

3D Laser Scanner Positions Jury at the Scene of a Murder

Early on a Sunday morning in 2013, four teenagers started a fight with a man at a gas station in the City of Marietta, located in Cobb County, Georgia. The four teenagers punched and kicked the victim into traffic, pushed him to the ground, kicked him unconscious, and left him there. The helpless man was eventually hit by a passing car and later died of his injuries.

Three of the four were ultimately convicted following a trial in which data captured with a FARO 3D scanner was used to create a “CSI moment” for the judge and jury.

The CSI effect

CSI: Crime Scene Investigation was a TV series where fictional crime scene investigators use scientific and technical wizardry to solve problems and crack cases. “Jurors see these things on TV and they tend to have heightened expectations of what we in law enforcement can do,” says Jesse Evans, the Deputy Chief Assistant District Attorney (DA) who took charge of the case. So we in law enforcement and prosecution try to minimize this CSI effect. That being said, we take advantage of any opportunity that we have to show the jury that we are capable of doing some pretty remarkable things ourselves. For a jury that has only looked at photographs and listened to testimony to then look inside a crime scene, using FARO 3D scanner technology, that’s a very different thing. I consider it one of the high points of the trial that we were able to do that.

An unusual murder case

“This was an unusual murder case,” says Evans. “It didn’t involve your typical gunshot, stab wound, that type of thing. We had a unique mechanism of death.” Autopsy photographs shown in court demonstrated injuries to many parts of the victim’s body.

The crime scene was particularly unusual. It started in the parking lot of a Chevron gas station and ended some distance away out in the middle of roadway, as shown in *Figure 1*. “It was not an isolated crime scene,” Evans points out. “It was actually pretty large. We wanted to find a way to bring the jury ‘into’ our crime scene so that they could see things such as the distance that the assailants went to track the victim into the roadway and leave him incapacitated.”

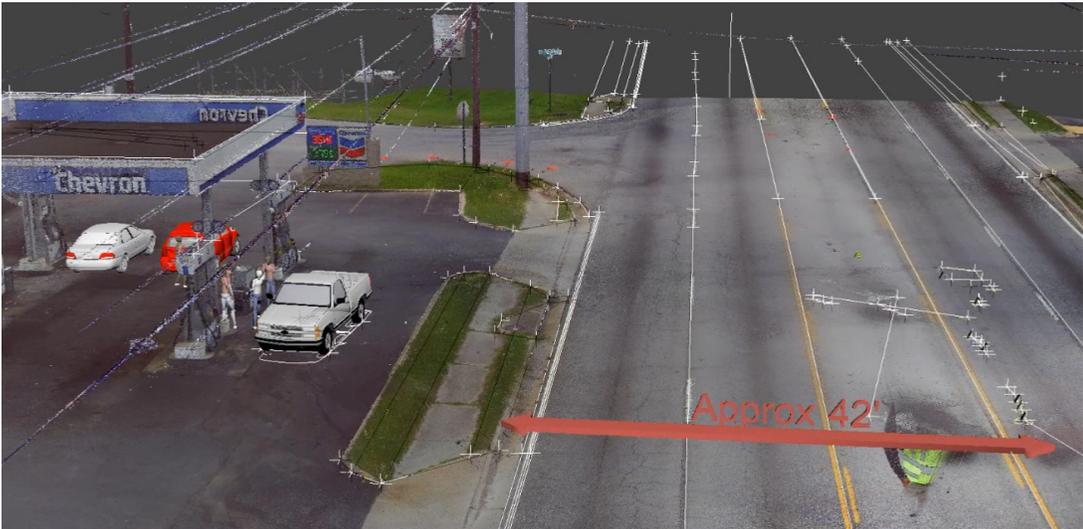


Figure 1. This image is taken from an animated 3D crime scene created by David Dustin using total station data, surveillance video, and data captured by a FARO 3D Laser Scanner. The arrow shows that, when the victim was hit by a passing car, he was “approximately” 42 feet from the side of the road.

3D Laser Scanner Positions Jury at the Scene of a Murder

Using FARO 3D Laser Scanners at the crime scene

Enter David Dustin, owner of Dustin Forensics, based in nearby Adairsville, GA. Dustin is a true believer in using FARO Laser Scanners for crime scene documentation and reconstruction. He had previously asked the Cobb County police if he could scan a crime scene to show them the benefits of using a scanner, so they asked him to scan this scene.

Dustin showed up with one assistant and his FARO Laser Scanner. The crime scene included a busy roadway, so the police department had about 10 people present, about half of which were needed to control traffic. The rest were in the roadway doing measurements. Dustin recalls, there was “‘The Brass’—captains, lieutenants, majors. They were very curious about the technology, but couldn’t quite visualize what it was going to look like.”

Dustin created an initial 3D model of the crime scene, and took it to his first meeting with Jesse Evans, the DA. “Jesse was trying to multitask, and he thought he had an idea what the scanned data would look like. But then I opened up the crime scene on my computer, and I remember the look on his face!” recalls Dustin.

