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per l’Innovazione

The Silent World

Deaf People Can Do Anything Apart From Hear!

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Introduction

Intro.IT

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Intro.EN

On the future, we always have all kinds of speculation and expectations, although we may not be able to achieve for the future of the idea, but with the development of science and technology, our beautiful ideas can be achieved after all.

In this issue, we choose 10 years later this time as the object of study. Ten years of time, in the history of science and technology is a short not long time. The technology maybe can not make the subversion of innovation, but a small step possible to do.

So in this situation, using the existing science and technology, we can do a design which is can be achieve. The role of the designers, is to choose a different science and technology. And using some ways to make the design come true. In China, there is a saying: Governing a large country like cooking a small fish. Meaning is to control a big country, like cooking a dish. This sentence can also be used in the design. The design and cooking are the same.We understand these technologies, these materials process, like cooking materials. These materials, by combining, arranging and bringing them together. And for the future design, like a bottle of wine in the wine, through the time of catalysis, when ten years later, we will get a bottle of wine, a good design

Technology is able to continuously improve the human life, people also from the scientific and technological progress to get a better survival experience. We often say that technology creates the future. But in the future, there are a lot of different people. These people have different races, different cultures, different backgrounds, different physical conditions. Whether it is any background, any area, any culture, people with disabilities have always been a vulnerable group among the human groups. In 2013 world hearing-impaired population is 360 million people, accounting for about 5% of the total.To hearing-impaired people, they have been living in a world of silence, but sign language is a key that opens the door to a silent world Sign language is the first language with which they continue and create their culture.Motion Communication is required for the hearing-impaired people to communicate with non-disabled people by their language.

Since science and technology can improve the way of human life, people with disabilities also can share the fruits of human development. It is exactly what we should do is the use the technology to make their lives the same as normal people.

01

The Deaf

1.1 The number of deaf people worldwide

1.1.1 Areal Distribution

1.1.2 Distribution between Males and Females

1.1.3 Age Distribution

In 2013 world hearing-impaired population is 360 million people, accounting for about 5% of the total.The Survey of Income and Program Participation (SIPP) is one of a few national surveys that regularly collects data identifying the American population of persons with hearing loss or deafness. Estimates from the SIPP indicate that fewer than 1 in 20 Americans are currently deaf or hard of hearing. In round numbers, nearly 10,000,000 persons are hard of hearing and close to 1,000,000 are functionally deaf. More than half of all persons with hearing loss or deafness are 65 years or older and less than 4% are under 18 years of age. (1)

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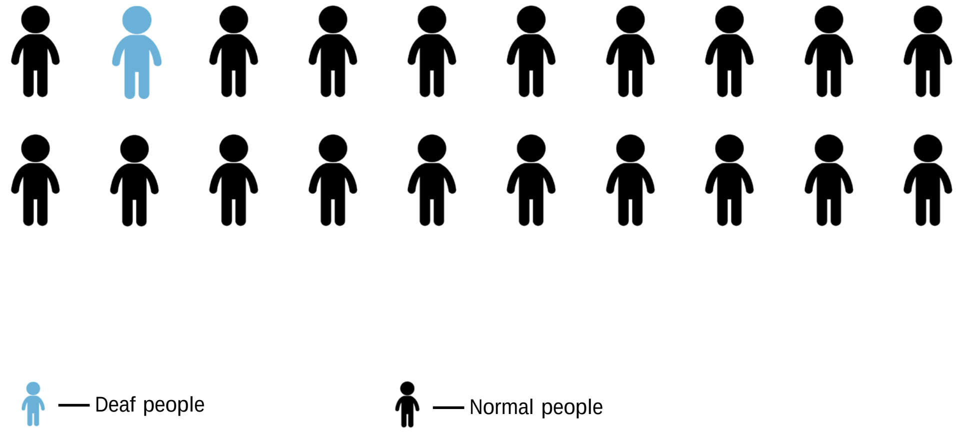
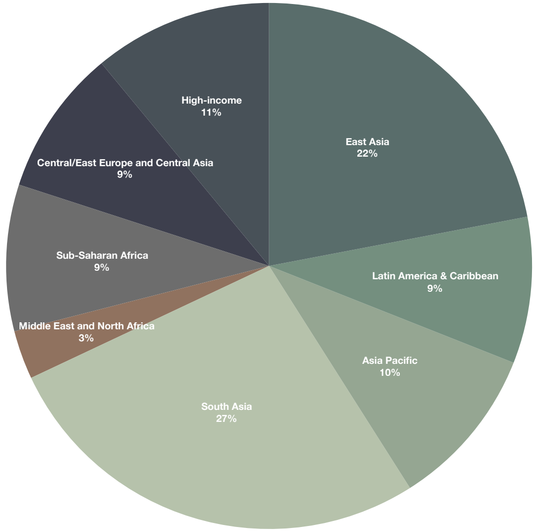
How many deaf people are there in our life?



