

Application of ProHawk Imaging Software to Shroud Ventral Image

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In July 2020 I received an e-mail from Royce de Melo of Tactical Intelligence International regarding the [ProHawk](#) video enhancement and analysis software that their company represents. They were interested in knowing if their software could in some way contribute to the image analysis of the Shroud. They were even gracious enough to offer STERA, Inc. a gratis copy of their software to explore its application to the study of the Shroud. Unfortunately, their software requires a rather powerful workstation to run properly, and none of STERA's computers were up to the job, so I had to decline their offer.

Instead, they agreed to have their engineers apply their software to a digital, research quality image of the Shroud that we would provide them. At that point we uploaded a 203mb TIF file of the Ventral Shroud image in natural color to their Dropbox account. No processing of any kind had been applied to the image and the TIF file was uncompressed. The file was so large that their software was having problems with it (since it is much larger than the largest video image their software was designed to process), so they cropped it into two separate sections showing the upper and lower portions of the Ventral image. This reduced the file sizes and made them easier to work with.

At that point, we all hoped that their software might reveal something new about the Shroud's image and waited for their engineers to do the processing. Instead of applying arbitrary settings, they simply applied a series of default preset filters that were previously tested and built into their program. In March of this year they uploaded seven processed images to Dropbox, along with the software settings they used (in the form of screen grabs in PNG image format) and a written overview of the work they had done. Basically, they applied a number of the software presets that are native to and designed specifically for their program to the image of the Shroud.

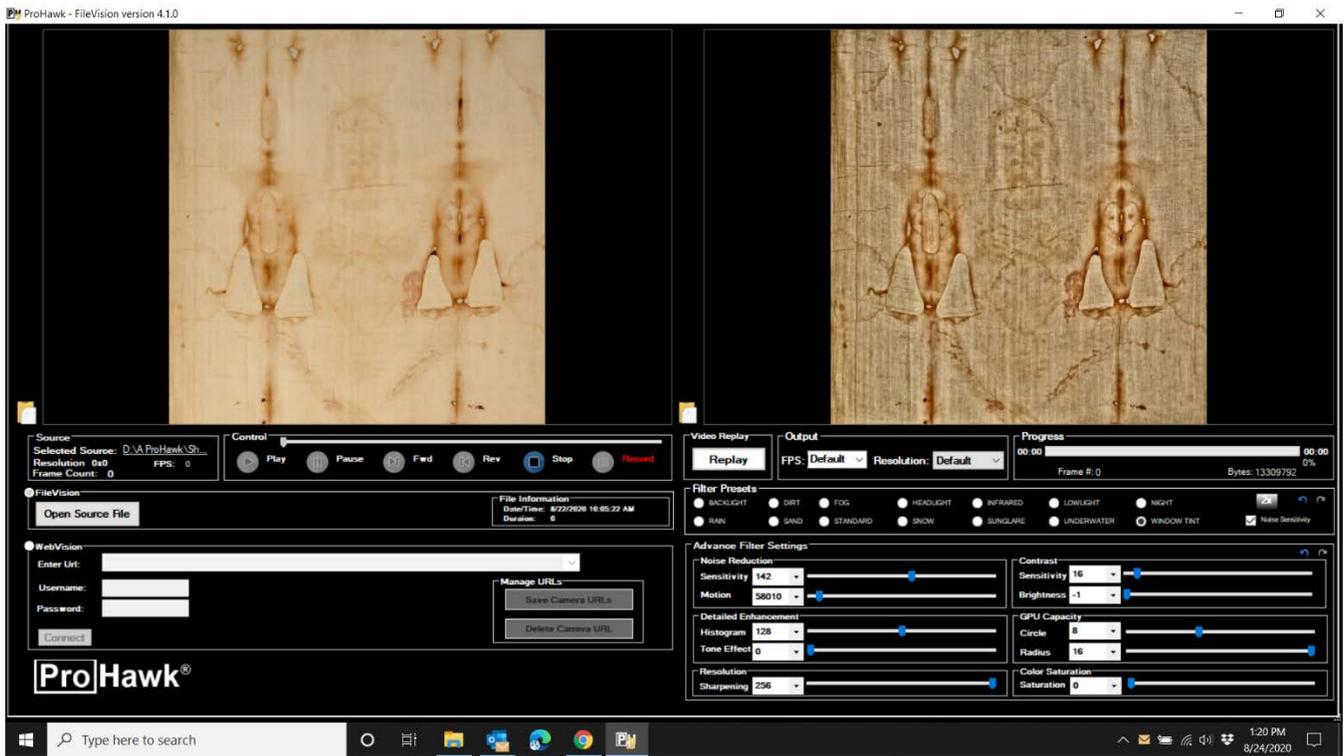
In my initial review of the processed images, I focused mainly on the Shroud image itself, looking for any new information that might have been revealed by the processing. Of course, over the past few decades, image processing technology has advanced dramatically and is readily available to everyone, so many Shroud researchers have applied it to their studies of the Shroud. After closely examining the images, my personal opinion was that there was really nothing new revealed by the new processing.

