

AFIS IDENTIFICATION OF ENHANCED LATENT FINGERPRINTS

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This article is being offered as a result of this writer's use of and the results obtained from the use of the IBIS Image Enhancement System. The opinions are of this writer and do not constitute an endorsement by the Florida Department of Law Enforcement.

The FDLE Orlando Regional Crime Laboratory has an image enhancement system that was developed by the IBIS Corporation. The main components of our system include a 486 based CPU mini-tower PC with 14" SVGA monitor, high resolution 21" greyscale display with live video switch, a high resolution DAGE-MTI Model 81 camera with Newvicon tube (multi dual rate sync, generator, modified remote control for gating, remote sweep reversal, 60mm camera lens & C-Mount and bencher M-2 camera assembly with lights), high speed video digitizer and display boards, 14.4 Kbps modem with diagnostic software, 3Com ethernet link, DEC Pathworks software, Image Pro Plus software and the IBISPRO Image Enhancement software with AFISD linkage.

AFIS identification of latent fingerprints is not anything new. AFIS has been around for quite some time now, however, AFIS identification of enhanced latent fingerprints is news to talk about.

First, just what is an enhanced latent fingerprint? An enhanced latent fingerprint is not a latent print that someone has altered by adding or deleting information which changes the print. It is however, a latent fingerprint that through the use of brightness and contrast adjustments and other filters that has been cleaned up giving the AFIS technician more and/or clearer minutia to encode for search. The enhanced latent finger-

print, because it has better and/or clearer minutia/points, increases the possibility of an AFIS identification.

Not all latent fingerprints need to be enhanced for an AFIS search to be effective. What criteria is used to determine if a latent print needs to be enhanced? It is a latent fingerprint that on its own merit is identifiable but there are just not enough good quality minutia to justify encoding it. There must be areas in the latent fingerprint that have ridge detail that, through the use of the enhancement tools, may be made more visible. Also, latent fingerprints that have previously been searched through the AFIS but were not identified and have areas that may be cleaned up are good candidates for enhancement.

There are several steps utilized in the enhancement process. First the image has to be captured into a graphic file format compatible with the software being used. To capture an image, the latent fingerprint (lift, photograph or object with latent print) is placed underneath the camera which has been placed in a continuous acquire mode. By utilizing the external control panel you can adjust the brightness and/or contrast, the print can also be reversed (color and/or position). Once the image has been adjusted to the operator's satisfaction it is then captured. This operation is performed by the video board and software. At this point the image is frozen on the monitor screen and resides only in the RAM (Random Access Memory) of the computer. The next step taken is to save the un-enhanced image to the hard drive. The image is saved by selecting the save image option in the program menu. A file name is assigned to the un-enhanced image

then a box is drawn around the image and the area is saved. The size of the box is determined by the AFIS requirements. The IBIS software captures the images using the "TIF" (Tagged Information File) format. (Any "TIF" file loaded into the computer could be viewed and possibly enhanced utilizing this software.) A copy of the un-enhanced image should always be kept for documentation purposes. Once the original image has been saved a copy of it can then be processed with the software enhancement tools.

The next step taken is to use the software to adjust the contrast or the copy. This can be done manually using the Slide & Stretch option or automatically using the Auto-Fit option. After that has been completed you may want use some of the other filters that are available in the software. If not, the next step that is executed is the most important and produces the most dramatic results.

Fast Fourier Transform (FFT) is the most powerful tool in this system for enhancing latent prints. This filter is used after all of the previous filters and adjustments have been made. The FFT filter is a tool that scans a selected area of the latent print, pixel by pixel, looking for a pattern. The results of this scan are shown in a spectrum. A repetitive pattern (ridges flowing in the same direction) is represented by a point or area of light in the spectrum away from the center. This point of light can then be boosted or suppressed to enhance the latent print. None of the image is erased or added to. The FFT filter is used on small areas of the latent where the ridges tend to flow in the same general direction. Numerous areas may need to be

done to achieve maximum results. Care must be taken in this step not to over process any particular area. With some practice and a good eye an examiner or technician should be able to use this tool to dramatically enhance any latent print.