1.1.1 Areal Distribution



¥Disabling hearing loss is unequally distributed across the world

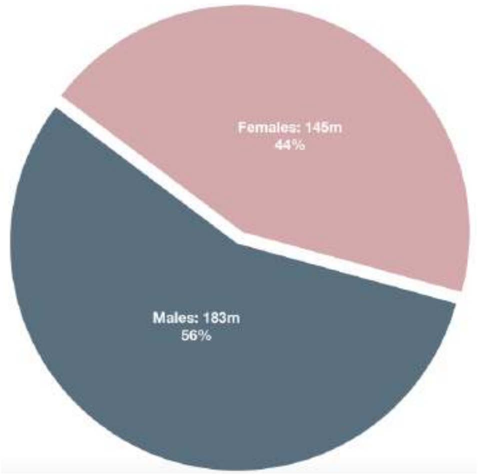
MBD, WHO, 2012 DHL estimates; DHL adult threshold is ≥41 dB, adults of 15 years or older.

In the global context, the distribution of hearing loss is also uneven, like the distribution of the population. However, the table shows that in the low and middle income countries, the proportion of hearing loss people is more than that of developed areas. The more the poor, the more birth.So the number of hearing loss people will be increased. Moreover, the medical conditions in the poor areas are not particularly well established, and many medical devices that can prevent hearing loss are not used, so the likelihood of congenital hearing loss is greater than that of developed areas.

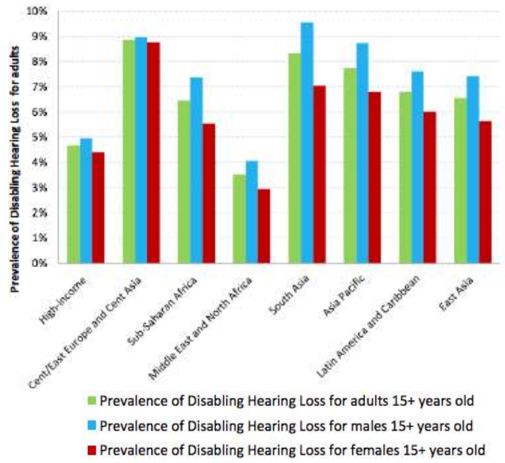
Low-income countries are developing countries, in their working environment, there is a lot of noise pollution. This reason also make a lot of acquired hearing loss was obtained. Poor medical conditions have also led to a large number of children who have lost hearing due to illness.
Therefore, the poor medical conditions, the work environment of the noise pollution, high birth rate, resulting in low-income countries, the number of hearing loss accounted for the proportion of global hearing loss of the proportion of large.

1.1.2 Distribution between Males and Females

¥Prevalence of disabling hearing loss for adults by region:



MBD, WHO, 2012 DHL estimates; DHL adult threshold is ≥41 dB, adults of 15 years or older.



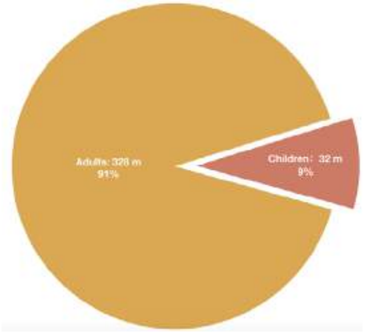
*MBD, WHO , 2012, DHL estimates, where DHL adult threshold is ≥41 dB HL

The data shows that among the hearing loss people, the proportion of men is higher than the proportion of women. It is more obvious to show this result in the proportion of adults.

Because of the work that men need to do in society is more than what women need to do in the physical. And the job that requires work in a noise-free environment is borne by men. So the possibility of hearing impairment, men tend to be greater than women. In addition, the use of alcohol, tobacco will further damage the male hearing, so that they lose their hearing.

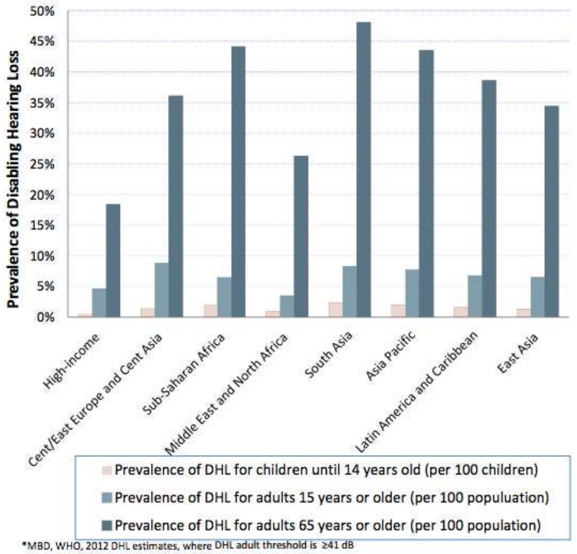
We should be glad that modern medical technology has been able to prevent and treat hearing loss to a certain extent. These advances in medicine and science and technology further reduce the difference between hearing loss and normal people, so that they can live better.

