



Focus on Current Research on the Impact of Motion Capture on Actor Performance in Chinese Immersive Theaters

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Abstract

In the 20th century, thanks to a digital revolution, its derivative multimedia art was formed and immediately extrapolated to the field of theatrical events, but acquired new forms in the 21st century. With the continuous development of science and technology, motion capture technology is increasingly able to change different social and cultural fields. From stiff body movements to flexible walking, it is inseparable from the upgrade of various software and equipment. With the launch and update of Unreal Engine 5's metahuman animator, digital humans have more development possibilities. At present, most Chinese drama stage performances generally prefer traditional performance forms. With the influx of more relevant talents and funds, there have been obvious innovative developments in the fields of film and drama arts, and Chinese drama has also emerged. A variety of performances, including the utilization of virtual reality and motion capture in immersive theaters, offer more possibilities on the theater stage. It also brings vitality and innovation to the actors' performances and stage effects of China's immersive small theaters.

Keywords

Motion (facial) capture, immersive theatre, metahuman animator, actor performance

1. Introduction

Recently, I conducted field experiments on facial capture. In order to apply the capture technology to small theaters in China as much as possible, I conducted expert interviews and production studies. First, I went to the Qingdao Film Production Center in China to interview experts in motion capture technology. A movie using motion capture technology (Mauro, 2023) was being shot that day. Currently, virtual shooting in China includes virtual shooting based on LED shooting and motion capture technology. 80% of 3D animation projects and 90% of game projects use capture technology. There are several types of capture types used. Common ones include optical capture (David, 2020), inertial capture (Daniel, K, 2016), image capture and light stage (Ghosh, 2023), and metahuman.

2. Capture based on metahuman

Metahuman Animator will be released in March and June 2023. This interesting new technology enables individuals to record an actor's performance on their iPhone and computer simultaneously and create high-fidelity meta-human face animation. The 2023 Game Developers Conference (GDC) featured Metahuman, the latest synthetic human technology for capturing high-fidelity performance. Use the new MetaHuman Center's informational features, learn basics, and chat with other users. No one needs to intervene here. The Metahuman Animator software lets actors record their performances on an iPhone, making it easier to add high-fidelity face animation to Metahuman figures.

Modern technology can accurately replicate complex emotions, body language, and facial expressions. This enables computer simulations of individuals to correctly depict these things. Anyone may get these amazing results in this simple way. Although the user is accustomed to performance capture, these additional tools can considerably improve their process. It conserves time and energy and boosts creativity. It took months to accurately convert an actor's performance to a computer figure. Metahuman Animator finishes easily. Animations end in minutes with native GPU generation.

A procedure performer points the camera at the performers and starts recording. A complete procedure is neglected. Metahuman Animator records an actor's performance and accurately imitates the personality and traits of any Metahuman character.

This method works technologically because "Mesh to Metahuman" has greater functionality. Only three video frames and depth data are needed for this improved capability. An iPhone or vertical stereo head-mounted camera can collect depth data. People got data. The Metahuman Animator enables you to customize the solver for each actor and animate many Metahuman models. For basic use, Metahuman Animator requires an iPhone (ideally model 12 or newer) and a desktop computer. The improved Live Link Face iOS app gets raw video and depth data, which is delivered to Unreal Engine to be processed on the device, allowing for the desired output (Moon, 2022).

I learned the main capture types via expert interviews. I used the cheaper metahuman for facial capture research due to cost and objectivity. Additionally, it is the latest technology. His latest Unreal Engine 5.2 plug-in debuted in June 2023. Motion capture has been employed in animations, games, and movies, but not in tiny stage productions. I think this technology will give Chinese drama creators greater creative freedom and bring up new concepts. It will unlock artificial intelligence and drama. Given motion capture and AI, what else do performers need to accomplish? Actors are needed because no technology can substitute their emotional expression and on-the-spot reality, even in the future. There is additional theater technology for actors and typical performance effects.

Understand the UE (Unreal Engine) MetaHuman plug-in's usage and safety before utilizing it. UE5 facial capture requires MetaHuman Creator for cloud editing and import. Free cloud utility Metahuman Creator was launched by Unreal Engine in 2022. Create digital characters in nature. MetaHumanCreator allows you to customize your avatar's hairstyle, facial features, height, body proportions, and more. You can create and download MetaHuman using the cloud-based MetaHuman Creator, which streams images to your browser via Pixel Streaming. You can launch MetaHumanCreator to explore the "Presets" library. New metahumans will start with a "default". Select a preset from the collection and press "Create Selected" to customize. All new metahumans are saved to "My MetaHumans" immediately. You can download and load them. Editing MetaHuman in MetaHuman Creator changes it. While saving. Click Remove to delete MetaHuman from My MetaHuman. Exporting MetaHuman Data MetaHuman can be exported in two ways in Quixel Bridge (BENESCU, 2022).

