Take a Cue From NASA

The Real Value of 3D & 360° Imaging in Crime Scene Investigation and the Investigative Process

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MABMAT

Crime Scene Rover

https://www.youtube.com/watch?v=8zlWUOn9RUg


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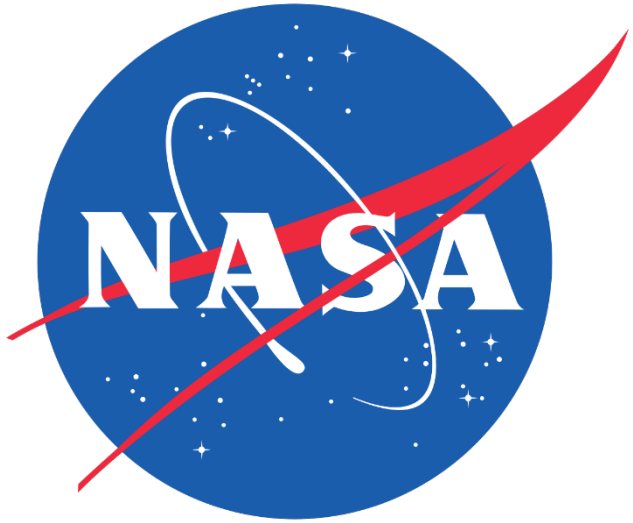

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Crime scene investigations using portable, non-destructive space exploration technology

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Abstract

The National Institute of Justice (NIJ) and the National Aeronautics and Space Administration's (NASAs) Goddard Space Flight Center (GSFC) have teamed up to explore the use of NASA developed technologies to help criminal justice agencies and professionals solve crimes. The objective of the program is to produce instruments and communication networks that have application within both NASA's space program and NIJ programs with state and local forensic laboratories. A working group of NASA scientists and law enforcement professionals has been established to develop and implement a feasibility demonstration program. Specifically, the group has focused its efforts on identifying gunpowder and primer residue, blood, and semen at crime scenes. Non-destructive elemental composition identification methods are carried out using portable X-ray fluorescence (XRF) systems. These systems are similar to those being developed for planetary exploration programs. A breadboard model of a portable XRF system has been constructed for these tests using room temperature silicon and cadmium-zinc telluride (CZT) detectors. Preliminary tests have been completed with gunshot residue (GSR), blood-spatter and semen samples. Many of the element composition lines have been identified. Studies to determine the minimum detectable limits needed for the analyses of GSR, blood and semen in the crime scene environment have been initiated and preliminary results obtained. Furthermore, a database made up of the inorganic composition of GSR is being developed. Using data obtained from the open literature of the elemental composition of barium (Ba) and antimony (Sb) in handswipes of GSR, we believe that there may be a unique GSR signature based on the Sb to Ba ratio.

Full-Circle Panorama Beside 'Namib Dune' on Mars

Courtesy: National Aeronautics and Space Administration

Crime Scene Imaging

Visiting a ‘Virtual Crime Scene’

https://www.youtube.com/watch?v=9u5YnyApsCE

What is 360° Imaging, anyway?

The Basics

- Typically recorded using either a special rig of multiple cameras, or using a dedicated camera that contains multiple camera lenses
- Using a method called “stitching” individual images are merged together into one spherical photo/video, and the colour and contrast of each shot is calibrated to be consistent with the rest
- Stitching can be done automatically in-camera or automated software on a computer. In some cases, manual intervention may be necessary

The Basics (continued)

- The images/video can be played back on smartphones, computers and using virtual reality headsets
- The quality of the image(s) would depend on the same aspects as image quality determinations made for traditional photography or videography
- Commercial and consumer solutions are available on the market on a variety of cost plans, ranging from $199 to $100,000

What does raw output look like?

Usually…


MABMAT 360° Test Image
Capture Resolution: 3008x1504
White Balance: Auto
Rover: Active
Rear
Front

Factors to Consider

There are a few

User Experience

- One photo captures an entire scene from a 360° vantage point
- Video can be used to document crime scenes from every angle
- Operation is relatively simple for majority of available systems
- Stitching and exporting can be done automatically out-of-the-box
- User interaction/distortion can be minimised due to smart software

Image Considerations

- Aperture
- Field of View
- Sensor
- ISO
- Shutter Speed
- Resolution
- Compression
- Output Format

Practical Considerations

- Size
- Weight
- Battery
- Assembly
- Mounts
- Weatherproof
- Shockproof
- Warranty

Costs

Consumer options range from $199 to $6000

Specialised Commercial Solutions are between $3000 and $100,000

Error Management

- Subjective Bias
- Contextualisation Errors
- Proficiency Testing
- Identification of Good Practice
- Planning
- Transparency
- Cold Case review

Does this discussion matter?

Well…

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#AI, #VR, and #IoT Are Coming to a Courthouse Near You!

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Judge Herbert B. Dixon Jr.

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The title of this column got your attention, didn't it? I thought that would likely happen if I used Twitter hashtag abbreviations to arouse your curiosity. The abbreviations stand for Artificial Intelligence (AI), Virtual Reality (VR), and the Internet of Things (IoT). Now that the hashtags have been decoded to plain English, I assume that you have a passing familiarity with the first two concepts, but less familiarity with the latter.

Artificial Intelligence (AI)

For this column, AI refers to the ability of computers to perform information-gathering and decision-making processes typically attributed to humans and their intelligence. One example of AI referenced by many writers is the Hal 9000 Computer in the movie 2001: A Space Odyssey. Another example often mentioned by others, which I also referred to in a previous column, is the IBM Watson computer that won a contest against two former Jeopardy champions.[1] Finally, a current example of AI is Ava, the super-intelligence in Alex Garland's 2015 movie Ex Machina.

Virtual Reality (VR)

You already have some understanding of VR if you recognize a device named Samsung Gear VR, Oculus Rift, HTC Vive, or Google Cardboard. If you do not recognize the name of any of these devices, I offer you my preferred explanation of VR, which I adapted from the online edition of the Oxford Dictionary. VR is a computer-generated simulation of a three-dimensional image or

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Questions & Discussion