VIRTUAL REALITY

THE NEXT EVOLUTION IN OPERATOR TRAINING

Jonathan McCurdy, President of GlobalSim

As a long-time player in the simulation industry, we at GlobalSim have evaluated numerous VR technologies over the years. We never felt the technology was ready to provide effective simulation training at a cost that could be accepted in the Port and Maritime industry. Over the last year, we finally saw advances in the technology that changed everything. We felt like the technology finally came to the point where we could create cost effective, high fidelity VR training systems.

GAINING CONFIDENCE IN VR

Virtual Reality has been around for years, but it hasn't been broadly utilized in simulation training for many reasons. The cost was astronomical, the headsets were too heavy, the image quality was poor, and the video update rates were slow. Not to mention the motion sickness for the user. Today everything has changed. We have entered a new era of immersive head mounted display technology. High-end graphics cards and the continued miniaturization of electronics and displays have made this revolution possible. The new VR systems are cost effective, relatively light, and the image quality and speed are phenomenal. This technology will continue to influence simulation based training for many years.

WHAT DOES VR BRING TO SIMULATION BASED TRAINING?

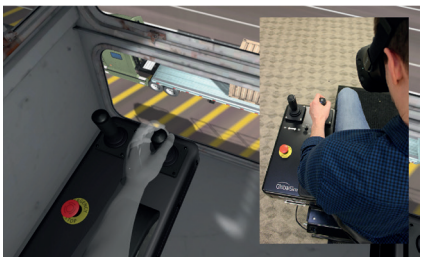
A VR training system brings four primary advantages; cost effectiveness, field of view, parallax, and depth perception. Traditional simulators use projectors or flat panel displays to provide a view into the virtual world. These systems can be large and very expensive requiring unique infrastructure investment and high maintenance costs. Even with large systems, the operator will have some limit to the Field of View (FOV). With a VR headset, the operator can turn his head 360 degrees and see everything in front, to the sides and behind. A VR system has a smaller footprint and lower cost both up front and in maintenance.

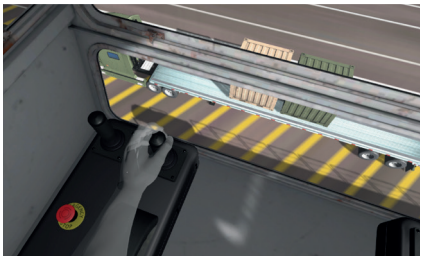
Another limitation of most traditional simulators is that the view for the operator is fixed and flat. Because it is not truly three dimensional, the student can't "look around" the simulator frame as he would look around a structural member of the real cabin. This is called parallax. A VR system has no such limitation. The view is three dimensional in the sense that the operator can move his head side to side and gain a perspective not possible with a flat display. Also, because the virtual scene is rendered for each eye the operator gains depth perception. The perception of depth is tremendously important for training crane operations because it provided that element of immersive realism that can be crucial for effective training.

CONTROLLING A CRANE IN A VIRTUAL ENVIRONEMENT

At GlobalSim, most of our systems are high-end simulators where the trainee is fully immersed in a life-like virtual environment. To develop a VR system to meet our standards we needed it to feel like the real thing and not a game. When a student wears a VR headset they no longer see items in the real world like their hands or the crane controls. This

required us to create virtual controls to match the actual equipment controls – the same joysticks and buttons you find on the real equipment. Also, the human mind requires the ability to see hands as a reference for interacting with the crane controls. A novice crane operator doesn't know the feel or layout of the controls and so they will frequently look down at the controls while performing different operations such as expanding the spreader or activating the flippers. If you're going to create a life-like simulation, it becomes important for them to see their own hands as they interact with the controls. We had to test a variety of technologies and tie everything together with our proprietary software. All of this was a challenge, but it worked out nicely. Now there's a solution that allows the crane operator to continually interact with the machine and to perform operations while wearing a VR headset.





DOWNSIDES TO VR

We don't see VR simulators completely replacing traditional simulators in the near future. Certainly they could upend the market, particularly the market for low-and-mid range simulators, but there's still going to be a demand for high fidelity "Full Mission" type of systems. The most obvious "CON" to a VR system is that the trainee must wear a headset. The VR headset can be a comfort and ergonomic challenge for some. We see this more often when there's a scenario that lasts for an hour or longer. It's tough for a trainee (or anyone) to wear a headset all day long. Other issues are the image resolution and reduced peripheral vision – traditional simulators can have higher resolution images compared to VR systems that include full peripheral vision. VR systems will continue to improve, but (at this point) the visual fidelity is not equal with a traditional simulator.

THE APPLICATION OF VR IN TRAINING

The best application for VR training is for equipment that requires hand-eye coordination and depth perception. To compensate for the lack of 3D perception, simulators today will use hints for the operator such as imposing a transparent circle over a target. The circle may shrink the closer the operator gets, or the simulator may use artificial "shadows" to provide a clue to where the spreader is in relation to the target container. An additional benefit could be where the crane operator needs to interact with someone else. An example would be a mobile harbor crane operator trying to position a hook to pick up a load from a ship. He could use the added depth perception provided by a VR system. And he could interact with a person on the ship giving hand signals. The signal person could also be using a VR system that is integrated within the crane simulator. The VR system can provide a more immersive experience for the trainees than viewing a flat panel display or projected image.

THE MODEL

Our first model, which was demonstrated at I/ITSEC in December 2016, is a ship pedestal crane that was done for the U.S. Navy. The next one will be a construction crane. To a certain extent, the market will determine the product development. GlobalSim will continue to roll out models throughout the year. If someone is willing to fund an obscure application, we are willing to pursue it.

VIRTUAL REALITY & COST EFFICIENCY

There are some very inexpensive VR headsets available at consumer electronic stores, however all of them require a mobile phone (which typically costs hundreds of dollars). For a professional application, there needs to be cutting edge computer hardware, real equipment controls, and proprietary software that is far more robust than anything available at the consumer level. In the case of our own professional VR simulators, the price ranges from USD $20,000 to $150,000 depending on the application and features chosen.

ABOUT THE AUTHOR

Currently serving as President of GlobalSim, Jonathan McCurdy has over 20 years of experience in the high-tech industry. Since joining the company in 2001, Jonathan has held several key roles at the company including Systems Engineer, Software Developer, Product Manager, and General Manager. Jonathan was key in the development of largest crane simulator in the world. He holds a degree in Electrical Engineering from the University of Utah and is a licensed crane operator.

ABOUT THE ORGANISATION

GlobalSim, Inc. builds, installs and maintains training simulators for port cranes, construction cranes, military cranes, and other heavy equipment. Having installed nearly 200 systems on five continents, GlobalSim products cover many virtual equipment models which can be installed on various hardware platforms. The simulators range in size from desktop units to the largest crane simulators in the world.

ENQUIRIES

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