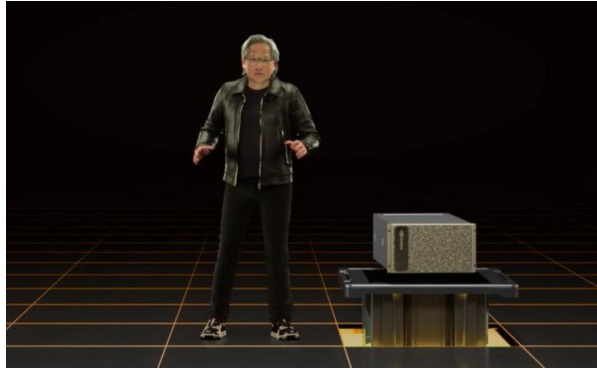


# Digital human: use cases and technologies

**Mei YAN**  
Engineer of CAICT

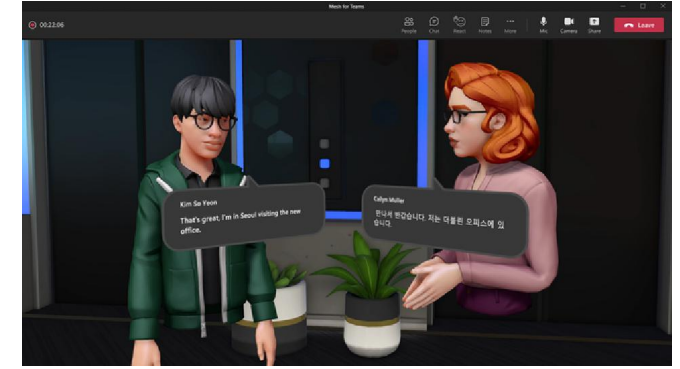
# The rise of the metaverse has once again put the digital human at the forefront



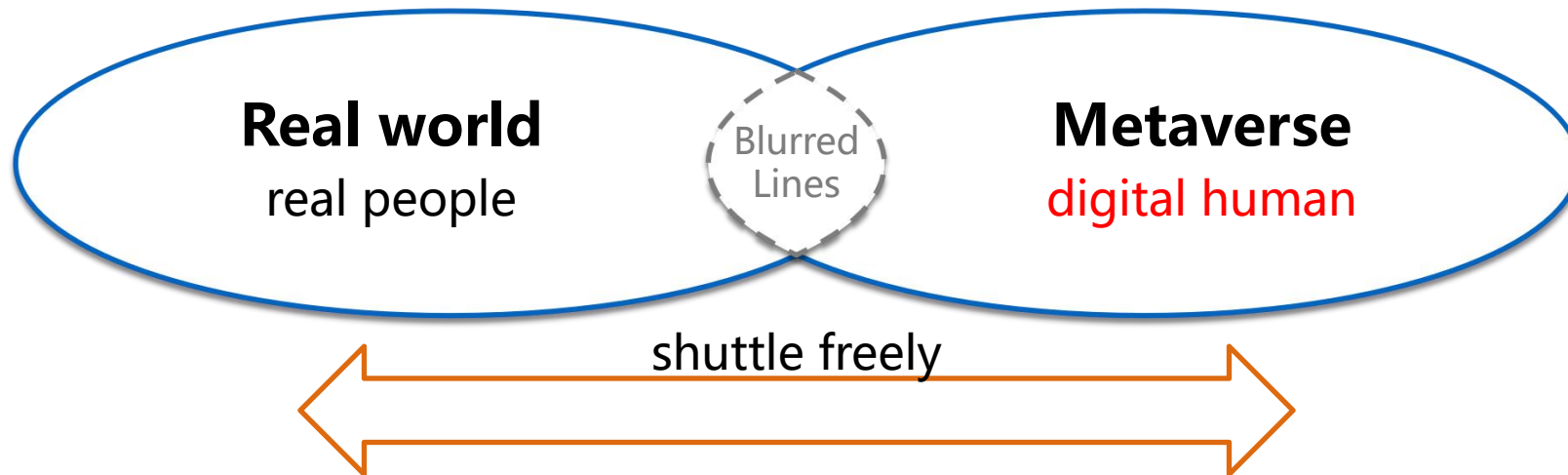
Nvidia launches metaverse platform, Omniverse



