Digital Playground for Investigators

BY GEOFFREY T. DESMOULIN, GTD SCIENTIFIC INC.

Back in the day, investigators would tackle new cases armed with sound reasoning, sharp instincts, and perhaps a little notepad. Now, readily available technology enables us to digitally recreate the scene of an incident to help us understand the activity of each individual involved. Whether the incident is a shooting, a bicycle accident, or other injury case, understanding the environment can play a substantial role in investigator conclusions and, therefore, the outcome. Hence, it has almost become a requirement of modern investigations to build a virtual scene to make full use of the evidence.

Before such a virtual environment can be assembled, it is still necessary to rely on thorough, old-fashioned scene documentation. Sketches or diagrams of the scene are always helpful, but few methods are more descriptive (and close at hand) than proper forensic photography. For photography to truly shine, one has to remember that the investigator who will use the photos may not have the chance to visit the scene. For this reason, context must be preserved using a thorough forensic photography method complete with contextual shots and close-ups with a scale for reference.

Once this foundation has been established, the real work of building a digital framework can commence. This usually starts with a laser scanner. These scanners come in various forms from handheld to stand-based. Handheld scanners are typically more affordable and accurate for small scanning volumes. These scanners tend to be overwhelmed when having to tackle multiple rooms or perhaps a large outdoor scene. For this purpose, laser scanning stations are more appropriate (and considerably more expensive). They are placed on a tripod and will capture a scene automatically by rotating to freeze the entire point of view from a given position at a point in time. Although a scene can be captured through photogrammetry, laser scanning remains the most efficient way to capture a scene. Soon, even mobile phones might be able to be used to capture an entire scene in three dimensions.

Such scans will often have surprising benefits to an investigation. Often when finding ourselves deep into a case, an analysis may benefit from a measurement that would otherwise be unavailable or simply difficult to obtain without access to the scene or a scan. Sometimes the scene is in another city, or maybe the scene simply does not exist anymore. Therefore, capturing it early and crisply in a scan is often invaluable. You may not be brought early enough to capture the scene in its freshest state but if you do not get it done as early as possible, you may regret the lost opportunity later.

DIRECTIONS TO THE DIGITAL PLAYGROUND

FORENSIC PHOTOGRAPHY
Capturing the evidence in all its detail while making sure to keep track of its context in the greater scene allows experts to see the scene through the eyes of first responders.

LASER SCANNING
Capturing the totality of the scene in order to make measurements at a later date and virtually go back to the scene is too invaluable an opportunity to pass up.

BUILD A VIRTUAL SCENE
Focusing on the most important elements of the scene, it is possible to build a simple mockup which can be used in an interactive manner.

TEST THEORIES
Using the virtual scene, it is possible to add suspects and victims models in key positions and have them interact with evidence within the environment.

COMMUNICATE FINDINGS
The virtual environment allows for easier communication of key findings in a manner that does not require complex explanation since an image speaks for itself.

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Using a scan as a reference and backdrop, it was possible to clarify the infrared images of two individuals involved in a shooting.

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Once a scene has been captured in such a way, it is sometimes beneficial to convert this into a more malleable format. The scan may allow the investigator to make any measurement needed, but it often does not allow to easily add to the environment. This can be achieved through engineering software tools such as Solidworks or its lesser-known competitors like Inventor, Creo, or SolidEdge. By using such tools as these, it is possible to recreate the key features of a room in a clear format, which allows for true visualization and easy communication of results.

With the scene established and the shooter position clarified, it was possible to test bullet trajectories.

Moreover, this environment allows an investigator to test theories by, for example, drawing trajectories, or placing individuals in the scene. In fact, it is possible to scale anthropometric human models to the dimensions of the individuals involved. More importantly, it is possible to pose those human models within the scene in relation to the evidence previously identified and documented.

Beyond the undeniable practical use of virtual scenes, this method puts investigators in a position where they can easily communicate their findings to a lay audience. Such representations of an incident often speak for themselves because after all, an image is worth a thousand words. At the end of the day, the most amazing discoveries are worthless if they cannot be understood by their target audience.

Therefore, the next time a case is brought in, dispatch someone to scan the scene so that you do not lose access to valuable information. You will be glad for it when the experts use that information to build convincing and compelling material to support the case.

Geoffrey T. Desmoulin, PhD., RKin., EngL., Principal of GTD Scientific Inc., holds two degrees in both Engineering Sciences and Kinesiology, allowing him to predict human injury in any environment. He was previously an Emergency Medical Technician, firefighter and military reservist. Since 2009, GTD Scientific Inc. has garnered Federal and Supreme Court qualifications and an extensive international client list within the legal and law enforcement communities. gtdesmoulin@gtdscientific.com