VICON | VFX

REDEFINING
VFX
MOTION CAPTURE

V | VFX

VICON SHŌGUN

BUILT FROM THE GROUND UP, SHŌGUN TAKES ADVANTAGE OF VICON'S 35 YEARS' EXPERIENCE IN MOTION CAPTURE AND THE IMPROVED TECHNOLOGY AVAILABLE IN VICON VANTAGE AND VERO CAMERAS.

Today's visual effects productions need to be achieved in real time and deliver the highest quality skeletal data in the shortest time possible. Shōgun 1.8 Live and Post are designed to help studios of any size optimize capture and processing for maximum quality results. Updates in 1.8 include best in class, low latency tracking for both film and virtual cameras, support for Viper and Viper X, and much more.

"We consider Vicon the gold standard for production. It is unbelievably powerful."

- Dan Pack, Founder Silver Spoon Animation

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WHO IS SHŌGUN IDEAL FOR AND WHY?

GAMES COMPANIES

- Ubisoft
- EA
- Sega
- Nintendo
- Square Enix
- Epic Games
- Warner Brothers
- Activision
- Ninja Theory
- Larian
- Valve
- Myrkur Games
- Bandai Namco
- Plarium

FILM PRODUCTION COMPANIES AND STUDIOS

- Framestore
- Double Negative
- ILM
- Disney
- Pixar
- Digic Pictures
- Dreamworks

SERVICE PROVIDERS

- AudioMotion
- House of Moves
- Imaginarium
- Silver Spoon
- Beyond Capture
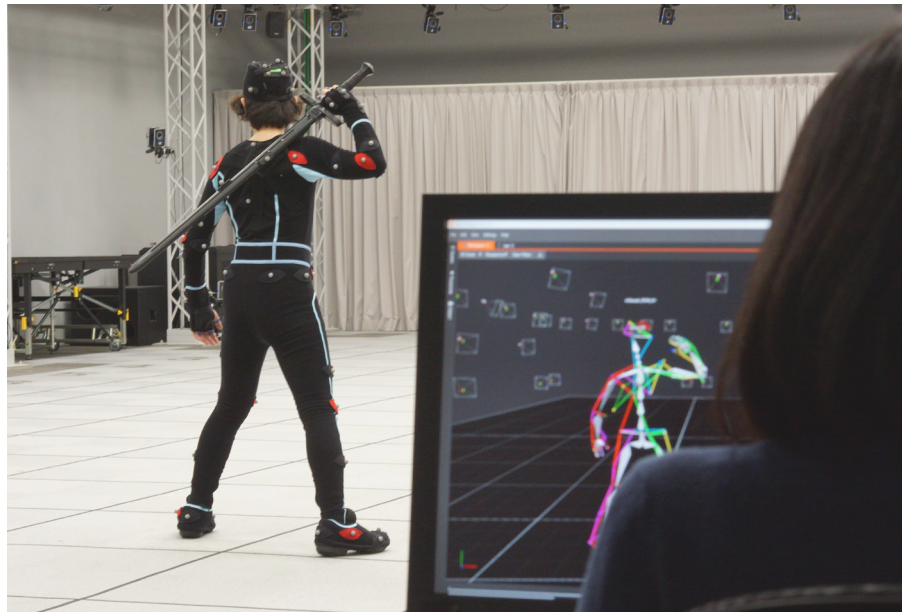- Neoscape
- The Capture Lab
- MOOV

UNIVERSITY FILM & GAME DEPARTMENTS

- DAVE School
- Staffordshire University
- NYU
- Portsmouth University
- Savannah College of Art & Design
- FIA
- USC

KEY MARKET USE CASES

SQUARE ENIX – VISUAL WORKS

Video game titan Square Enix has built its reputation and its fan base by drawing gamers deep into immersive worlds such as those of the famous Final Fantasy series. One of the cornerstones of this worldbuilding is the use of lengthy, increasingly lifelike cut scenes that bring the games' stories and characters to life, and one of the most powerful tools for creating them is Square's Vicon motion capture stage.

Visual Works

Since the groundbreaking release of Final Fantasy VII in 1997, Square's Visual Works CGI animation studio has been the driving force behind the cutscenes illuminating the publisher's games. The studio has worked on multiple entries in blockbuster franchises such as Final Fantasy.

Branching out, the production house began extending itself to standalone CGI films in 2005 with Final Fantasy VII: Advent Children, and taking on AAA Western series such as Tomb Raider since Square's acquisition of British publisher Eidos in 2009.

Visual Works has used Vicon technology since 2006 and currently boasts a huge motion capture volume equipped with 100 Vantage cameras, making it one of the largest mocap stages in Japan. In keeping with the epic scale of Square's games the team often uses the large space to capture casts of 10 or more actors, while at a more granular level they're investigating Shōgun's new high fidelity finger solver as an option for producing hand animation.

The director of Visual Works emphasizes the speed that the studio's Vantage cameras and Shōgun software allow his team to work at. Being able to quickly process capture data in-house and output real-time animation in the studio is a powerful advantage, particularly when it comes to creating fantasy animations which might take the form of anything from a realistic medieval knight to a bobble-headed anime character.

Whether Visual Works is subtly grounding and balancing fantastical characters or creating spectacular set-pieces, everything the studio does comes back to bringing beloved characters to life, such as Cloud in the recent Final Fantasy VII Remake.

How universities are evolving their motion capture offers to keep pace with the technology.

As cost and technical barriers of entry to the world of motion capture come down, universities are adapting fast to keep up with both the proliferation and diversification of commercial motion capture applications. Vicon gathered together a panel of leading motion capture educators to discuss how the field is changing and where it might be heading.

"There's a democratization going on with the technologies," says Nick Juschyshyn, Program Director of VR & Immersive Media, Drexel University, USA, summing up the overall arc of commercial motion capture as it relates to education.

"Today, there are tools that will just use a single video camera to shoot a video and a machine learning system processes it and produces a moving joint system. It's not as accurate as a fullblown, studio-grade optical system, but you've got an FBX file that you can start animating with. Then, all of a sudden that leap to a full-blown optical system isn't that big of a step," says Juschyshyn.

"It's a great thing, because it just widens the scope of what we can do with motion capture in education," adds Alex Counsell, Faculty Technical Adviser for the School of Creative Technologies at the University of Portsmouth in the UK.