Facebook changed its name to Meta

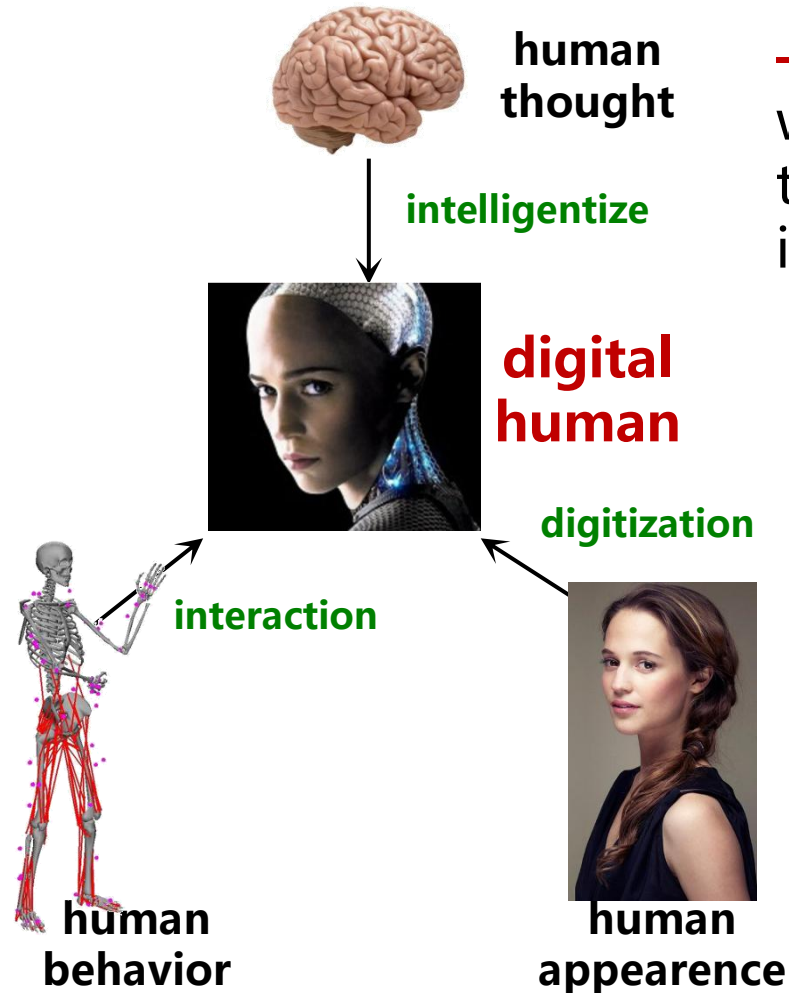


Microsoft launches metaverse hybrid office products



# What is digital human?

Digital human refer to virtual characters that are based on the design of the real world, generated by computer, and then driven by real people or computation, and presented on display devices.