1.1.3 Age Distribution



The prevalence increases with age, i.e. prevalence in children is 1.7%, in adults aged 15 years or more, it is around 7%, rapidly increasing to almost one in three in adults older than 65 years.

Approximately one-third of persons over 65 years are affected by disabling hearing loss. Exclusion from communication can have a significant impact on everyday life, causing feelings of loneliness, isolation, and frustration



*MBD, WHO, 2012 DHL estimates, where DHL adult threshold is ≥41 dB and children threshold is ≥31 dB (children 0 until 14 years old).

1.1.3 Age Distribution

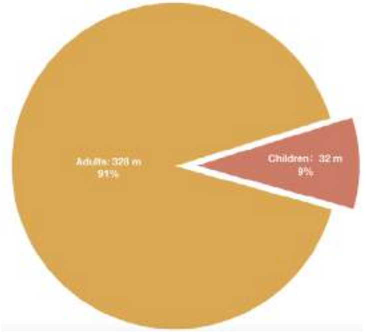
¥Prevalence of disabling hearing loss in children:

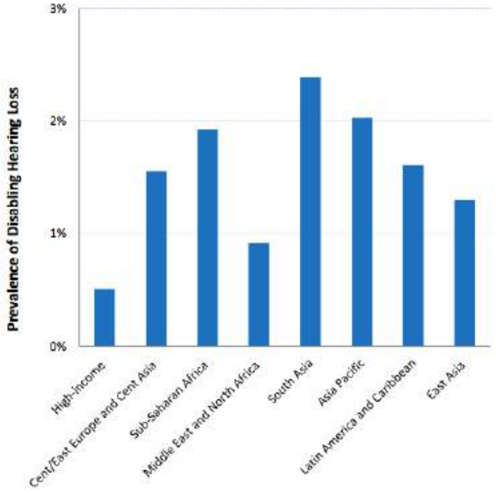
According to the World Health Organization in 2012 statistics, we can see that children suffering from hearing loss accounted for 9% of the overall. Most children suffer from hearing loss because of congenital hearing loss and hearing loss due to major illnesses in early childhood. In the childhood lost the hearing, then he will lose the ability of language.

Listening is a very important stage of the development of children's wisdom, there is no hearing, there is no way to communicate, and language is the necessary factor for the growth of children's wisdom. And the loss of hearing and language leads to children feel lonely, there is no way to communicate with their peers, resulting in eccentric, away from the crowd.

They grow up to go to school, there is no way to go to the normal school, only to the special school which is for the deaf, learn the knowledge which are more simple than normal knowledge.When they grow up as adult to work, because of physical disability, most of the hearing loss can not find the right job. Therefore, the loss of hearing led to no way to communicate with normal people will bring a child suffering from a whole life.

The prevalence for disabling hearing loss in children is highest in the south Asia region followed by SubSaharan Africa. There is a marked difference in the prevalence rates in high income parts of the world.





*MBD, WHO, 2012 DHL estimates, where DHL children threshold is ≥31 dB

1.1.4 Conclusion

∑ There are 360 million persons in the world with disabling hearing loss (5.3% of the world's population).

∑ 328 million (91%)of these are adults (183 million males, 145 million females)

∑ 32 (9%) million of these are children.

∑ The prevalence of disabling hearing loss in children is greatest in South Asia, Asia Pacific and Sub-Saharan Africa.

∑ Approximately one-third of persons over 65 years are affected by disabling hearing loss.

∑ The prevalence of disabling hearing loss in adults over 65 years is highest in South Asia, Asia Pacific and Sub-Saharan Africa.

1.2 Economic Impact

WHO estimates that unaddressed hearing loss poses an annual global cost of 750 billion international dollars. This includes health sector costs (excluding the cost of hearing devices), costs of educational support, loss of productivity, and societal costs.
In developing countries, children with hearing loss and deafness rarely receive any schooling. Adults with hearing loss also have a much higher unemployment rate.

Among those who are employed, a higher percentage of people with hearing loss are in the lower grades of employment compared with the general workforce.
Improving access to education and vocational rehabilitation services, and raising awareness especially among employers about the needs of people with hearing loss, will decrease unemployment rates for people with hearing loss.

1.3 Causes of hearing loss and deafness

The causes of hearing loss and deafness can be divided into congenital causes and acquired causes.

