CSI in a virtual world: New grant furthers NC State's work in forensic science

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North Carolina State University's IC-CRIME's laser scanner technology will allow investigators to accurately record room and object dimensions, as well as the placement of every piece of evidence in a crime scene. Credit: Doug Schiff, 3rdTech

Imagine using the same process that goes into building video games to help investigators solve real-world crimes. Through a new grant, that's what researchers at North Carolina State University plan to do. Their work will lay the framework for multi-agency collaboration in crime scene investigations (CSI) by creating an unprecedented cyber infrastructure - a virtual environment that provides data resources, simulation tools, expert access and unique collaboration capabilities.

"The problem is that while there have been major advancements in the field of forensic science technology, how investigative teams come together to collaborate has not changed over the years. Current methods of CSI can be greatly enhanced with the application of the right cyber infrastructure tools," says Dr. Mitzi Montoya, Zelnak Professor of Marketing and Innovation Management at NC State, and lead researcher on the project. "Since CSI is characterized by a need for rapid coordination and data translation across disciplines and agencies as crime scenes are processed, reconstructed, solved and ultimately prosecuted over time, current technology lends itself to this type of application."

Montoya and her interdisciplinary team representing four colleges at NC State received a $1.4 million grant from the National Science Foundation's Cyber-Enabled Discovery and Innovation (CDI) program to help lay a foundation that promotes greater collaboration in the field of forensic science - a platform they are calling IC-CRIME (interdisciplinary, cyber-enabled crime reconstruction through innovative methodology and engagement). Co-principal investigators on the project include Dr. David Hinks, professor of polymer and color chemistry, who is co-leading a growing NC State initiative in forensic science and engineering, and Dr. Michael Young, associate professor of computer science and an expert in serious gaming. Other faculty on the project include Timothy Buie, assistant professor of industrial design and an expert in data visualization; Dr. Keith Beck, professor of textile engineering, chemistry and science; and Dr. Anne Massey, professor of information systems at Indiana University and an expert in virtual collaboration.

The IC-CRIME platform will employ the latest in 3-D laser scanning technologies to virtually reconstruct and preserve crime scenes, and will be built on a game engine to enable virtual recreation of the scene. The laser scanner technology, developed by Research Triangle Park company 3rdTech, will allow investigators to accurately record room and object

dimensions, as well as the placement of every piece of evidence in a crime scene. The scanners can capture millions of data points at a crime scene within a few minutes. Combined with high resolution digital photography, and other trace evidence data such as microscopic and chemical analysis of fibers, a comprehensive, permanent data record will be produced within the NC State IC-CRIME platform. The IC-CRIME platform will make the crime scene accessible to those investigators granted access, such as blood spatter and hair and fiber experts who may be located in different parts of the country. In fact, experts from around the globe will be able to be brought into crime scene virtually and collaborate effectively to prosecute a case.

"The IC-CRIME platform also has great potential value as a case progresses into prosecution. Prosecutors will be able to demonstrate the validity of some witness testimony by showing the jury scenarios using IC-CRIME," Young explains. "For instance, if a 5'7" woman testifies to witnessing an attack, a prosecutor could use IC-CRIME to show the jury the viewpoint of the crime scene from someone at that height so they can decide if that scenario makes sense."

Another key component of the grant is the development of an unprecedented dyed fiber database by Hinks and Beck. "Despite what you see on crime shows on television, most crime scenes do not involve DNA evidence. However, hair and fibers are often found at the scene of a crime," Hinks says. "We will develop a comprehensive database comprising key dyes and fibers that crime scene investigators can use to compare to fibers found at a crime scene. If the research is successful, crime scene investigators and hair and fiber forensic examiners will be able to collect and analyze fiber evidence by new analytical methods and then search the database for matching dye and fiber standards. These data will then be location-embedded into the virtual crime scene to aid in visualization and discovery. This approach would establish an unprecedented knowledge base that aids in understanding how events

may have unfolded."

"The development of the IC-CRIME platform is designed to be intuitive - considering crime scene investigators, not computer programmers, will be tasked with recreating crime scenes," Young says. The project team envisions that the platform will be instrumental in providing state-of-the-art training and certification of agents to use IC-CRIME.

This grant furthers the research and training work that is ramping up at NC State through the N.C. Program for Forensic Sciences, which is co-directed by NC State's Dr. Ann Ross and Dr. Billy Oliver. "One of our goals is to revolutionize the field of forensic science by studying social processes that underline collaborative decision making. This research will help determine how best to support and enable crime scene investigation using technology," Montoya says.

Source: North Carolina State University (news : web)