"We talk about democratization because it's so much easier now to get amazing results instantly," he goes on. "Our volume has become a much more collaborative space through the years. There are more and more people coming in and more and more people trying new things. People are attracted towards it rather than scared of it because it's not so deeply technical anymore."

That growing interest is being reflected at an institutional level, according to Carlos Vilchis, Lecturer of Animation & PhD Student at

Tecnológico de Monterrey, Mexico. "Universities have started to see that motion capture is more than just making small characters move. It's amazing the interest we're seeing now that programs like media want it for virtual production or for digital humans."

Vilchis, Counsell and Juschyshyn note that within their universities motion capture is being used in fields ranging from fashion to aerospace to architecture, and the jobs available after graduation are in sectors that are just as diverse.

Changing courses

To cater to these new fields, universities are increasingly offering courses that break out of the VFX and videogame design silos.

"Where Drexel traditionally had a game design program and we've had an animation program or visual effects program, we saw an opportunity to create a new offer," Juschyshyn says. "VR and Immersive Media pulls in components of all of those disciplines and brings them

together. It's virtual production, motion capture, virtual reality, augmented reality, full dome projection and projection walls, all of that working together."

Counsell says that in the UK, where getting a course accredited can be a long process, having degrees that feature a variety of different digital production techniques is useful. "It allows us to be reactive and agile within the course, rather than having to establish a new program and get it accredited," he says.

"That's one thing we've definitely been doing over the last few years – these open-ended modules and programs that allow experimentation. They allow the music students to talk with the students doing mocap, for example, and this collaborative work becomes easier and builds skillsets."

"I'm struggling to try to keep up with the amount of demand that there is for these kinds of skills, this real mix and match of all these skills that bring different elements together," Counsell adds.

Beyond the technical

The increasing accessibility of motion capture hasn't only changed the applications teachers are covering. It has also changed the skills they are teaching. As the tools have become simpler to use, educators are able to shift focus beyond the more technical aspects of tracking.

Juschyshyn agrees. "There are always problems to be solved, even though the front-end user interface has been optimized and it's easier to get through a calibration process. Well, that gives you more time for motion capture, and it gives you more time for creativity and experimentation. When that experiment didn't turn out the way you thought it would, you wonder why. You dig in under the hood – what's the calculation going on there? Is there a way that we could make a Python script to automate something and make this a little bit more efficient, more repeatable,

etc.? So there's always more to be done."

Jesse Woodward, Lecturer of Animation for the Design Department at the University of Wisconsin-Stout, USA, gives an example. "A couple of weeks ago we did a motion capture shoot for our animation production class. In one of their shots, the main character is walking on a tightrope. And I said, if you try to do standard walking, foot after foot on a flat surface, it's not going to look the same. So we decided to get a standard two by four, put it on the ground and have them stand on it, because that's a much better feeling. It looked a lot more genuine. Creative problem solving

can be something as simple as just putting a board down for a prop."

Soft Skills

One element of motion capture work that's getting more teaching time now is soft skills. Part of that, Woodward adds, is teamwork. "Whoever is going to be in the suit, whoever's working with props and whatnot, the first and most important thing is to make sure that they feel comfortable in what they're doing, and feel comfortable in the suit, and making sure that it's a good experience for them." For more insights into the present and future of motion capture in education, see the full panel discussion on Vicon's YouTube channel.

DIGIC – TAILS OF KITTY CAPTURE

With patience, even the most difficult animal scan produce good data.

DIGIC has been providing motion capture services to its clients for around 12 years, using its data to produce VFX for film and TV as well as animation for video games. Mostly, that involves capturing stunt performers and vehicles. DIGIC also has a very specialist sideline, tracking animals.

To date, much of this work has focused on horses and dogs. More recently, though, the studio has been tracking animals that are notorious for their unwillingness to do what they're told – cats. Doing animal capture in-house wasn't DIGIC's first choice. "We purchased horse mocap data from several places for earlier projects," György Tóth, Managing Director of DIGIC Services, says, "but we weren't satisfied with the quality, so we decided to try to record the horses' movements ourselves.

"During our first horse shoot, it was difficult to get the markers to stay on the horse, so for the next shoot we had a cloth sewn to make the

markers stick better. There were also some problems with that: the cloth on the legs would get tangled, and if the horse got too sweaty the cloth would stretch, for example. After three or four shoots we got to the point where we could extract good data from the sessions, and the current marker set was developed based on that experience."

DIGIC has banked almost 10,000 shooting hours in the dozen years since it established its volume, amassing 60TB of data and nearly 40,000 takes, so experience isn't something the studio is short of.

Those takes have been done in a steadily evolving setup that currently includes 40 16MP Vicon T160 cameras. "The team that designed the system had experience with optical motion capture and inertial sensing," says Tóth. "Based on this knowledge, we decided to go with the most advanced Vicon camera solution at the time, which was the T160 series. Over the last 12 years, after a few thousand hours of shooting, we think we made the right decision!"

Despite that deep bank of experience and a powerful motion capture system, however, capturing cats came with its own set of challenges.

Mocats

The mocat project began at the request of a Korean client looking for a library of mocap data and scans of dogs, horses and cats to be integrated into their game engine as full navigation movements.

While DIGIC was working with the cats, the studio decided that it would also use some of the data for "some more interesting ideas both for internal use and to put it on the market," says Tóth.

For all of DIGIC's work with horses, turning their expertise to cats wasn't as straightforward as swapping one animal for another.

On a practical level, Csaba Kovári, Mocap Division Lead, says that, "We couldn't dress the cats, so the marker placement had to be done differently. And you couldn't put markers on the tails, either; it would have made natural movement impossible."

Then there was the issue of getting the desired performance from the cats.

"Although the cats were trained and had been in films many times, it was a challenge to get them to move naturally despite the markers that were placed on them," says Kovári. "The solution was a relatively long acclimatization process. First, placing one or two markers on the cat's body for a few minutes, then gradually working up to the full marker set.

"Also, it's important to note that it took approximately one month to train the cats – with the help of a professional animal trainer – and prepare them for the mocap shooting session.

"Another thing to mention is that, unlike humans, cats, horses and dogs can work for much shorter periods of time. Therefore we had to take a break after one or two hours or replace the animal with another one."

After the performances were captured, processing the data presented its own problem.

"The other challenge was that for the cats, as for the dogs and horses, we had to develop a bespoke solver that could transfer the marker data to a skeleton that's as lifelike as possible, while also taking into account the anatomical features," says Kovári.