Congenital causes
Congenital causes may lead to hearing loss being present at or acquired soon after birth. Hearing loss can be caused by hereditary and non-hereditary genetic factors or by certain complications during pregnancy and childbirth, including:

1,Maternal rubella, syphilis or certain other infections during pregnancy;
2,Low birth weight;
3,Birth asphyxia (a lack of oxygen at the time of birth);
4,Inappropriate use of particular drugs during pregnancy, such as aminoglycosides, cytotoxic drugs, antimalarial drugs, and diuretics;
5,Severe jaundice in the neonatal period, which can damage the hearing nerve in a newborn infant.

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1.3 Causes of hearing loss and deafness

Acquired causes
Acquired causes may lead to hearing loss at any age, such as:
1,Infectious diseases including meningitis, measles and mumps;
2,Chronic ear infections;
3,Collection of fluid in the ear (otitis media);
4,Use of certain medicines, such as those used in the treatment of neonatal infections, malaria, drug-resistant tuberculosis, and cancers;
5,Injury to the head or ear;
6,Excessive noise, including occupational noise such as that from machinery and explosions;
7,Recreational exposure to loud sounds such as that from use of personal audio devices at high volumes and for prolonged periods of time and regular attendance at concerts, nightclubs, bars and sporting events;
8,Ageing, in particular due to degeneration of sensory cells;
9,Wax or foreign bodies blocking the ear canal.
Among children, chronic otitis media is a common cause of hearing loss.

02

Life of
the hearing loss

2.1 Prevention

Overall, it is suggested that half of all cases of hearing loss can be prevented through public health measures.

In children under 15 years of age, 60% of hearing loss is attributable to preventable causes. This figure is higher in low- and middle-income countries (75%) as compared to high-income countries (49%). Overall, preventable causes of childhood hearing loss include:

¥Infections such as mumps, measles, rubella, meningitis, cytomegalovirus infections, and chronic otitis media (31%).
¥Complicationsat the time of birth, such as birth asphyxia, low birth weight, prematurity, and jaundice (17%).
¥Useof ototoxic medicines in expecting mothers and babies (4%).
¥Others (8%)

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2.1 Prevention

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Some simple strategies for prevention of hearing loss include:
immunizing children against childhood diseases, including measles, meningitis, rubella and mumps;
immunizing adolescent girls and women of reproductive age against rubella before pregnancy;
preventing cytomegalovirus infections in expectant mothers through good hygiene; screening for and treating syphilis and other infections in pregnant women;
strengthening maternal and child health programmes, including promotion of safe childbirth;
following healthy ear care practices;

2.2 Hearing Devices

Advances in the field of hearing aids and cochlear implants have considerably improved available options for people with hearing loss. Despite this, only a fraction of those who need these devices can access them, due to a lack of availability and high cost.
Because of the high cost, not everyone who are deaf can buy this devices. We need do some actions, develop sustainable initiatives for affordable fitting and maintenance of hearing devices, which can also provide ongoing support for people using these devices.A lot of hearing loss people are in the middle-low income countries.How to make the devices cheap and easy to use is very important.

2.3 Communication

A deaf child benefits greatly from early introduction to language. This may be in the form of rehabilitation for verbal communication, such as auditory-verbal and auditory-oral therapy.
Policy-makers should also promote alternative communication means including sign language, total communication, bilingual/bicultural (bi-bi), cued speech and lip-reading approaches. Use of loop and
FM systems in classrooms and public places as well as provision
of captioning on audio-visual media are important for improving
accessibility of communication for people with hearing loss.
So the communication is the most important things for the hearing loss people. We need to ensure access to communication through all available means, in

04

Scenario

4.1 Work Condition
- Present

- Low-income
- Difficult to communicate
- Injustice

In the present society, hearing loss people are vulnerable groups.

Although we are constantly advocating a variety of equality, but for hearing loss people's attention are inadequate.Especially in the public facilities, blind people have the blind road, wheelchair disabled people with barrier-free access.Because in normal people's understanding, hearing loss people just can not speak and hear, but it doesn't affect their lives.In fact, hearing loss people also have a lot of inconvenience, there is no way to communicate.Most of the deaf people were subjected to a lot of discrimination and injustice when they were looking for a job.Because they can not speak, hearing loss people can not do a lot of work which need to communicate with other guys.

It is gratifying that, with the government's policy, more and more disabled people have their own work. In China, if an company has disabled employees, then the company's tax can be reduced. But most of the hearing loss people are still engaged in low-income jobs. Because of educational background and other reasons, deaf people are not very easy to get some high-income jobs.