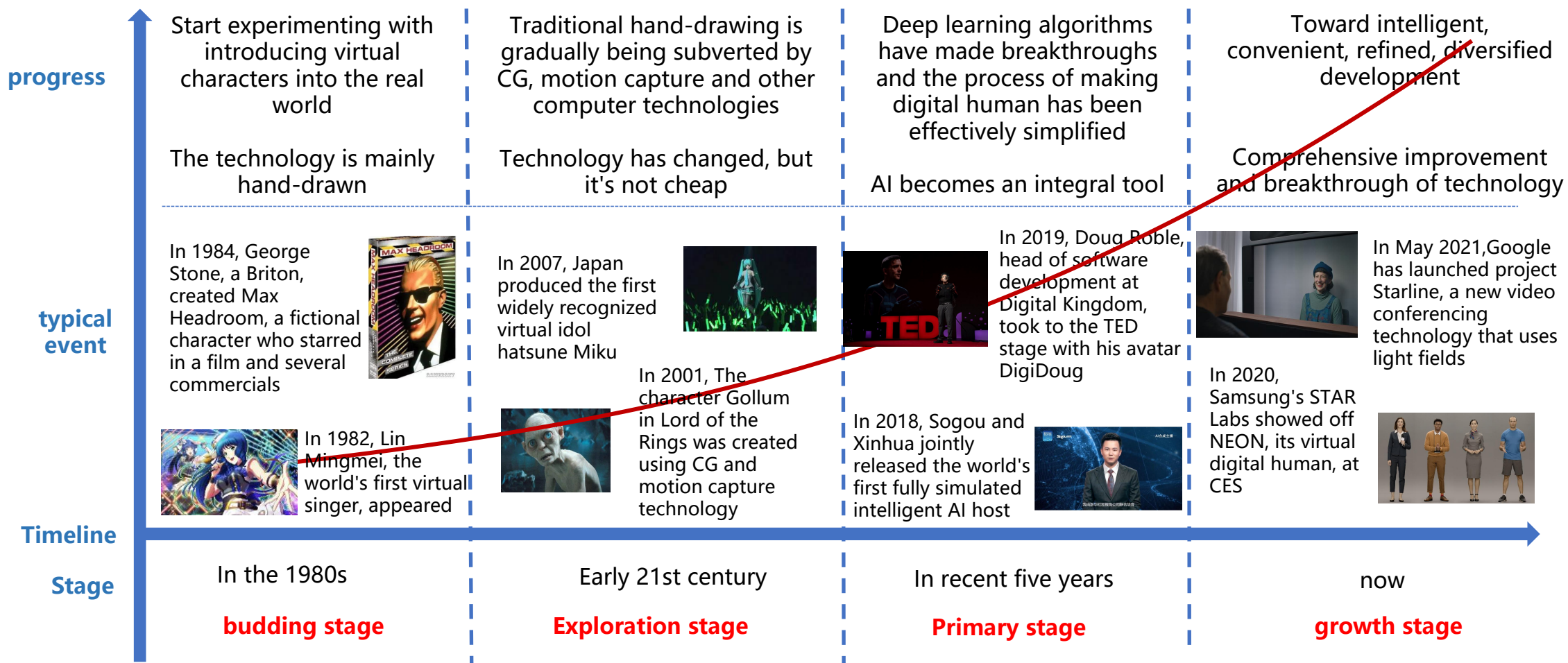


**-the thoughts of human:**  
with the ability to recognize the external environment and interact with human beings

**-the behavior of human:**  
with the ability to express emotions with language, facial expressions and body movements;

**-the appearance of human:**  
with a specific appearance, 2D or 3D, cartoon or the realistic style;

With the development of its supporting technology, digital human has gone through four stages since the concept was put forward.



# The application of digital human has broad prospects, mainly including two application scenarios

## Intelligent Content Production

News broadcast content production

film and television production

Game character Making

Educational Curriculum making

.....



labor-intensive to technology-intensive

## Multimodal Interaction

Holographic communication

Intelligent customer service

personal assistant

virtual anchor

.....



audio interactive to audio-visual dual-channel interactive





*Alita: Battle Angel* is one of the typical application cases of digital human technology combined with film

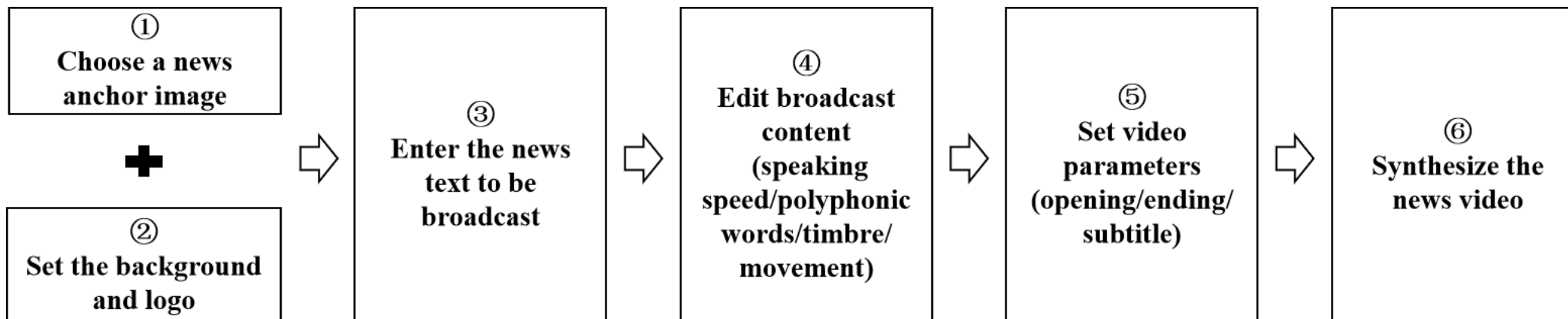


NetEase Foxi Laboratory has successfully applied digital human technology to the production of plot animation scenes of many games