The following are two homicide cases that illustrate the results that can be obtained through the use of an image enhancement system.

CASE #1

One of the Sheriff's Offices in our coverage area submitted numerous latent lifts for AFIS consideration and search. Out of the lifts that were submitted, five latent fingerprints were retained and encoded into our AFIS for search. The initial search of these latent prints was done on January 19, 1995. As a result of that encoding and search no "hit" or identification was effected. The AFIS Analyst then selected several latent fingerprints that she felt were marginal and asked to have them enhanced, if possible. Using the procedures I previously outlined, I was able to offer some enhancement on three of the latent fingerprints. She then entered the enhanced latent fingerprints into the AFIS on January 25, 1995 and they were sent off to be

searched. As a result of that search, a "hit" was made on one of the previously unidentified prints. That latent fingerprint was originally encoded with only thirteen (13) minutia. The enhanced version of this latent print was encoded with sixteen (16) points. This latent fingerprint however turned out to be one of the victim's fingerprints.

CASE #2

This case was submitted by another Sheriff's Office in Central Florida. Numerous latent lifts were also submitted in this case for evaluation for AFIS. Out of this group, eight (8) latent fingerprints were kept and searched through the AFIS. These prints were first entered into the AFIS on October 5, 1993. None of them were identified as a result of that initial search. Again the AFIS Analyst selected several as candidates for enhancement. The enhanced latent fingerprints were encoded and searched on February 15, 1995. As a result of the second search a "hit" was made on one of the enhanced prints. When this latent fingerprint was encoded originally, it was with fourteen (14) points. The enhanced version was encoded with seventeen (17) points. This identification turned out to be with a suspect list-

ed in the case. The investigator was immediately notified of the identification. He was very pleased with the information. There was already a warrant issued for the suspect's arrest based solely upon circumstantial evidence. Prior to this identification they did not have any physical evidence. This "hit" gave them physical evidence that they could use to bolster the arrest warrant.

There are several possible reasons for the enhanced prints being identified while the un-enhanced were not. As a result of the enhancement process, the AFIS Analyst was able to better plot the minutia. There were more points that could be entered, thereby increasing the chances of effecting a "hit." Both of the enhanced "hits" cleaned up extremely well and in both of the aforementioned cases there were three (3) additional minutia encoded in each latent fingerprint. That in itself is an increase of approximately 20%. Also there is the possibility that the inked prints that the enhanced prints were identified with were not in the database when the original latent fingerprints were searched. However, after checking with the AFIS Analyst that was ruled out.

FROM THE DESK OF THE HISTORIAN

By Debi Fertgus

JANUARY - JUNE 1962

Dick Cooke, of the Institute of Applied Science, advised Editor John Tyler in the April - May Issue that he had located some extremely rare books written by Dr. Henry Faulds. He was offering them to members at a very small cost on a first come basis.

The spring meeting of the F.D.I.A.I. was hosted by Sergeant Evans Costopoulos of the Fort Pierce Police Department. The meeting was held on May 26, 1962 and began at 9:00 a.m. in the Court

Room of the Police Department Building with 54 delegates in attendance. Some of the talks presented were: "Collection and Preservation of Evidence", "Principles of Flash Photography", "Development of Latent Impressions", "Photographing of Latent Impressions with Various Cameras" and "Handwriting Problems".

Mrs. McCall of the Vero Beach Police Department and the only female member won the drawing for the door prize, it was a man's electric shaver. They were sure that her husband would enjoy it.

In the June 1962 issue of the Newsletter, it was reported that all state employees would be fingerprinted. The Florida Highway Patrol had been selected to conduct the canvass. This was an issue that the Association had been campaigning for some time.

The International Association for Identification was preparing their Annual Conference to be held in St. Louis, July 23-25, 1962. This conference was being hosted by Sergeant John McGahan of the St. Louis Police Department.