The cats' much more mobile spines were a particular factor when it came to designing for cats rather than horses, too. "It took a lot of finetuning, and the marker set changed a lot after the first tests," says Kovári.

People Power

Having the right technology in place is only one piece of the puzzle, however. The other is having people in the loop who can problemsolve during a difficult shoot.

"Working with animals is a completely different field from working with human performers," says Tóth. "It's very important to find the right trainer team, to work closely with them, to assess what is feasible, what is not, or when the shoot might become unpredictable. Also, it's crucial to be prepared for the possibility of a complete redesign of the shooting schedule."

While working with animals might require a loose approach to planning, DIGIC doesn't intend to be put off. Looking ahead, the company plans to deepen its library of cat and dog animations. The studio is also, Tóth says, working on a new IP of its own, funded by the Epic MegaGrants program, involving a range of different animals.

At the heart of every project that ILM has utilized performance capture for over the last 25+ years lies a core technology that helps push the boundaries of visual effects: Vicon motion capture systems.

It is no exaggeration to say that the collaboration between ILM and Vicon has helped redefine the extent of our imagination.

The latest example of this work is one of ILM's most challenging and ambitious projects ever – The Mandalorian.

Following the Emmy Award-winning season one, the latest season of The Mandalorian pushes the thrilling ride for fans to new heights — all thanks to ILM's ground-breaking StageCraft technology that achieves a giant leap forward in filming techniques.

Working with Vicon, ILM has evolved well beyond traditional VFX motion capture to become a world leader in virtual production.

Turning vision into reality through technology

With The Mandalorian, filmmakers Jon Favreau and Dave Filoni have been explicit in their desire to "bring Star Wars to the screen in a new way."

With the scope and ambition of the series only increasing on the second season it was crucial that the actors and viewers not only experience a huge range of new worlds — but truly believe in the reality of the worlds being created and are able to build emotional connections with the characters.

This ambition has required new filming techniques to be rapidly developed and deployed — chief among them virtual production techniques including camera tracking for in-camera VFX (ICVFX).

Virtual production in its simplest form is the merger of physical and digital worlds. Through a combination of immersive technologies like virtual reality (VR) and augmented reality (AR), as well as ILM StageCraft and real-time render engines, virtual production allows filmmakers to view their projects live on set to quickly react

and make changes as needed, rather than having to wait until post-production.

Virtual production also offers several logistical benefits as it allows for more iterations of scenes or shots to be created with fewer personnel in a shorter space of time, therefore significantly reducing production costs.

Allowing the creative team and the actors themselves to better visualize the environments on shoot day is paramount. Production teams previously had to imagine the final scene while using green screens to shoot, with visuals applied in post-production after the fact.

ILM has invested heavily in leading the way with these techniques – and projects such as The Mandalorian and George Clooney's feature, The Midnight Sky has been a tour de force of just what is possible with virtual production.
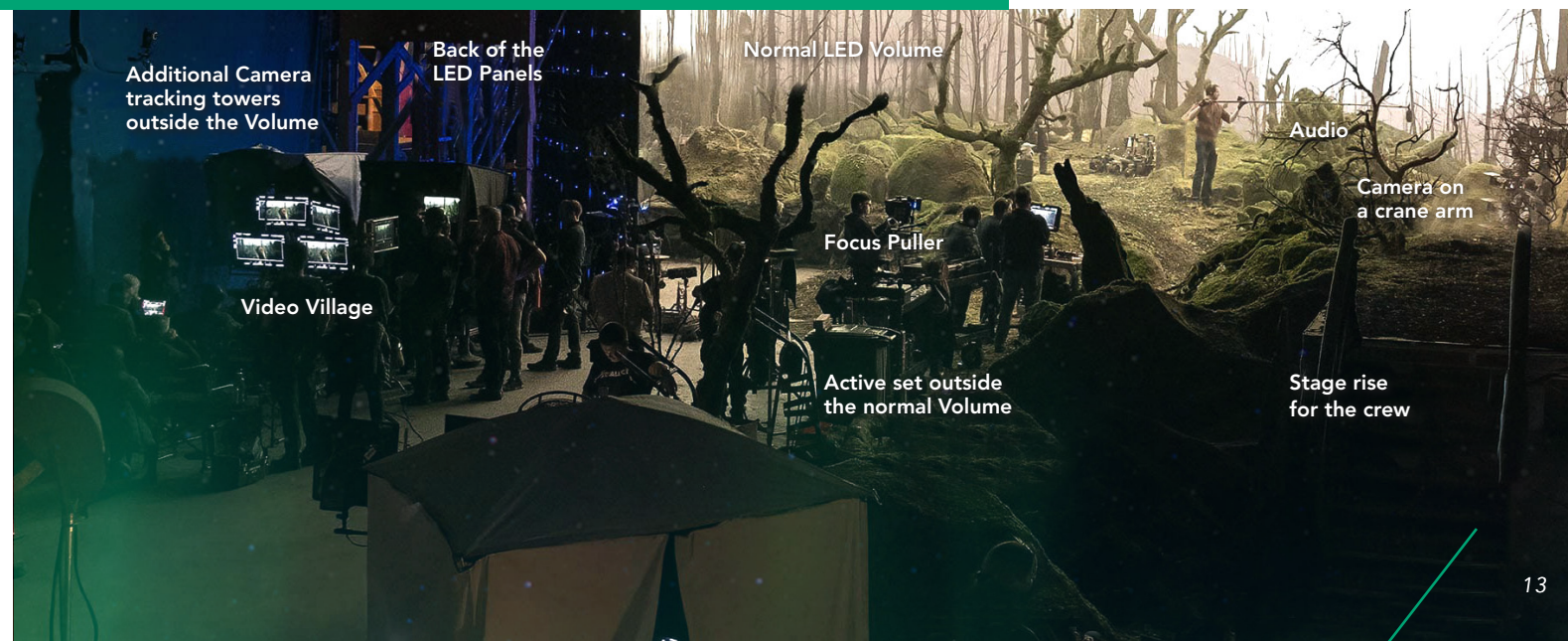
Motion capture technology in a virtual production pipeline is a crucial component in making these endeavors a reality.

Vicon's technology has allowed ILM to recreate the universe of Star Wars in compressed time with 60 different live environments, which they can use over and over again.