It was then that I noticed something I had missed in my initial review. In many of the images there were obvious vertical lines running the entire length of the cloth that appeared to coincide with the banding known to exist in the Shroud. Until now, this was best visualized in the transmitted light photographs I made in 1978. Although the bands are not obvious in my natural light photograph, it appears that the ProHawk software was able to detect and enhance the differences in the weave and make the banding more visible. The original images ProHawk provided are very large (around 100 MB each) so I converted them to JPEGs to reduce them in size for this article, although they are still around 38 MB each. Included below are direct links to the two high resolution JPEG versions. Please note that it may take a few moments to open and view them. If you wish to save the files for further study, simply right click over the image once it is opened and chose "Save Image as..." to store it on your hard drive.

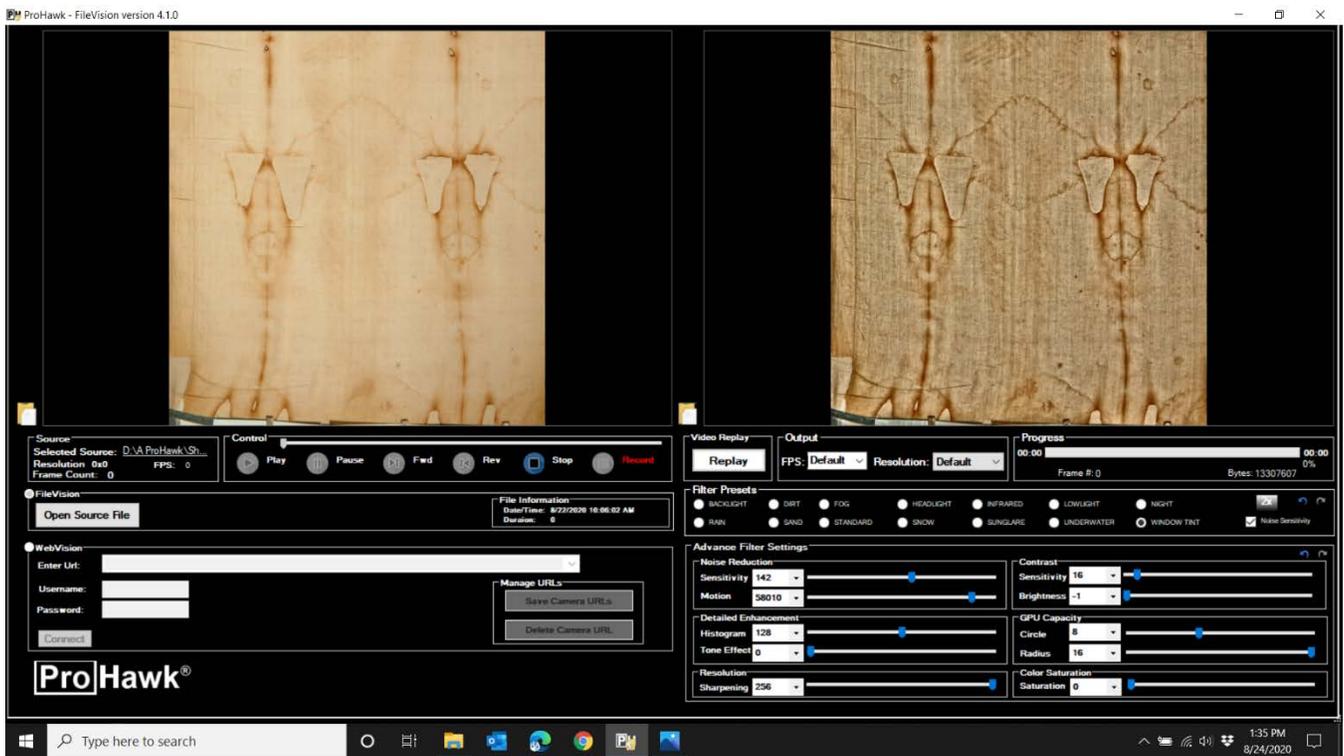
[Top Image](#)

[Bottom Image](#)

As an added benefit, the engineers kindly included screen shots of their software settings for each processed image, so I am including them here for your information:



Top Image



Bottom Image

As I explained to the folks at ProHawk, in my opinion their processing didn't reveal anything new about the Shroud's image, but it appears to have visualized in a new manner the banding that we already knew existed in the Shroud. I wish to extend my sincere gratitude to Royce de Melo, Robert Brown and the engineers and software designers at ProHawk for their generous offer and dedicated efforts in applying their excellent technology to the study of the image on the Shroud.