To utilize MetaHuman Avatar Export, please hover over the square and click the Export button (the right-pointing black arrow inside the blue circle). Meta-Human starts high-quality exports to your Unreal Engine project instantly. MetaHuman Information Panel export is the second option. First, choose a "quality" level, then press "Add". Only previously generated and downloaded assets' quality will be shown in the drop-down menu. Please wait for the export progress bar to finish. If this is your first time exporting MetaHuman to your project, Unreal Engine will prompt you to activate settings and plug-ins. Click Enable Missing on each question. Unreal Engine will ask you to restart in the lower right corner when you enable all options and plugins. Search the "(Content Browser)" folder for downloaded MetaHuman files after restarting Unreal Engine. Drag "BP_Ada" from the Content Browser into the level viewport.

In the summer, I did a field experiment at Qingdao Theater in China. My actors performed a section, several audience members saw it, and I asked them for their opinions and feelings. Visual research methods were utilized to collect performance recordings and images, and then comparison procedures were used to choose extracts from the Qingdao Theater's "Leaving You" drama. The drama uses modern The stage arrangement is modern and old-fashioned, reminiscent of the war years, making it ideal for testing my ideas. I initially had the actors give a conventional performance, then utilized my capture approach to make a demo video clip, and then used the iPhone to perform a real-time performance. Comparing the three ways allowed the audience to ask if innovation and influence are possible.

First, I will introduce how to use metahuman for facial capture, and then how to apply it to dramatic performances.

First, you need to prepare a computer with the latest Windows system. It must have a high-configuration graphics card of NVIDIA 30 series, and an iPhone 12 or above mobile phone, then install the epic game Unreal Engine 5.2 on the computer, then open it and install Metahuman Latest plug-ins.

Second, then use the iPhone 12 phone to install the Live Link Face software. After opening it, record two videos.

The first is the recording of the two sides of your own face and the front and exposed teeth. The second video shows your face. The recording of expressions and performance will be saved and sent to the computer version of WeChat after completion.

Third, open the unreal Engine 5.2 software on your computer, create a new project, right-click the mouse in the content manager and select Metahuman animator, select capture resources, then select the type among the capture resources, select the live link face document, and then open the file that was transferred to the computer from the mobile phone just now, then click on the project settings in editing and enter the cache in the project settings. Find the cache size and change it to 2, 4, 2 according to the official requirements. Then find the Tools option, select Capture Manager, and directly select the first video you just recorded. Then go back to the content manager, right-click on the metahuman body, find the video in Create, then select your front, and two sides, and add keyframes. Then click on the ontology to solve, and a facial model will appear. This model is your face. Click B to compare reality and virtuality. Then return to the ontology to add the body, click mesh to metahuman, open the browser, and enter metahuman creator Login to register an account, and then enter metahuman. Then you will see your innovative new character model. You can edit the character image you want, then return to the software, click Add, open Quixel Bridge, and then you can see it in the software. Go to the character you just edited. At this time you can see the very detailed face, then select Download, wait for it to complete, click Add, then return to the body to add teeth, then click Prepare for Performance, wait for a long time, and then return Go to the content manager to create a new metahuman performance, select the first video match and the second video, click Process, and then you will see the animation, then output the animation, then return to the content manager, you will see the new Metahumans, click on the blueprint class, then create a new level and level sequence, drag the animation into the level sequence, and then you will see this virtual human. Click on him to see the detail selection on the right, and you can see the Livelink face, and then Click Adjust to open it, then open the iPhone software Livelink. Click to perform face capture through Arkit, find the IP address on the computer, and then enter it into the phone. You can find your phone on the computer, and then you can control it through the phone. your virtual human face,

Fourth, of course, you also need to learn other things in Unreal Engine 5 during this process, such as adding a camera and setting the camera as your main perspective. Then according to the adjustment, you will see your face. Of course, you can also change other faces according to what you want, any face will do, I used my own face to create a clip and captured the face in real-time with an iPhone. In the theater, I connected a large LED screen and found an actor to choose. Take a clip from a performance that's been performed recently, perform it, and then find the audience to ask (Figure 1) (Zhang, 2023).



Figure 1. iPhone connects to Unreal Engine 5.