Everything from VR scouting, previsualization, performance capture and in-camera VFX using giant LED walls can make use of Vicon technology in some way.

One of the biggest leaps forward has been real-time capture in the volume itself, which requires high-resolution cameras and large frustums. The latest Vicon hardware has enabled ILM to accurately track cameras on set while moving about no matter if the camera is handheld, on a crane, a Steadicam, or some other support equiptment. This has helped to create a 360 degrees virtual production environment at large scale such as ILM's pioneering StageCraft LED volumes, enabling them to capture a whole new category of shots while successfully blending photoreal visual effects with live action, which previously wasn't possible.

SETS EXTENDING OUT OF THE CAPTURE VOLUME

Additional Camera tracking towers outside the Volume

Back of the LED Panels

Normal LED Volume

Audio

Camera on a crane arm

Focus Puller

Video Village

Active set outside the normal Volume

Stage rise for the crew

Making the impossible, possible for 25 years

For Rachel Rose, ILM R&D Supervisor who oversees the studio's developments for virtual production, the success of The Mandalorian and all ILM projects requiring motion capture owes much to the collaboration:

"Since day one Vicon has enabled us to do things that were never possible before — and that's as true today as it was in the 90s. Vicon's technology and hardware have constantly advanced throughout our relationship, and the processing power available to us with their technology is like no other. We can deploy and always count on Vicon's tech as it's such reliable, robust hardware requiring only a quick calibration."