Dustin used his computer to maneuver inside the 3D model, make quick measurements between points, and even to hide parts of the model that were getting in the way.

“Jesse’s eyes got big and he said, ‘Oh, my gosh. This is amazing.’ And he was hooked! He has since become a tremendous proponent of 3D scanning of crime scenes.” Dustin said.

Creating and authenticating a 3D model of the crime scene

Using FARO SCENE and other software, Dustin created a 3D model of the crime scene based on the data captured by the FARO Laser Scanner, measurements taken by total stations, the surveillance video, still pictures, and more (Figure 2, 3 & 4). To represent the four men, the victim, and various vehicles, he used “off-the shelf” 3D models .

“We did have some ‘canned’ 3D animations that we used initially to ‘fly’ through the crime scene so that everybody could get a sense of where everything was in relation to itself.”



Figure 2. Dustin is careful to distinguish between surveillance video images and the images created from the FARO scanner data. The animated video that he created for the trial begins with the above still which points out the “real” camera that took the surveillance footage, and beside it the initial location of the “virtual” camera.



Figure 3. Next, Dustin’s animated video shows a still from the video taken by the surveillance camera. In the center are the four young men, standing near a gas pump. To the left is a fifth man who will soon be murdered. The time is just before the assault started. At the trial, the jury had seen the surveillance video before seeing Dustin’s video.



Figure 4. Then, Dustin’s video replaces the surveillance still with the corresponding still from the virtual camera. This demonstrates to the judge and jury that Dustin’s 3D model of the crime scene is consistent with the surveillance video. “It was a pretty dramatic and effective way to authenticate and show the validity of the technology,” says Evans. Dustin does not animate these characters, but in court he was able to use his laptop computer to “fly” the judge and jurors through the crime scene. It was truly a CSI moment.

3D Laser Scanner Positions Jury at the Scene of a Murder

After reviewing the fly-through video, Dustin moved the virtual camera manually in response to questions from DA Evans, as shown in *Figure 5*.

For example, there were several eyewitnesses to the assault. Naturally, the four defense attorneys wanted to challenge the accuracy of what each witness said he or she saw. “By using the 3D model”, says Evans, “we could actually position the jury at the precise vantage point of each eye witness so that the jury could see that there was an unobstructed view of what occurred.”

Establishing Dustin’s credentials as an expert witness

The trial transcript shows that, before presenting any evidence based on scanner data, Evans questioned David Dustin to establish his credentials as an expert on FARO 3D Laser Scanner. The judge and jury learned, for example:

- Dustin’s company, Dustin Forensics, creates maps (i.e., 3D models) of crime scenes, vehicular accident scenes, and other forensic scenes
- Dustin had been with the company since 2001
- He used 3D laser technology to create forensic scenes
- He had been trained by the manufacturer (i.e., FARO Technologies), and then helped FARO to improve the training for law enforcement and forensics
- Dustin’s procedure for scanning a crime scene
- How the laser scanner worked
- Techniques for verifying the accuracy of the scanner
- That Dustin had trained law enforcement agencies and agencies of the American military in the use of the technology
- That Dustin could bring up a 3D model on his computer and use it to take measurements of a crime scene

Then Evans tendered Dustin as an expert on forensic 3D imagery capture and crime scene mapping. The four defense lawyers made no objection. “Georgia’s got a pretty liberal approach to the qualifications for expert testimony,” cautions Evans.



Figure 5. Finally, Dustin moves the virtual camera around the crime scene, showing it from different angles. Here, the camera is slightly “above” the roadway, looking back at the five characters and the Chevron gas station.

Demonstrating the technology to judge and jury

To demonstrate the technology to the judge and jury, Evans asked Dustin to visit the courtroom before the trial, to scan the room, and to create a 3D model of the room.

There was a picture frame hanging on the wall above the jury box. Using a tape measure, Dustin manually measured the width of the frame.

In court, before asking Dustin to show the model of the crime scene, Evans asked Dustin to show the model of the courtroom where the judge and jury were actually sitting.

“It was a ‘wow’ moment for them because they could see me effectively flying around in the courtroom as if I had a camera mounted on a tiny drone,” recalls Dustin with glee. “I watched their faces, and they were all immediately amazed.”

Evans then asked Dustin to use the software to take some measurements of the model courtroom, including the picture frame. “Then he asked whether I got the same results when I had measured it with the tape measure, which I did.”

“It was a pretty dramatic and effective way to authenticate and show the validity of the technology,” says Evans.

“I work with 3D scanner technology all the time,” says Dustin. “And yet, even I’m still impressed at how cool it is. But to those that haven’t seen it much, it’s just mind-blowing. It’s a game changer.”

View more of FARO’s case studies at www.publicsafety.faro.com/resources.html or www.faro.com