows the butcher's true nature and looks cruel and sinister.

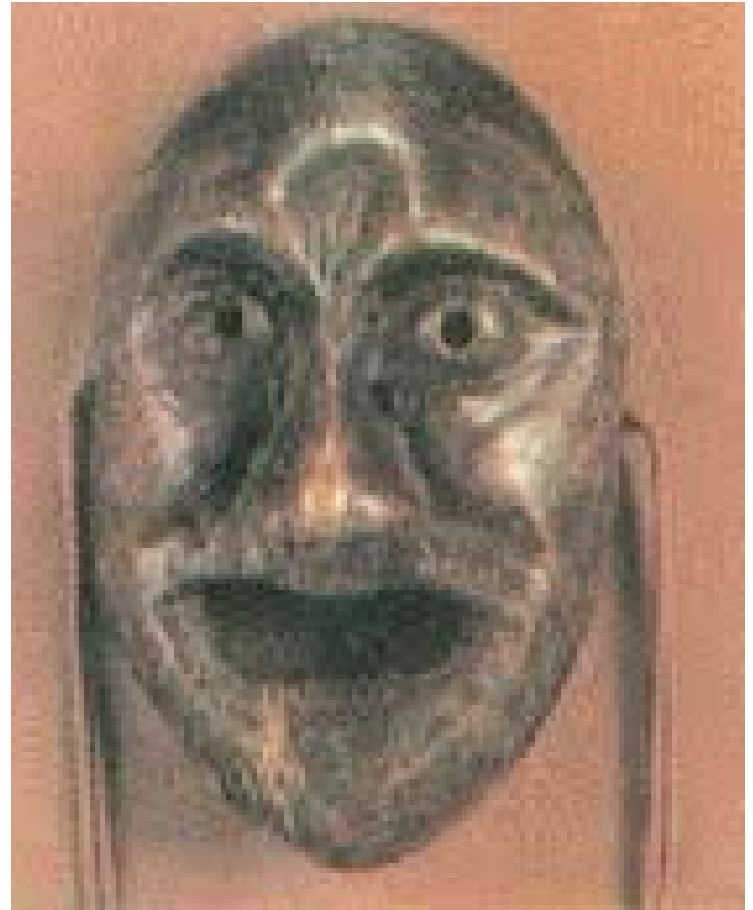
The same remarks as to the previous



Halmi T'al (The Granny Mask)

- The Granny Mask has a tiny wizened brown face to show the hard life the widowed granny has had.
- It has a pathetic expression and the open mouth is always ready to take in food and pour out her lamentations.
- The mask of Halmi reveals the poverty and the figure of a woman surviving in a hard world.

Very good candidate and easy to animate. The mouth must be done movable. Eyes are easy to animate. Eyelids and eyebrows can be added and the face must be transformed to a more feminine



Chung T'al

(The Buddhist Monk Mask)

- The Buddhist Monk Mask has a greasy grinning face to show his dissimulating behavior.
- The crescent-shaped eyes reveal that he is a lecher.
- He is not a monk who leads an ascetic life, but a depraved one who wanders and begs.

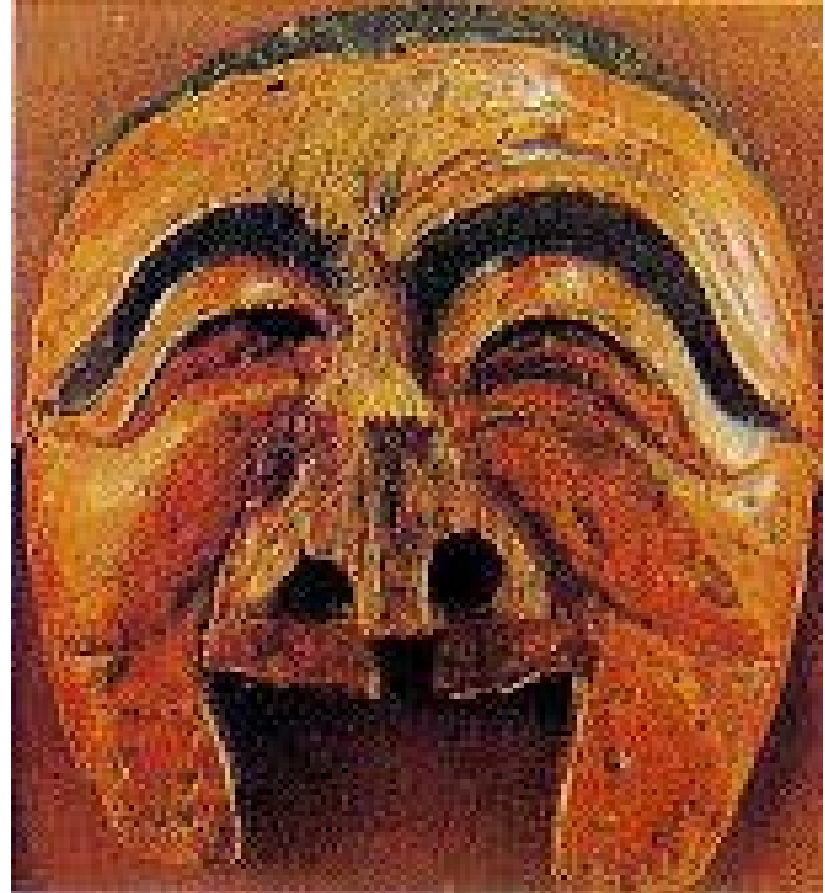
Changing eyes to moveable in this mask would be difficult. Mouth is good and it is easy to add eyebrows.