"ILM always looks to collaborate with those who are making best-in-class software/hardware solutions for problems we're solving.

If a solution doesn't exist, we'll solve it on our own, but we're not looking to reinvent a solution that's already there.

We are incredibly lucky that we have a long-standing relationship with such an innovative company like Vicon. The absolute best thing I can say is that with Vicon I have a powerful performance capture system that just works."

Unleashing a new wave of creativity

With ILM's StageCraft virtual production technology, ILM and Vicon have realized many filmmakers' vision for creating fully digital worlds that are as close to reality as possible.

The Mandalorian is just the start of a new wave of creativity that will be unleashed as film directors explore new ways to take advantage of the virtual production techniques pioneered by ILM and Vicon.

As we have seen in recent projects, the possibilities within highly accurate virtual production pipelines are endless.Rose concludes,

"As excited as I am about what's been accomplished by our StageCraft team and the visionary filmmakers we have been fortunate to collaborate with, we've only just scratched the surface of what we believe the system is capable of. What's really exciting is where filmmakers will lead us next."
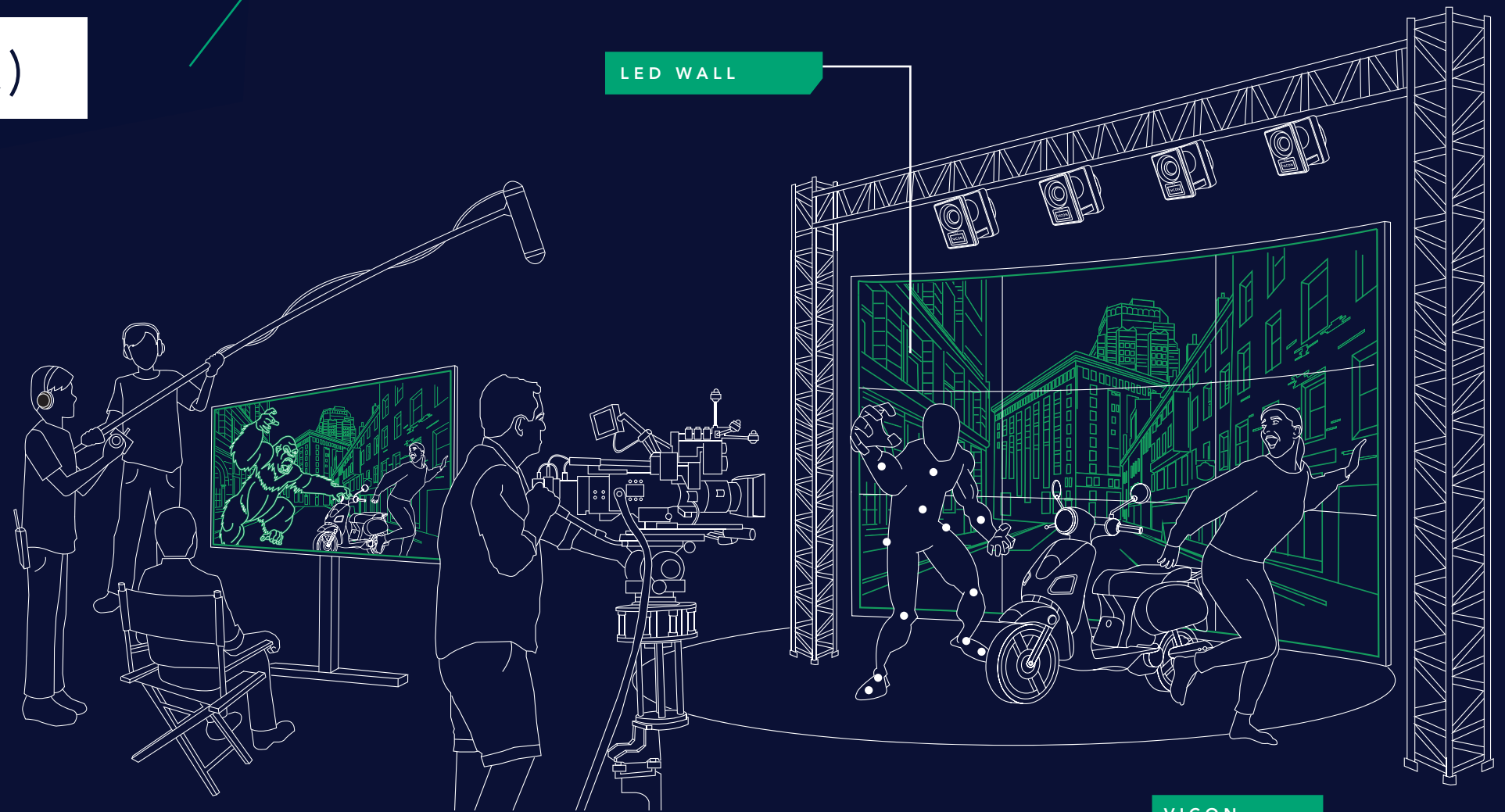
While the landscape of film and TV is constantly evolving, it is certain that whatever happens next, motion capture and virtual production will play a key role in innovation. High-quality tracking technology, offering ultimate precision, is central to enabling the advances that will allow creatives to make leaps and bounds forward and to continue to revolutionize the entertainment industry.
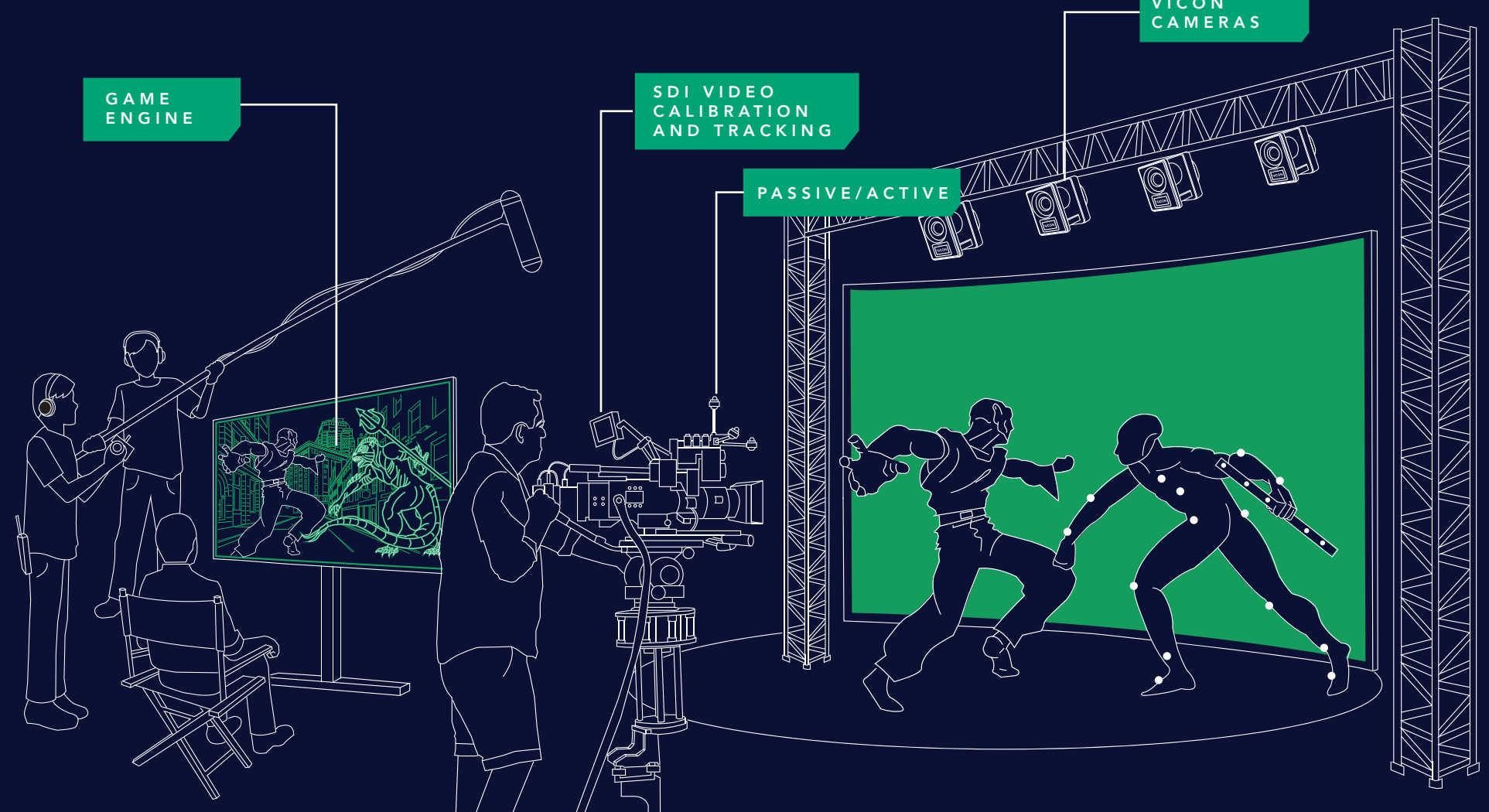
IN CAMERA VFX (ICVFX)