Xinhua News Agency launches 3D AI anchors. Xinxiaowei can start broadcasting news by typing in text on a computer

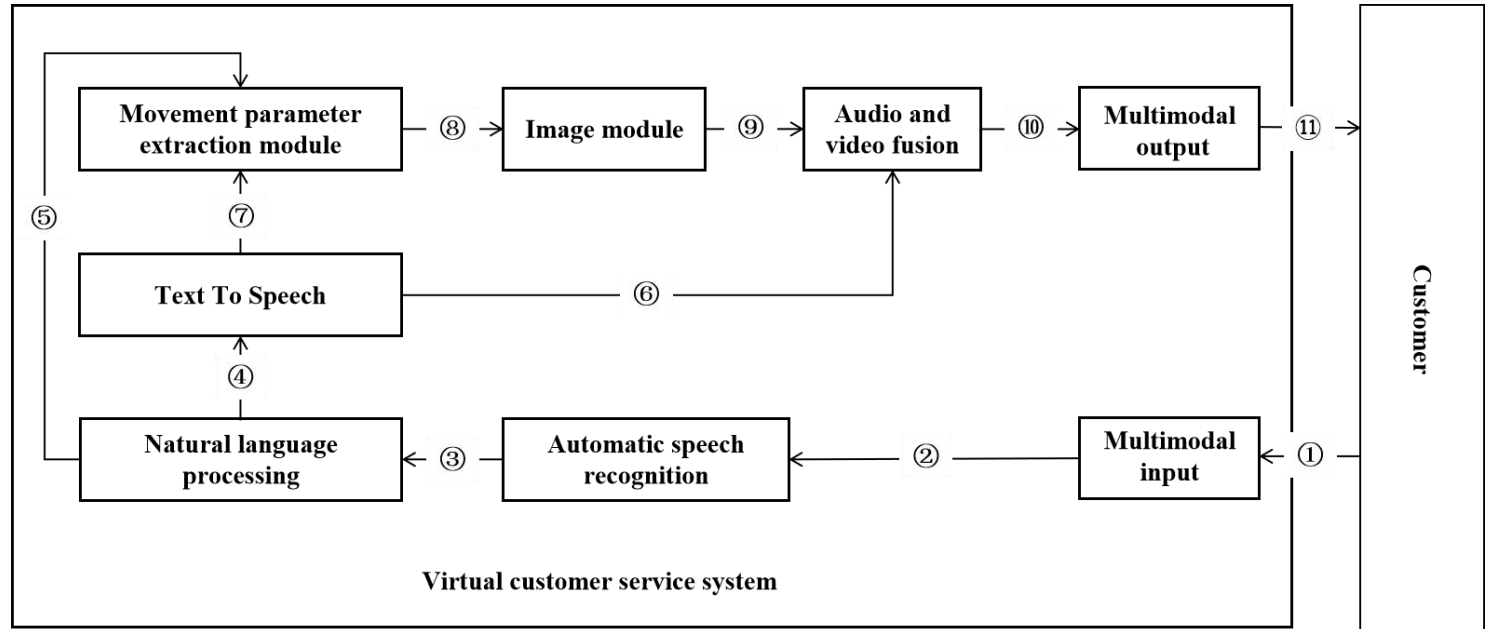
## The workflow of news production using digital human technology



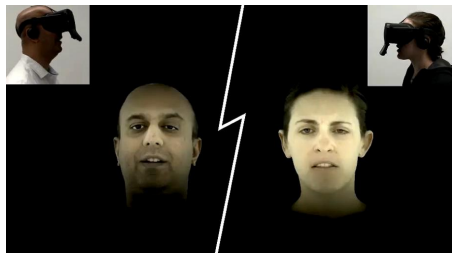
Shanghai Pudong Development Bank  
Financial digital staff Xiao Pu



