

# Forensic Artist, Joe Mullins, Helps Solve Cases by Putting the Right Face on Skulls

Joe Mullins, | Forensic Imaging Specialist | National Center for Missing and Exploited Children (NCMEC) |

## Challenge:

The US struggles with a huge backlog of unidentified human remains, partly because it is so difficult to identify a victim when there are no facial features to be recognized by family or friends.

## Solution:

Joe Mullins of the National Center for Missing and Exploited Children (NCMEC) is working to change this, applying his skills as a forensic artist to approximate the face of a victim, based on the 3D characteristics of the skull.

## Results:

Mullins' "facial approximations" are making it possible for families of some victim's to finally have closure. When the faces he creates are recognized, it is often the first step needed before DNA and other evidence can result in a positive identification and the case be closed.



The FARO ScanArm was brought in to Joe Mullins' class to capture 3D scans of the busts created by New York Academy of Art students.



The non-contact laser measurement process used by the FARO ScanArm makes it ideal for preserving a digital model of skulls. It took approximately five minutes to fully document each bust with the FARO ScanArm.

The skeletal remains of tens of thousands of homicide victims are sitting in evidence boxes across the US, waiting to be identified. In 2005, the National Institute of Justice held a strategy summit to find ways to solve this growing problem. The NIJ was charged with the task to use every available tool to solve missing persons and unidentified human remains cases.

One result of this summit is the "NamUs" National Unidentified Persons Database that can be search by anyone over the internet. The NamUs system is praised by law enforcement and the families of victims as an important way to help match missing persons with unidentified remains.

Forensic anthropology techniques can often be used to estimate some things from a victim's skull and other bones, including gender, age, height, race, and how they died. While this can help determine an identity, the easiest way to identify a victim is to publicize photographs of their face and hope someone recognizes them.

### Reconstructing A Victim's Face May Lead to Identification

What if all these unidentified remains could also be given a face? This is the mission of Joe Mullins, forensic imaging specialist for the National Center for Missing and Exploited Children (NCMEC). Mullins, began his career in forensic arts in the year 2000. He has created thousands of age progression images to show how a missing child might look years later. He has also worked on hundreds of facial reconstructions.

Mullins uses descriptions of any evidence that may be available from law enforcement to help with the reconstruction, including photographs, a description of clothing, and the condition of the skeletal remains. In some cases, he has even been provided a digital, 3D representation of the skull captured with a hospital CT scanner. Today, these images can be 3D printed to form a physical model of the skull. Mullins said, "If we can get a 3D print of the skull, we can create a clay facial approximation directly on that copy."

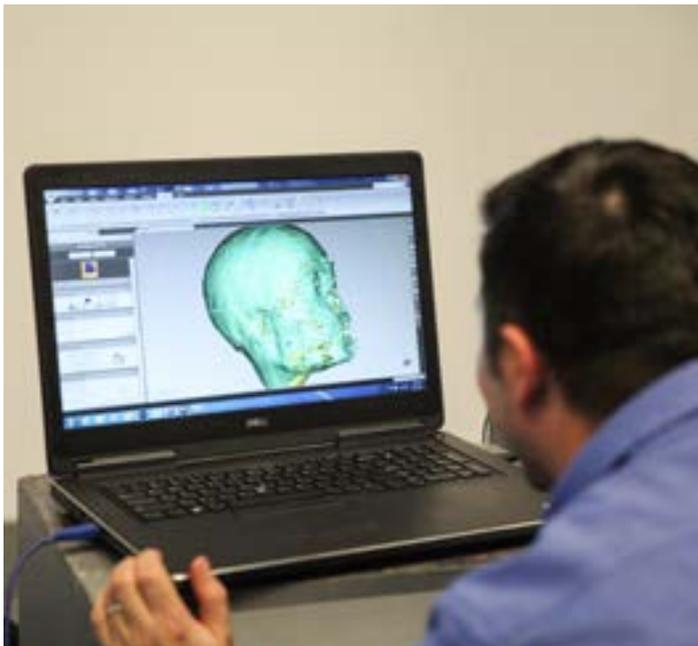
Facial recognition is certainly not an exact science and different forensic artists may provide a different reconstruction. Ultimately, Mullins emphasized, the goal is to achieve what he calls "smart recognition." This means he hopes the facial approximation he creates will spark a recognition of the face by someone who knew the victim and will report they are missing. Once a possible identification has been made, DNA matching and other means can be used to verify it.



*Mullins examines the skull replicas that were 3D printed for his class of New York Academy of Art sculpting students*

In his 18 years at NCMEC, Mullins has seen examples of facial approximations that resulted in a positive identification of the victim. For example, the NCMEC received a skull for a South Gate, California, female teenager who had been missing for several years.