By enabling you to work with close-to-finished visuals on set, Vicon technology can save you time and resources in post-production while ensuring consistent visuals over multiple shoots.

Streamline production on set, reducing the number of people and cameras on a shoot, bringing down the number of builds and saving on travel costs. Our pipeline allows you to integrate LED walls and green screen technology, all tracked with low latency and unbeatable accuracy.
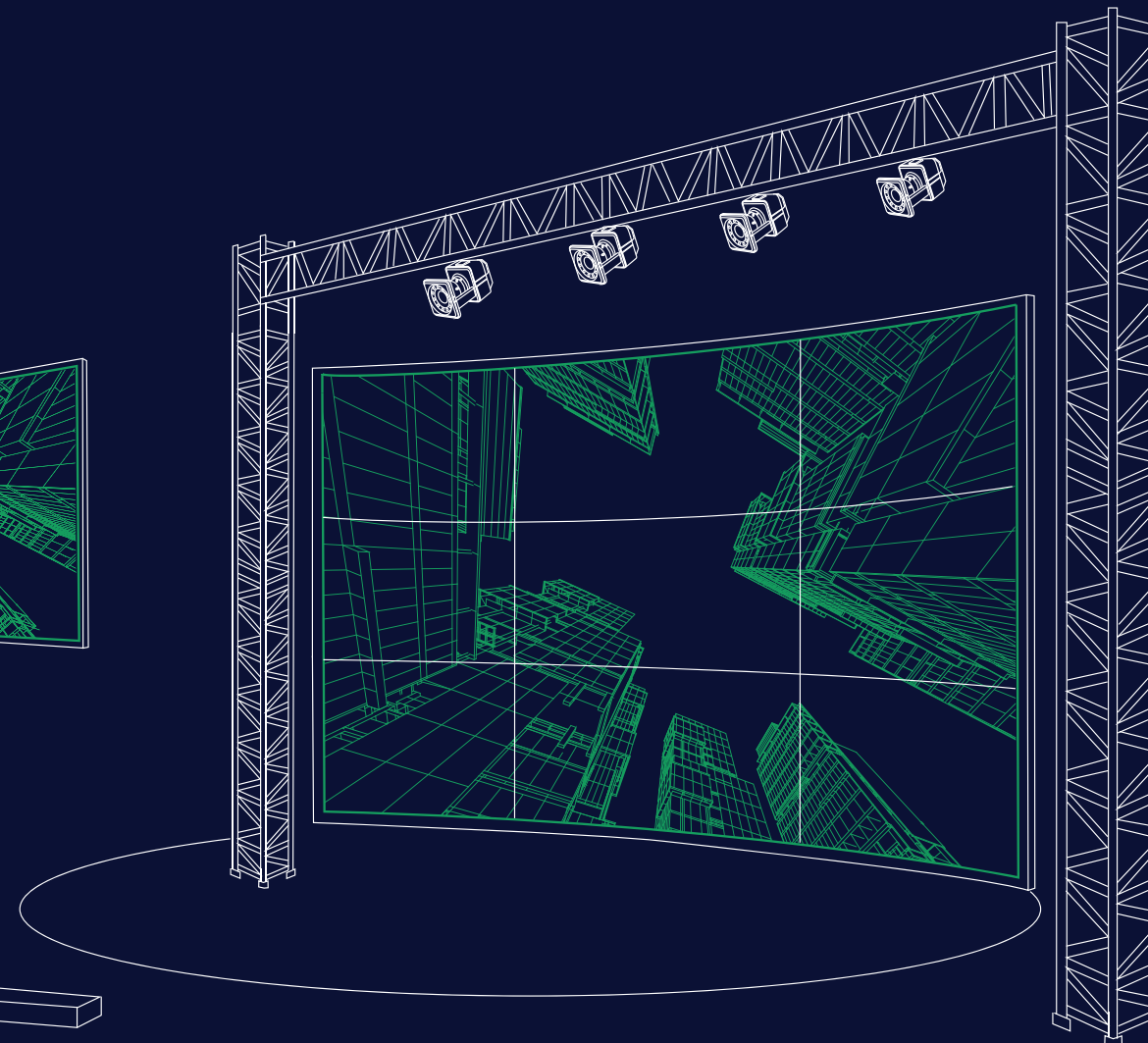
LED WALL

VICON CAMERAS

GAME ENGINE

SDI VIDEO CALIBRATION AND TRACKING

PASSIVE/ACTIVE

PARTNERS

bluefish444
THE PROFESSIONALS' CHOICE

Aximmetry

EPIC GAMES

ARRI

ROE
CREATIVE DISPLAY

REALLUSION®

unity

VR SCOUTING

VR Scouting powered by Vicon tracking allows for remote working and collaboration. Review game engine sets within VR, we can track multiple HMCs within the same space.
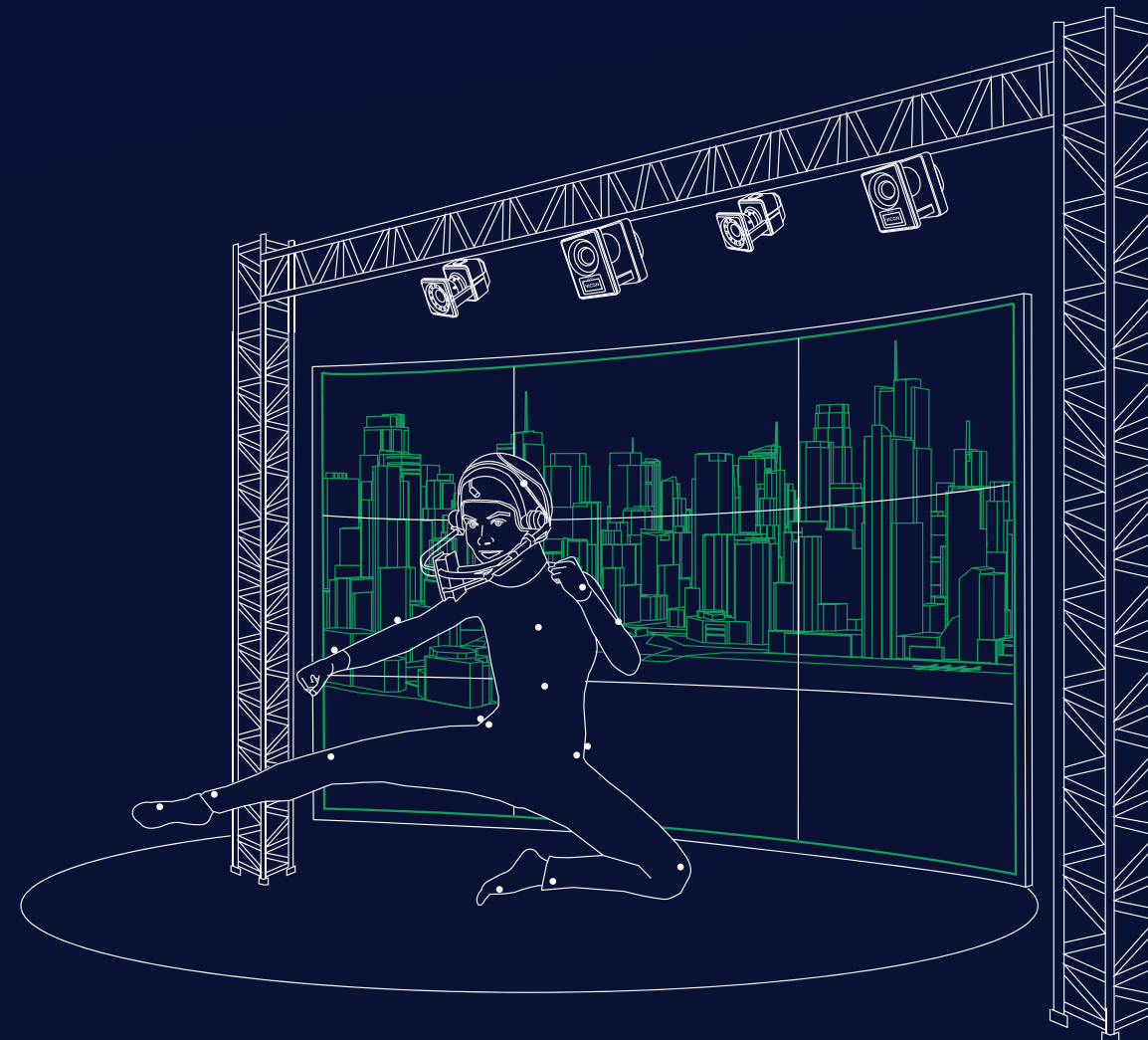
Scouting and pre-production in VR enables agile, non-linear production to overcome scheduling blocks, delivers consistent production values over time and different locations, reduces the number of people needed on set, the amount of build and travel costs, as well as post production cost.