## The workflow of virtual customer service using digital human technology



Microsoft 3D video capture system, Holoportation



Facebook Metric Telepresence



Google launches Project Starline, a new video conferencing technology

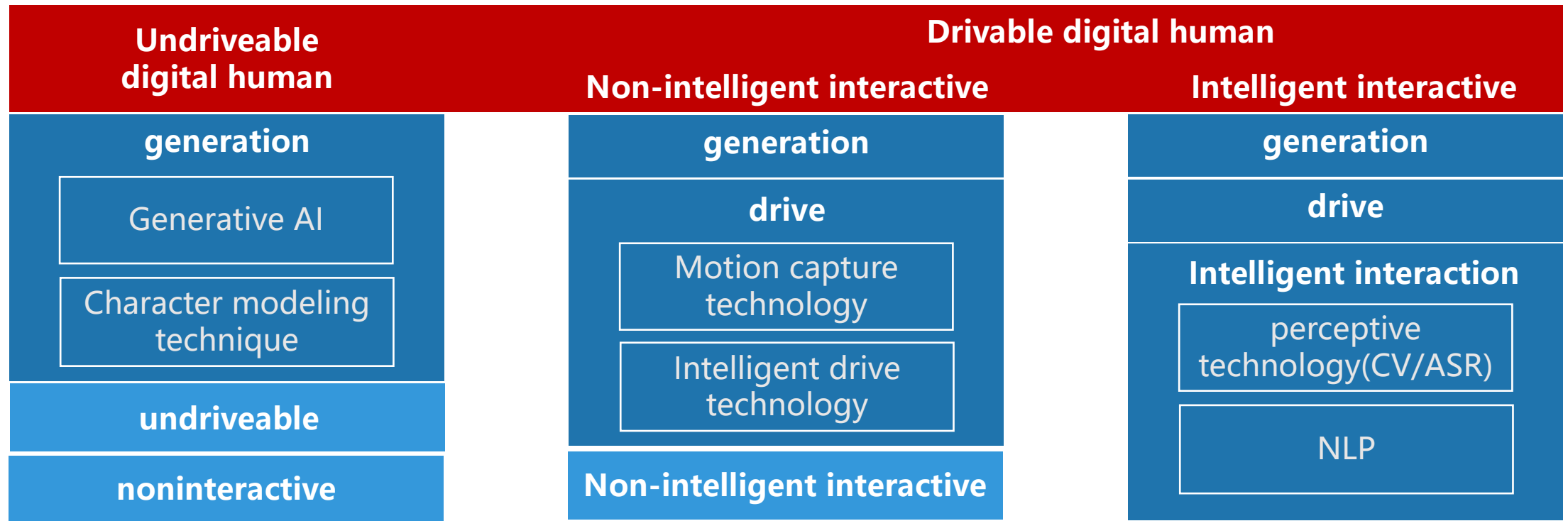


Jingdong purchasing assistant



OPPO phone assistant

Digital human mainly includes three key technologies of **generation, drive and interaction**, involving computer graphics, computer vision, intelligent speech, natural language processing and many other technical fields.

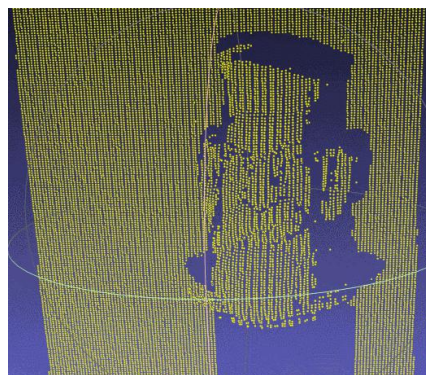




Structural light scanning and reconstruction, camera array scanning and reconstruction, light field imaging and relighting are the main modeling methods at present. And camera array scanning reconstruction is widely used in the field of digital human production.

## Structural light scanning reconstruction

Achieve 10 $\mu$ m scanning reconstruction accuracy



## Camera array scan reconstruction

High-speed photo reconstruction, can realize fast free view point real-time switch