4.1 Work Condition
- Future(2025)

- **Improve work condition**
- **Ability to communicate**
- **Social cohesion**

In the future, with the popularity of this glasses, more and more hearing loss people have the glasses, they can have the ability to communicate with normal people.The ability to communicate can make they to do a variety of work, rather than as before, just do some low-income work.Social division of labor can be further improved, raising the status of the disabled in society as a whole.With the increase in income, the rights and interests of persons with disabilities are more fully guaranteed.
More people with disabilities have the right to make their own voice, is conducive to social unity and cohesion of the upgrade.

4.2 Daily Life
- Present

- **Isolate**
- **Reclusive**

- **Miss love**
- **Lonely**

In the daily life of deaf people, they also have all kinds of difficulties.Especially hearing loss people who are born deaf, in childhood, they have no way to communicate, other people would isolate them, so it make their character from childhood to become particularly reclusive.And when they are adults, when they begin to love, they often miss a lot of good love because of their poor communication with their lovers.According to the distribution of the hearing loss people's age, the proportion of the people over the age of 65 is the highest.And after hearing loss, the old people will feel more lonely, and it will cause a lot of psychological diseases in the elderly.A healthy state of mind is also the key to quality of life. When the elderly feel lonely, their quality of life decreases.

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4.2 Daily Life
- Future(2025)

- **Easy to communicate**
- **100% accuracy**
- **Sunshine**

And in the future, with this device that can be translated. Children who have lost their hearing at birth have the power to call. When they wear this translation lens, they learn sign language, just like learning a native language. They can communicate with normal children without obstacles. As the children growing up, the use of this glasses is longer and longer, and glasses can record and learn signs of hearing loss. When they are adults, the accuracy of sign language translation may even reach 100% accuracy. Glasses can easily translate what they are trying to convey. It can help them to face all kinds of difficulties in the daily life. Including communicating with your lover. And for 65 year old people, they use sign language interpreters to make their lives full of sunshine.

4.3 Education
- Present



- **Deaf school**
- **Challenge**
- **Unfair**
- **Vicious cycle**

The hearing loss people are able to go to school now, but most hearing loss people can't go to normal school. Because of their own conditions, there is no way to hear the teacher said and caught the content of the lecture. So most hearing loss people go to the school for the deaf and dumb. And the knowledge taught in deaf mute schools is simpler than those learnt in normal schools. This increases the difficulty for hearing loss people to acquire knowledge. As we all know, knowledge can change our fate. While hearing loss people are born with disabilities, fate is unfair to them, and the difficulty of acquiring knowledge has been increased. The lack of knowledge, but also enhance their difficulty in finding a job. Because of a small difficulty, it led to a vicious cycle.

4.3 Education
- Future(2025)




- **Hope**
- **The same**
- **Interested**

And when hearing loss people own their own sign language translators, they can go to regular schools to receive formal education. Their lives could change for that. Life in the school gives them hope for life. Hearing loss students can clearly understand the contents of the teacher's lectures, and their difficulty in acquiring knowledge becomes the same as that of normal people. With enough knowledge, they will be able to do whatever they are interested in. Instead of being able to work in low paid jobs just like before. They add a lot of colour to their lives.

05

Product

Design for the hearing loss people

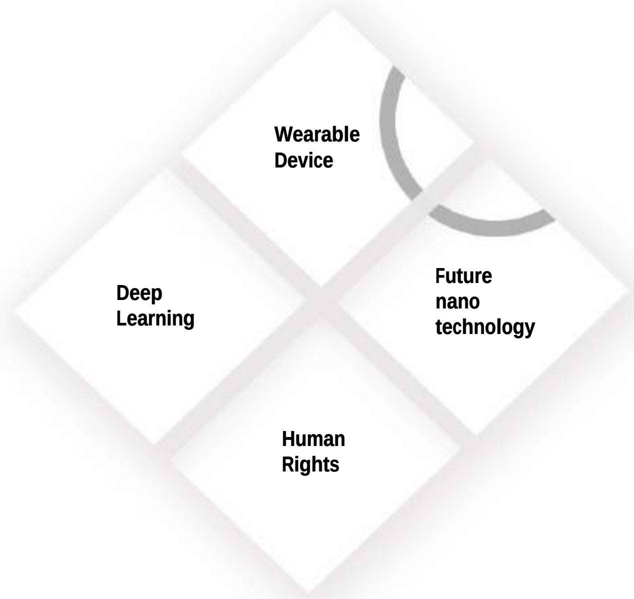
Sign language translation

Artificial Intelligence

Silent Glasses

Since science and technology can improve the way of human life, people with disabilities also can share the fruits of human development. It is exactly what we should do is the use the technology to make their lives the same as normal people.
So, we make a design for the hearing loss people to help them use the sign language to commuicate with others like normal.
The product have two color to choose black and white.