A news release was sent out to the local community where the girl lived, which included a facial approximation made from a 2D image of the girl's skull. According to Mullins, an investigator who attended a town meeting where the facial approximation was exhibited recognized the victim. "We knew it might take many people to see this drawing before there was an identification," Mullins said, "but he was the right person." Soon after the investigator identified the victim, another South Gate resident also recognized the missing person and called the NCMEC hotline. "This caller knew who the victim was, and...who shot her," Mullins revealed.



*The data captured by the FARO ScanArm was used to create a highly detailed, 3D model of each bust. The models can be viewed from any position, measured, and modified.*

### FARO ScanArm a Compelling Tool to Digitally Preserve Skulls

Although a hospital CT scanner can provide a high-quality representation of a skull, it is not always possible for Mullins to acquire such a scan of unidentified remains. The desire to easily obtain a digital representation of every skull prompted him to always be on the lookout for other ways to digitally preserve skulls with all the details intact.

While attending a training session in Bogota, Columbia for Geomagic® software, Mullins got to see the FARO® ScanArm being used to scan skulls. The Fiscalía General (Office of Attorney General) in Columbia uses the FARO ScanArm for forensic anthropology and facial approximation.



*Mullins in the early phase of the facial approximation he did as part of the New York Academy of Art class*

The FARO ScanArm was originally designed to be used in manufacturing for 3D inspections, dimensional analysis, and reverse engineering. These capabilities have also proven to be ideal for scanning human skulls, other bones and small evidence.

When applied in a forensic lab, the FARO ScanArm's highly accurate, non-contact scanning process can be used to capture a 3D model of a skull, without the risk of damaging it. A software application from Geomagic converts the scan data into a 3D model which can be used to obtain accurate measurements or sent to a 3D printer to create a physical model of the skull. Using this process, all the details of the evidence are permanently preserved with sub-millimeter accuracy.

During the 3D Systems training session, Mullins was able to try out the ScanArm to scan a skull. "The FARO ScanArm is able to give you a surface scan of the skull," Mullins explained.

"You get all kinds of detail – teeth, inside the nasal aperture, ears, and more. The more detail you can get from scanning the skull, the better information you have about how that individual looked in life," Mullins added.

### New York Academy of Art Students Learn Facial Approximation

About eight years ago, Mullin's had an idea to use the skulls of unidentified victims to help train student sculptors in his facial approximation techniques. He was turned down because it was not feasible to allow the students access to the actual forensic evidence. In 2015 and 2016, the class finally became a reality with a partnership between the New York Academy of Art (NYAA) and the New York Office of the Medical Examiner (OCME). Rather than using the actual evidence, the students applied clay faces to life-like models of the skulls that had been 3D printed. All the skulls used in the class were from active cases.

According to Mullins, "A sculptor already understands the basics needed to be forensic artist. They already know anatomy, the human form, and muscle structure. They can learn to apply the combination of art and science that is needed to put a face back on these skulls."

He emphasized that the students are taught they cannot take artistic license when determining the face. They must let the bone structure dictate the facial features. Everything that is known about the victim is also incorporated into the facial approximation, such as gender and race. "We take all the information, put the facial features on the skull, and put the right face on it. The skull dictates the face we put on it." Mullins explained.

In Mullin's 2016 class, Scott Gershowitz from FARO, attended to help preserve the 18 busts that were completed by the students. Gershowitz used a FARO ScanArm to capture 3D models of the busts so they could be digitally shared, modified, or 3D printed. Gershowitz, who has more than 10 years of experience as a homicide detective, was thrilled to take part in the class. Gershowitz commented, "It is exciting to see how technology like the FARO ScanArm can be applied to allow more of these facial reconstructions to be done in less time and with more accuracy. These tools can help to provide a face to a case and, hopefully, a name to that face."

Many of the students described feeling an emotional attachment to the victim of skull they worked on and a desire to help some family find closure. Each skull represented a real person, with a family who wants to know what happened to them. They were highly motivated to apply a face that is as accurate as possible. Mullins explained that he is often asked how does he know when to stop, "When you start to see that face, that individual staring back at you – that's how you know when to stop."

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### Need for FARO ScanArm Urgent

While Mullin's facial approximation technique has proven to be a valuable tool to help identify victims, it depends on having access to highly accurate, detailed, 3D models of the victim's skull. Mullins is working with the NCMEC to eventually acquire a FARO ScanArm to be used for his work. This would allow him to obtain scans of skulls much more quickly and easily than waiting for CT scans to be sent to him. "The need for this technology is urgent because there are thousands of skulls sitting in medical examiners' offices or in numbered graves. I'd rather have a FARO ScanArm always available to scan these skulls instead of having to wait for an image of a skull to be sent to me," Mullins said.



The bust Mullins works on in the New York Academy of Art class is nearly complete.

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