FULL BODY PERFORMANCE CAPTURE

Vicon Shōgun allows for both cameras and full body subjects to be tracked at the same time, making use of optimized tracking profiles for both. This includes high fidelity finger animation and robust occlusion fixing when capturing the most complex moves.

These characters can be re-targeted within Shōgun and streamed directly into the game engine. This supports the latest technology innovations, including EPIC's new Metahuman project.

Cloud, Square Enix ™

Siren, Epic Games ™

Senua, Ninja Theory ™

WHAT CAN YOU DO WITH SHŌGUN LIVE?

Kassandra, Ubisoft ™

- Realtime retargeting direct into game engines without using 3rd party software

- High fidelity finger solver allowing complex hand gestures like sign language

- 4K SDI video camera calibration complete with overlay.

SHŌGUN LIVE VS

UNBREAKABLE REAL-TIME SOLVER THAT'S BEST IN CLASS

FASTEST TIME TO CAPTURE (INCLUDING CALIBRATION AND RECORDING OF 3D DATA DIRECT TO DISK)

WHAT CAN YOU DO WITH SHŌGUN POST?

Incredible Hulk, Marvel ™

- Automatic gap filling and data assessment including innovative gap list feature

- Full retargeting pipeline direct onto character fbx

- Add control with auto-skeleton
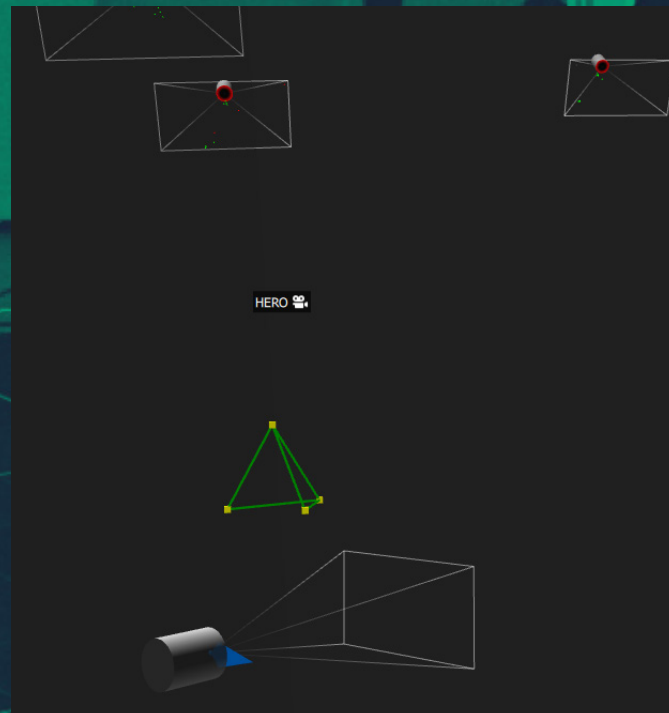
- Fully scriptable using Python or HSL.

SHŌGUN POST VS

ONLY MOCAP PROVIDER TO SUPPORT USD EXPORT FOR VIEWING ANIMATION ON IOS DEVICES
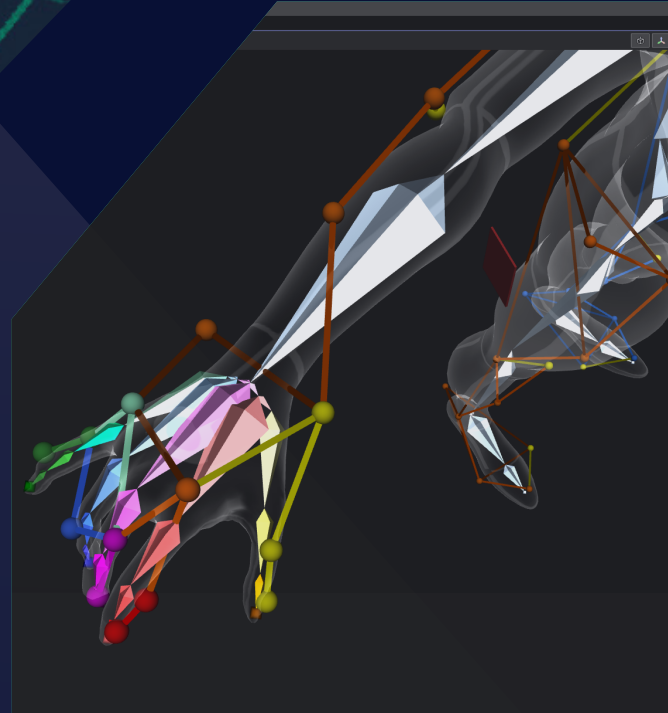

Snoke, ILM ™

SHŌGUN 1.8 FEATURES AND IMPROVEMENTS

TRACK BOTH VIRTUAL AND FILM CAMERA

Easily calibrate any film camera that supports SDI along with timecode and sync. This calculates the center of the lens or nodal point so the perspective is correct when the camera moves. We have tested this with the Sony Venice, Blackmagic Ursa, Red Komodo and Arri Alexa Mini LF.