The key words about the design

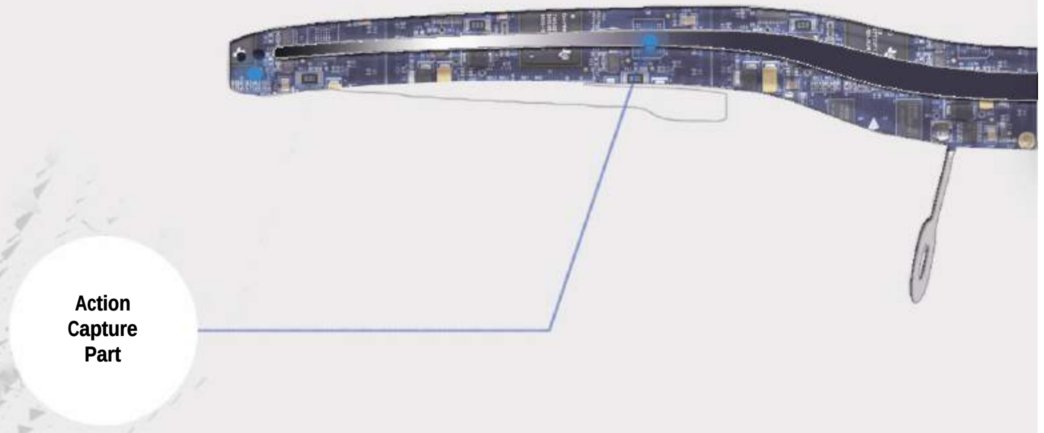


It is easy to use It is easy to wear

With the help of the nano technology, we can make the glasses as a normal glasses. So it is easy to wear just like norml. The user don't need to take any other equilpments. So it is easy to use. You just use your sign language and the translation work is on the glasses.If the user continues to use the glasses, it will collect your gesture information to give a better translation. More time can make more correct.

Nano technic will be used in the glasses

On the front part, the glasses have action capture part mic and sounder. The action capture part can caught the gesture and translate the sign language into sounds.



The briage between hearing loss people and normal

Normal people have 5-senses,but a lot of hea-ring loss people loss their sound and hearing. But when they use the glasses, the equipment will give them the two senses.

Use your hands to create sound

Hearing loss people have body and eyes, make these sense to create sound

Function and Material

Plastic
Legs
Inside the legs have the batteries

Glass
Display
Optical Head-mounted Display(OHMD)

Plastic
CPU-core
CPU to do the data processing make the capture signal into sounds

Plastic
Action capture
In this part have some cameras and capture sensers inside.

Plastic
Mic&Sounder

Main Technic

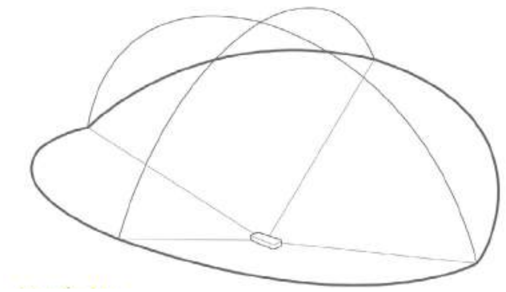
Mic AR Motion AI Sunder

06

Technique

6.1 Gesture Recognition

6.1 Gesture Recognition



Leap Motion

It is an American company that manufactures and markets a computer hardware sensor device that supports hand and finger motions as input, analogous to a mouse, but requires no hand contact or touching. In 2016, the company released new software designed for hand tracking in virtual reality.

Gesture recognition technology is divided into the six main processes: image acquisition, image preprocessing, feature extraction and selection (classifier design), gesture recognition, the output results.

For the deaf sign language recognition, the first step is to collect all the sign language action,the second step is make the image which are collected after the first step, caught the action points and gestures of the error. In the third step, the motion characteristics of the nodes are extracted and the contents are extracted, furthermore, the determination of the amplitude is further improved. The fourth step, the data will be classified to establish a database, design classification device.Finally, when someone use the sign language,the system can recognize the gesture and translate into sound language.

In the case of dynamic capture of an opponent's motion, the best technique is leap motion, which captures the movement of the hand by constructing a spatial structure. But this technology, the limitations are still very large, clear rate is not very high, prone to error. But with the future development of science and technology in the next decade with the algorithm upgrade, should be able to clearly and accurately identify gestures.

6.2 Speech Recognition

Speech recognition (SR) is the inter-disciplinary sub-field of computational linguistics which incorporates knowledge and research in the linguistics, computer science, and electrical engineering fields to develop methodologies and technologies that enables the recognition and translation of spoken language into text by computers and computerized devices such as those categorized as smart technologies and robotics. It is also known as automatic speech recognition (ASR),computer speech recognition, or just speech to text (STT).