Imae T'al

(The Foolish Person Mask)

- The Foolish Person Mask has a happy-go-lucky face which instantly shows that he is a simple minded fool.
- The crooked nose reveals that he is deformed, and the down-slanted eyes show that he is free from malice.
- He plays the role of a foolish person as the Sonbi's servant.
- This is the only mask without a chin.



I like this face, good for animation but eyes should be modified. We should add the chin.

Chuji T'al (The Lion Mask)

- The Lion Mask is an animal mask which has a short but wide (or fin-like) face with a bill-like mouth and feathers.
- It is said to be the mask of a lion.
- However it is difficult to identify the mask as that of a lion.
- The lion is a supreme creature in Buddhism and its position is very high.
- Unfortunately, Koreans at that time had never seen a lions and therefore they only guessed what lions might have looked like.



Easy to modify to a robot. May be ears should be added to have more degrees of freedom.



The mouth happens to be similar to Kismet and other Infantoid robots. Easy to animate. Eyes also easy to animate. One of easiest to animate of all Korean masks.



The same as for the previous mask



The same as for the previous mask

• Another variant of *Yangban*, or aristocrat, on the left, and *Bu-ne*, or flirtatious young woman, on the right.



More face variants to think about



Paekchong T'al
Butcher mask



Kakshi T'al
Bride mask



Sonbi T'al
Scholar mask



Halmi T'al
Old widow mask



Yangban T'al
Aristocrat mask



Chung T'al
Depraved Buddhist monk mask



Pune T'al
Flirtatious young woman mask



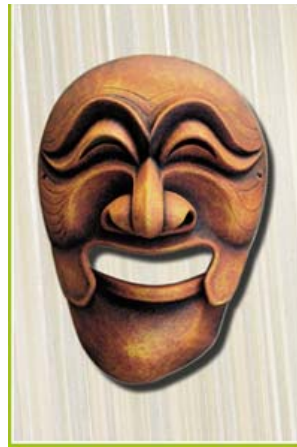
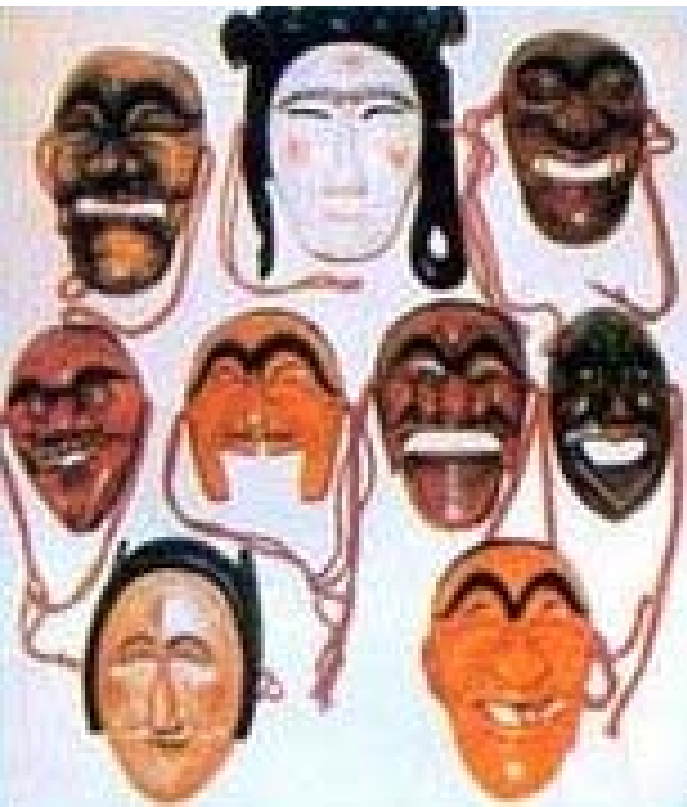
Imae T'al
Fool mask



Ch'oraengi T'al
Busybody mask

WE ARE FROM HAHOE VILLAGE

More variants



Challenges

This project brings totally new challenges.

What should be the voices of the robot-heads?

How to animate emotions?

What kind of voice synthesis tools to use?

What kind of tools for voice recognition?

What is the role of dialog?

What should be the role of learning (movement, emotions, voice, acting)?

How much of the script should be predefined and how much spontaneous and interactive?

Role of archetypes of Korean culture, role model, morality, ethical and esthetic values specific to Korea.

Mechanical design to create a space of movements in which emotions typical for these characters can be programmed. Development of a language of voice synthesis and emotion modeling that will be easy enough to be used by artists.

Nobody ever attempted to solve these problems in the world so far for any robot puppets.