The Virtual Camera rig is designed to support a number of different configurations and allows the user to view the game engine using a tablet device. Bespoke 3d printed stalks allow for high quality object tracking all the way to the edges of the volume. It's lightweight and completely wireless, allowing you to frame shots and create creative camera moves either during the shoot or as an additional camera pass once the main shoot is complete.
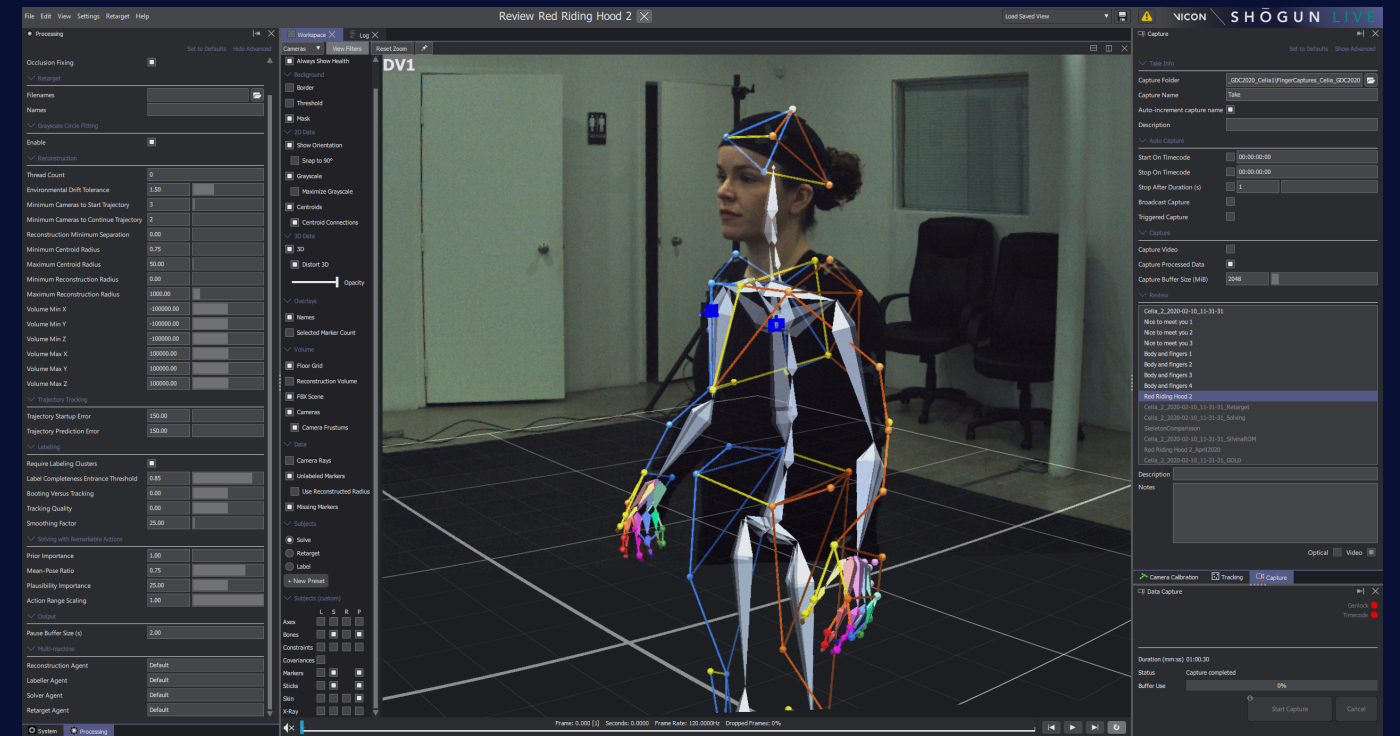
SUPPORT BOTH ACTIVE AND PASSIVE MARKERS

Shōgun 1.8 supports all Vicon cameras including active only cameras like the Viper and ViperX. You can also run Vantage and Vero cameras strobless. This allows for you to capture in complex environments filled with smoke and FX and even capture outside. Alongside traditional passive markers you can also use active markers like the Vicon Nova or solutions from Technoprops or Standard Deviation.

BEST IN CLASS LOW LATENCY OBJECT TRACKING

By placing tracking markers on the camera you can create a connection between the markers and the camera so that when you move the film camera the virtual camera moves with it. This allows for a sub pixel accurate overlay of the CG layer on top of the film plate. This overlay can be viewed in Shōgun or directly in the game engine.

LIVE 3D OVERLAY ENABLES AR / XR WORKFLOWS

The calibrated lens can be exported to the game engine as an ST map. This can then be used when compositing and allows for the overlay to be replicated in the virtual camera view. Multiple different lens points can be calculated allowing for changes in Focus, Iris and Zoom. These can then be linked in the engine and dynamically blended between using a separate lens encoder.

TRACK ACTORS FOR FULL PERFORMANCE CAPTURE

Shōgun 1.8 allows for both cameras and fullbody subjects to be tracked at the same time making use of optimized tracking profiles for both. This includes high fidelity finger animation and robust occlusion fixing when capturing the most complex moves. These characters can be retargeted within Shōgun and streamed directly into the game engine. This supports EPIC's new Metahuman project as an example.
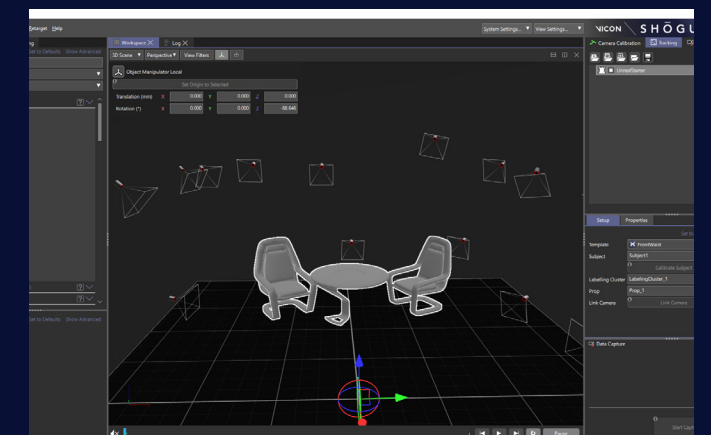
CALIBRATE MULTIPLE SELECTED CAMERAS

Expanding on the ability to quickly calibrate a single SDI camera if the intrinsic or tracking object has moved, the ability to calibrate or recalibrate multiple selected SDI or optical cameras has been introduced for a time-efficient and intrusion-free process on stage. Any cameras not selected are locked and the global co-ordinate system is maintained.

AUTOMATIC RETARGETING SETUP

Character retargeting continues to be a critical component in many VFX pipelines, regularly utilized in games and movies alike. With Shōgun 1.8 we have introduced the ability to automate large parts of the retargeting setup process, enabling our users to setup sides and parts, and create constraints with single button clicks. Retargeting your performance data to a unique character is now quicker than ever.

AUTO SKELETON

Live calibration produces reliable results for accurate labeling and can produce a high quality solve ready for direct real-time previsualization or retargeting. Auto-Skeleton allows the user to intervene and have greater control over the solving subject as a post-processed alternative to the Live calibrated solve. The solving subject can be reimported into Shōgun Live so that you can use this for real-time and also capture of processed data.

VICON V F X

For more information visit our website or contact us.

www.vicon.com/vfx
www.vicon.com/shōgun

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