3. That's how you create a virtual facial capture of an actor on stage

I first found the multimedia team of Qingdao Theater to cooperate with me in preparing for the theater test, lighting debugging, adjusting the LED screen, and connecting the computer to the theater screen and sound. Because the theater has Wi-Fi, it saves a lot of time. trouble. Here I am very grateful to China Qingdao Theater for providing a small theater stage including all multimedia equipment for use, including the staff for their help. I am also grateful to the multimedia and stage art team.

After connecting to the LED screen, my production appeared on the huge screen. I invited friends and the stage design center staff to see the experiment. I successfully presented my demo video. My live real-time performance on stage with lighting effects involves simultaneous communication with actors, screens, computers, and iPhones. I established network settings. Pressing and holding the computer window queries the Internet IP address. Enter cmd, press enter, then type IP config/all to display the IP address. Launch the iPhone LiveLinkface app. Download it from

Apple. Select the IP address option in the software and enter it on the PC. Return to the software's first page after turning on head rotation. Automatically activate the front-facing depth camera to see yourself. Open Unreal Engine on your computer, select the person you made, and then click the information option; Livelink will appear, followed by your iPhone. Successful connection. I located the phone after a long time owing to network quality issues, so a fast network is suggested.

At this time, my computer and iPhone were fully connected to the screen, and a complete form had appeared. Then I gave the phone to the actor and asked him to perform the play excerpts on the stage the day before to conduct motion capture experiments. Due to time and other factors, I just temporarily asked the actors to hold their mobile phones on the stage for a simple experiment and did not design how to perform. I just let the audience see the technology unfold first. The lighting engineer gave a simple light in the middle of the stage, and the actors performed the performance by pointing the mobile phones at their faces and then had the opportunity to see the real-time picture synchronized on the big screen. The following is a photo record of the scene (Figure 2).



Figure 2. Live real-time metahuman experiment in drama theater.

After the performance, the technical staff and the audience, including the actors, sat together and gave me strong support and positive views on the experiment just now, because the innovation and technological innovation of small theaters in the future may really change China. The best choice for audiences and playwrights to re-enter the theater. In China, except for Beijing and Shanghai, the theater environment in other cities can be said to be a cultural deserts. No one really buys a ticket to enter the theater, unless relatives and friends are invited by you to enter the theater, and many people prefer to go to the cinema. This is caused by various factors, and the reality is this. This requires reform and innovation in all aspects of the theater to create an unprecedented small theater performance that can dazzle the audience.

I conducted interviews with the audience on three comparisons. First, the most traditional performance form, which they think is the most common and the performance form of choice in all theaters now, and most of them prefer the second and third performances. , because they believe that this form has a real driving force for stage innovation and can truly serve as a key and channel for small theaters to lead to future theater forms. It can be interconnected with many devices, including projections, etc., which will also be of qualitative help to children's dramas and promote innovation in the overall performance form of children's dramas.

4. Conclusion

Of course, they believe that there are also shortcomings. For example, virtual people are delayed due to network problems, the performance form is affected by the environment, the virtual people need to be more refined in their realism, and many of the actors' micro-expressions are missing on the virtual people's faces, so about virtual people All human problems can be fine-tuned and modified. Of course, the more important thing is how to combine the script themes. After summarizing, its impact, advantages, and disadvantages are as follows:

Enhanced expressiveness: Facial capture can help actors convey emotions and expressions more accurately in a small theater environment, thereby enhancing expressive capabilities. It can even allow actors to control their faces while sitting in the audience, allowing the audience to be more deeply involved in the plot.

Creative expansion: This form allows creators of small theaters to create more creative and imaginative characters and storylines, breaking through the limitations of traditional small theaters and providing more visual and emotional impact. **Technological interaction:** Facial capture technology can create opportunities to interact with the audience, allowing the audience to communicate more directly with virtual characters and enhance their sense of participation.

Disadvantages and shortcomings: Cost and equipment requirements: Metahuman's facial capture requires specific computer configurations, equipment, and professional technical support for iPhone, which may be some equipment

burden for small theaters. Technical complexity: The setup of facial capture technology can be relatively complex and requires professional technicians to operate and manage it. Authenticity and emotion: In the atmosphere of a small theater, the audience is more likely to notice the actors' true emotions and performances. Facial capture technology may cause the distortion of certain emotions and emotional expressions, weakening the emotional resonance with the audience. Artistic style: Some small theater performances may be more inclined to some specific artistic styles, and facial capture technology may not be suitable for all types of performances.

In summary, facial capture technology has certain potential in the performing arts of small theaters in China, but its advantages and disadvantages need to be carefully weighed to ensure that the application of the technology can match the unique characteristics of small theaters and audience expectations.

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