Speech recognition system is a very mature technology at this time, this technology can analysis the sound, compared to the database, and change the language into words. In this design system, the role of voice recognition system is used to listen like the ears of the hearing loss people. Through the microphone to collect the voice of the normal person who is communicating with the hearing loss people, and then converted into text, through a special enhancement of the reality of the display, so that hearing loss people can see the speech content.

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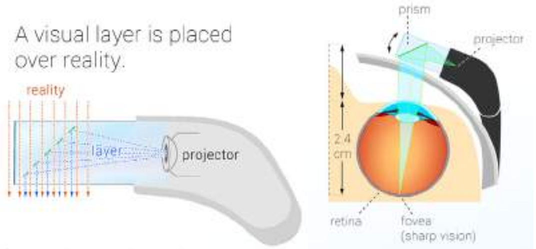
6.3 Augmented Reality

Augmented reality (AR) is a live direct or indirect view of a physical, real-world environment whose elements are ™agmented∫ by computer-generated or extracted real-world sensory input such as sound, video, graphics or GPS data.
It is related to a more general concept called computer-mediated reality, in which a view of reality is modified (possibly even diminished rather than augmented) by a computer. Augmented reality enhances one's current perception of reality, whereas in contrast, virtual reality replaces the real world with a simulated one.
Augmentation techniques are typically performed in real time and in semantic context with environmental elements, such as overlaying supplemental information like scores over a live video feed of a sporting event.With the help of advanced AR technology (e.g. adding computer vision and object recognition) the information about the surrounding real world of the user becomes interactive and digitally manipulable.



6.4 AI-Deep Learning

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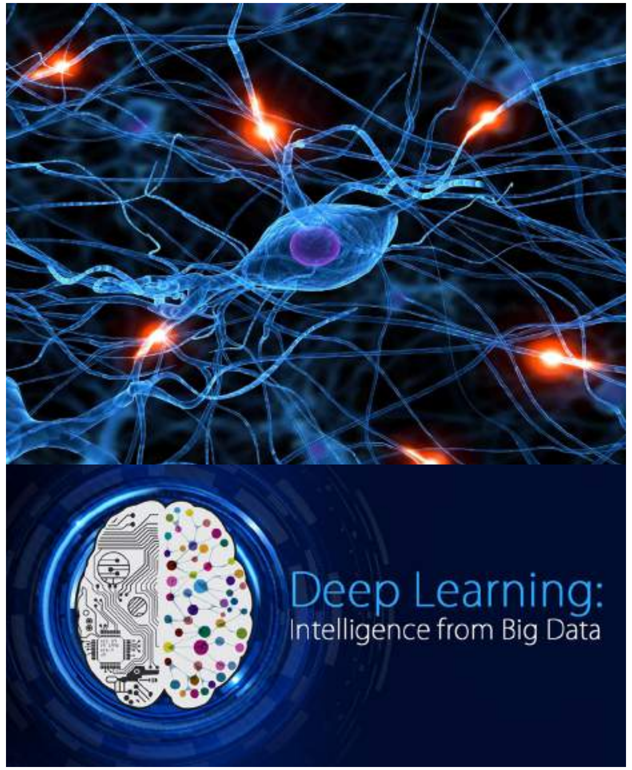
6.4 AI-Deep Learning



Deep learning (also known as deep structured learning or hierarchical learning) is part of a broader family of machine learning methods based on learning data representations, as opposed to task-specific algorithms. Learning can be supervised, partially supervised or unsupervised.