ProHawk also provided a written report dated 8 March 2021 titled "Curious What the Details in the Shroud Reveal?" which I am including here:

Clearly one of the most, if not the most fascinating artifact to study in human history, according to shroud.com, "The Shroud of Turin is a centuries old linen cloth that bears the image of a crucified man. A man that millions believe to be Jesus of Nazareth". Shroud.com has been shepherded by Barrie M. Schwartz, Editor, and photographer of the most pertinent photographs permitted of the Shroud of Turin. He has likely been at the center, and more involved in the hundreds of thousands of hours of thorough study and exhaustive research on the Shroud of Turin than anyone. This article will describe the findings of one such research investigation conducted by Mr. Schwartz, in collaboration with Royce de Melo of Tactical Intelligence International and Robert Brown of ProHawk Technology Group.

The 14'5" long by 3'7" wide Shroud of Turin is kept in northern Italy at the royal chapel of the Cathedral of Turin, typically only revealed a few times per century. The Shroud of Turin is a linen twill woven in an uncommon 3:1 under-over herringbone pattern, characteristic of expensive first-century Judean burial cloth. Linen is a fabric made from threads of twisted flax fibers that thickness can vary significantly. The different lengths of threads are not interwoven together, but rather laid in side-by-side during the weaving.

Royce de Melo of Tactical Intelligence International contacted the Shroud of Turin research organization and Mr. Schwartz in early July 2020. Tactical Intelligence International works jointly with ProHawk Group and the imagery enhancement technology. Out of interest and curiosity, Mr. de Melo offered Mr. Schwartz to try ProHawk to see what the technology might discover on the shroud, if anything, and to see what effects the technology might have on the shroud overall. In early August Mr. Schwartz replied to Mr. de Melo expressing his interest in trying the image enhancement technology on the shroud.

The purpose of the charity research investigation was to see what details could be extracted from a sanctioned Shroud of Turin picture using ProHawk Technology Groups patented computer vision pixel level algorithms in the ProHawk Vision product. This is not the first time that the Shroud of Turin image would be enhanced using computer technology to attempt to uncover details and facts not previously revealed or documented. This is the first time the Shroud of Turin image would be enhanced and enriched using pixel level computer vision algorithms, rather than full frame based post-production editing tools that enable color, contrast, hue, and brightness control over an image.

The uncompressed 24-bit sRGB TIF image file provided to ProHawk of the Shroud of Turin is a Ventral Image as it appears in natural light. The copyrighted Shroud of Turin 203MB TIF image is a whopping 5,829 x 12,177 pixel vertical and horizontal 305 dpi resolution. To appreciate the enormity of the image, consider that it was taken in 1978, and the 5,829-pixel height is 35% taller than a UHD 8K video frame, and 58.5% wider. It took a little work to get the complete image processed due to the unusually large dimensions of the image.

ProHawk Vision is a powerful computer vision system that contains pixel level algorithms that dramatically clarifies imagery to expose the most intricate details. The computer vision algorithms run in parallel to process every pixel of an image based on the interpretation and influence of surrounding pixels to reveal otherwise hidden details.

ProHawk Vision extracts fine details that may not be noticeable to the eye, even with the best of photography and lighting. This is the case with the Shroud of Turin image, which was photographed with extensive care, professionalism, and accurately placed lighting techniques.

The Shroud of Turin image was processed using 5 of the 14 one-click preset filters that quickly adjusted the ProHawk Vision algorithms to the desired settings. The Shroud of Turin image was processed, and the 5 different ProHawk Vision enhanced versions were saved. The team also saved the output in a side-by-side format, so the original image and ProHawk Vision image would be easily compared next to each other. Once the image was processed, the team set to analyzing the results.

Some of the results exposed many details, but these had been previously seen using prior techniques and approaches. Upon further examination, there was 1 of the 7, in fact the 7th image, ProHawk Vision enhanced images that exposed unexpected details and era specific craftsmanship. ProHawk Vision exposed darker and lighter yarn bleaching and the era specific construction of threads that resulted in the thicker and thinner bands, prevalent in the Shroud of Turin. This is most noticeable upon examination of the Shroud of Turin in the thicker left side of the face imprint as opposed to the thinner right side of the face. More importantly, it revealed the overlaid threads in the weaving from one thread to another to continue the pattern. This was the first time this level of details has been exposed from the Shroud of Turin.

This research effort was pursued as a benefit by Tactical Intelligence International, ProHawk Technology Group, and Mr. Schwartz to see if ProHawk Vision would reveal anything that has not been previously exposed. The team was excited with Mr. Schwartz image analysis of the intricate details ProHawk Vision produced. The undeniable details in the workmanship in the threads of the linen tying the Shroud of Turin to first-century Judea. Another tiny piece in the puzzle surrounding the Shroud of Turin.