



E73 3D Reconstruction of Shooting Incidents Using Laser Scanning and Computer Modeling

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After attending this presentation, attendees will understand how laser scanning and computer modeling can aid in the reconstruction of bullet trajectory analysis in shooting events.

This presentation will impact the forensic science community by demonstrating how a 3D computer model based on high-resolution laser scans of a scene was used in conjunction with ballistics evidence to analyze an unusual shooting event in which a bystander was struck and killed by a deflected bullet.

3D modeling and animation software is often used to analyze shooting events because of their ability to demonstrate the interaction between objects and projectiles in terms of time and space. An accurate computer model of the scene is necessary to achieve the best results. Point clouds generated by laser scanners can be imported into the software and used as they are or as a template to create the geometry in the scene. Once a scene is constructed, mannequins are placed in the scene to represent the individuals involved. Bullet paths can be depicted as lines through space from their point of origin to the objects they strike. Bullet deflections can be calculated based on the evidence. If a person is hit, the path of the bullet through the body can be depicted with lines placed through the mannequin, the same way a pathologist places rods through a body. Those paths are typically placed according to descriptions and measurements noted in the autopsy report, as well as photos of the wounds.

In this shooting incident, sheriff's deputies responded to a report of two men in a Sports Utility Vehicle (SUV) driving around a neighborhood with the passenger threatening residents with a handgun. One person who was threatened obtained the license number of the vehicle. The deputies were unable to find the suspects, so they watched the residence that the car was registered to. Late in the evening, the vehicle with the two suspects arrived at the location. The passenger, who had been brandishing the gun, immediately exited the vehicle and confronted the deputies. The driver of the vehicle then parked the SUV in a driveway approximately 20 feet down the road, exited the vehicle, and observed the confrontation between his passenger and the deputies.

The deputies had their weapons drawn and pointed at the passenger. They noticed that the driver was standing in their backyard and ordered him to move. As the deputies ordered the passenger to show his hands and get on the ground, they lost sight of the driver. When the passenger reached inside his jacket and started to extract a gun, multiple officers simultaneously fired multiple shots at the passenger and he fell to the ground. One bullet struck the hand with which he was holding the gun, penetrating both his hand and the handle of the gun.

After the shooting, the body of the driver was found approximately 40 feet south of the passenger's location, lying on the sidewalk behind a car in a pool of blood. The question in this case was how and why was he shot?

The autopsy revealed that the driver was struck by a single round to the left side of the neck, severing the left carotid artery and left jugular vein. Macro photography of a fragment of bullet jacket and core recovered from the wound exhibited striations and deformation consistent with striking a hard, abrasive surface.

The shooting site was laser scanned and the resulting point cloud data was imported in a 3D modeling program. The position of all the deputies and the suspect passenger were determined at the time of the shooting. The locations of bloodstains and bullet strikes were identified. The trajectory model revealed that a stray bullet fired at the suspect passenger had deflected off the concrete driveway and struck the bystander driver as he was crouched behind the front end of a parked car. The path of the bullet through the neck was consistent with this position. Also, the lack of a blood trail was consistent with him collapsing where he was shot. The computer modeling also demonstrated that in that position, he would not have been visible to the deputies at the time they fired.

Shootings, Laser Scanning, 3D Modeling