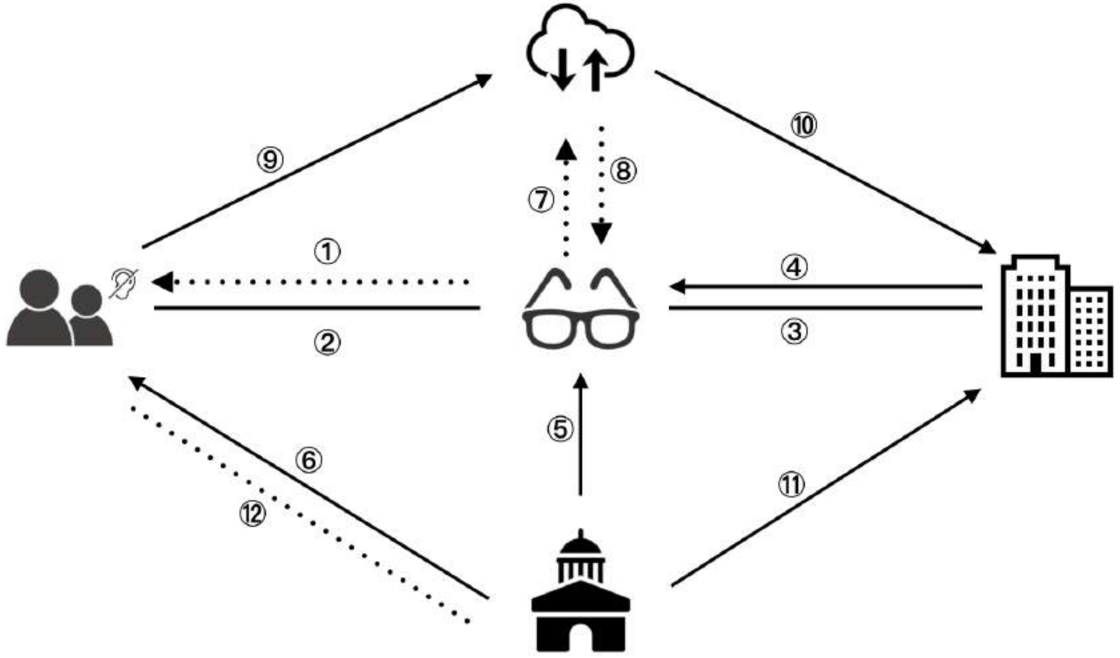
Some representations are loosely based on interpretation of information processing and communication patterns in a biological nervous system, such as neural coding that attempts to define a relationship between various stimuli and associated neuronal responses in the brain.Research attempts to create efficient systems to learn these representations from large-scale, unlabeled data sets.

Depth learning system, allows users to use after a long period of time, constantly improve the correct rate of sign language translation. Based on the large database, the more people use, the more data can be collected for comparison, so as to improve the accuracy of sign language translation.

07

Market

7.1 Market sysytem map



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7.1 Market sysytem map

- **Cloud**
- **Smart glasses**
- **Government**
- **Hearing loss people**
- **Company(Manufacturers)**

1.Glasses provide translation services for the hearing loss people,and help them to communicate with the normal people.

2.Hearing loss people have and use the glasses

3.The manufacturer produces this glasses

4.the manufacturer try to make give glasses' price cheaper

5.The Government introduced a policy to support the glasses, to further reduce the prices

6.The government can provide policy to support hearing loss people, as well as some money plan to help them buy this glasses

7.Glasses can collect the action about using the sign language information, upload to the Cloud to do the analysis

8.The Cloud will analyze the information and then translate them, re-spread to the glasses, and do the translation for hearing loss people

9.The hearing loss people use the ™pay for service∫ model, they only need to buy the service of sign language translation not the equipment.

10.The Cloud through the collection of translation services, to provide profits for the manufacturer.

11.The Government can also give some preferential policies for the manufacturers.

12. Because the communication problem for the hearing loss people have been resolved, it will reduce the unemployment rate. The human rights of hearing loss people are guaranteed, is conducive to maintaining the image of the government and the unity of the country.

7.2 Pay for service

™Payfor service∫ This approach is derived from the System Design for sustainability. It is a win-win business model, and in this system, it is actually a tripartite benefit model.
First of all, the user only need to pay for the sign language translation service, rather than pay for the hardware of glasses. In the next ten years, with the continuous progress of productivity, as well as the development of technology, the cost for hardware production is gradually reduced.So, this kind of payment model(pay for service) will change the normal way for the hardware payment. And such a payment way will also reduce the burden for users. The users only pay the service part, so the manufacturer will be responsible for the maintenance, upgrades and recycling of the product.Through such a process, manufacturers can extend the life cycle of the product and to make it sustainable.
And for the manufacturer, also the translation service provider, can get a lot of user data.At this stage the development of the Internet has become a data development economy.A large number of companies invested in large data business.And in the big data business, how to collect user data is the most important part.And such a wearable device can give the company a lot of data available for analysis.Not only in improving the accuracy of sign language translation to a very good upgrade, also can help the hearing loss people in their, the equipment will play a very useful roles in their life.

7.3 governmental support

The WHO estimates that unaddressed hearing loss poses an annual global cost of 750 billion international dollars. This includes health sector costs (excluding the cost of hearing devices), costs of educational support, loss of productivity, and societal costs.Therefore, it is a great economic interest to be able to improve the life of the hearing loss.
The government in order to promote this product, it can give some financial support, like,it can provide interest-free loans to low-income people, so that they are easier to get this services. The government's support for the manufacturer can be multidimensional, such as tax support, land support for the establishment of factories and so on. Why the government will support this service program?Because such a product can bring a lot of benefits for government. First, it improves the employment situation and the working environment of the hearing loss people; second, it is a manifestation of social equity and justice; third, it can improve social cohesion; finally, to enhance the image of the government.
So in the whole system, each part is benefit.