## light-field imaging

Single light field camera can achieve 4K@30fps real time field reconstruction



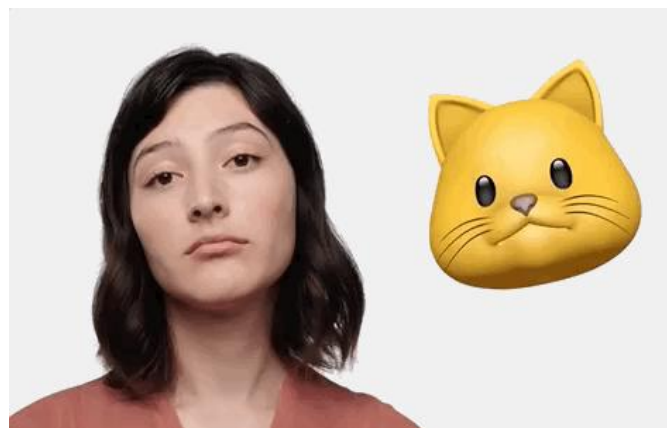
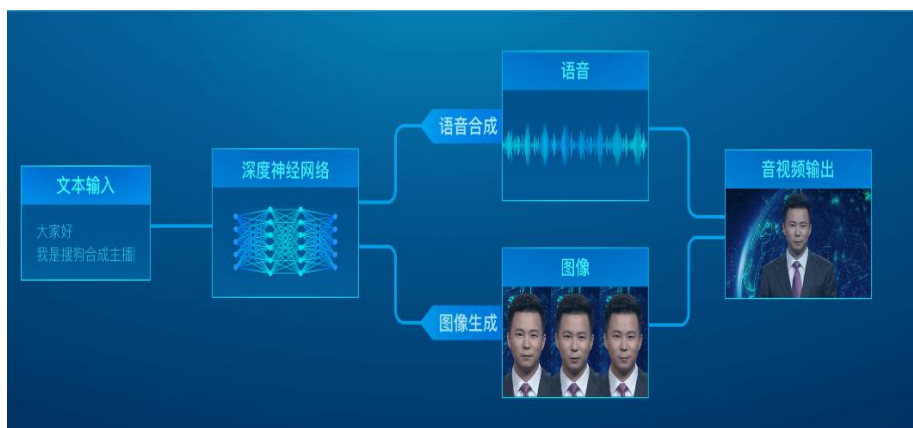
## relighting

LightStage blurs the boundary between virtual and real, and has been successfully used in Hollywood film and television production



**Intelligent synthesis** and **motion capture migration** have become the mainstream motion production methods of digital human

	text-driven	audio-driven	video-driven	motion capture device driven
Input	text	speech/music	video of real person	Sensor information
Output	digital human video			



Thanks to the breakthrough of deep learning technology, the accuracy of artificial intelligence technology has been greatly improved, which lays a foundation for digital human to simulate the functions and behaviors of the human body.

## ASR

Standard accent recognition rate is over 95%, with human level speech recognition ability

## NLP

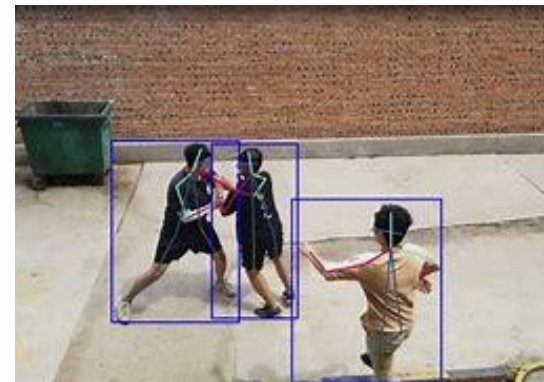
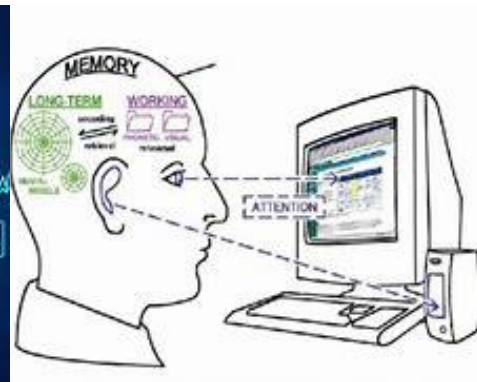
From rule-based statistics to deep learning, the accuracy rate in some cases is close to 90%

## CV

The motion can be analyzed and recognized by computer vision technology

## Multimodal fusion sensing technology

It's a far cry from the multimodal perception that humans generalize in real situations



## CAICT—Think Tank for Government & Innovation Platform for Industry

### ◀ Conferences and Activities ▶



- Set up the content technology industry promotion phalanx
- Host 2020 Digital Human Developer Conference (2020 DHDC)
- Technical seminars are held once a month on average

### ◀ Industrial research ▶



- Carry out research on digital human technology industry
- compile and publish **2020 White Paper on The Development of Digital Human**



### ◀ Standards ▶



Relying on CCSA, ITU and other standards organizations to develop standards related to digital human. At present, we have two digital human standards under development in the ITU, namely F.DH-FM, F.DH-2D.

### ◀ Test and Certification ▶



- Provide testing services for digital human related technologies and products



