FSS FOOTPRINT SCANNING SYSTEM

Introduction

FSS is designed for scanning the footprints on the crime scene. FSS is good at catching the latent dust traces on the floor with complex pattern, it is often present on the scenes of major criminal cases.

FSS is a nondestructive scanning device. The surface dust scattering light is spread over the space around the direction of reflected light of the same surface. Base on this knowledge, FSS only collects a part of scattering light and avoids the reflected light at the same time, so it has the great superiority of SNR, and the high sensitivity for the weak dust footprint. A lot of footprints on crime scene can be found by FSS while they are invisible with regular photography or electrostatic adsorption.

FSS: Wireless Split type

FSS: All-in-one type

key feature

1. **Acquisition of difficult footprint**, for example footprint interfered by background pattern, footprint on floor with high reflectivity, footprint can be observed only at a tilt angle.
2. **High SNR**, Due to background information weakened, the footprint image signal-to-noise ratio improved.
3. **Multiple acquisition mode**, special mode for the dust footprint, water footprint, flood footprint and some other footprint situation. Users only make a simple choice according to the site situation to acquire images.

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4. **High sensitivity,** more sensitive than the electrostatic adsorption film for dust footprint.
5. **All-weather operation,** Camera and Lights are built in the same unit, FSS can work both day and night, not affected by external light source.
6. **Nondestructive**, with optical scanning imaging mode, FSS does not touch floor, does not destroy the scene.
7. **Uniformity**, pictures scanned by FSS have uniform illumination and good contrast.
8. **Distortionless**, there is no deformation problem caused by photography.
9. **Automation**, no experience and training required, one-click scanning imaging.
10. **Built-in scale**, FSS automatically draw the perimeter scale without placing a physical scale.

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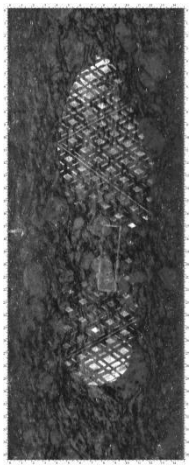
Widely applicable to floorings

Floor indoor is mostly made of composite wood board, manu-marble, tile, plastic and manu-leather. Latent footprints can exist on all of these kinds of material floor if they have the high contrast pattern or rough surfaces. Photography can not work well in these situations. According to this reason FSS is created to catch the latent images. It works well in knotty situations such as the following.

1，Footprint on surface with complex pattern

[Fig1-a] photo right above floor, glancing light.

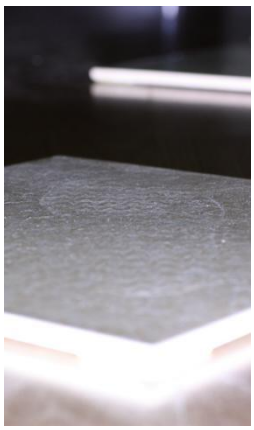


[Fig1-b] FSS Dust mode

Fig 1 shows a marble floor with black-white floral, strong contrast, smooth surface. It is usually used in living room, porch, hall, and so on. It is difficult to find the dust traces on this floor because most of them hide in the background patterns. Fig1-a is a photo taken just above the floor illuminated with glancing light, there should be a footprint on the center of the picture, but we can find only a part of outline. Fig1-b by FSS shows the same position on the floor. We can see that there is a big difference between the two pictures. FSS catches the whole information of the footprint, including the load bearing areas. In addition, most background patterns are restrained. That is why Fig1-b presents much better contrast.

2，Footprint can't be found right above the floor

[Fig2-a] photo right above floor, glancing light.

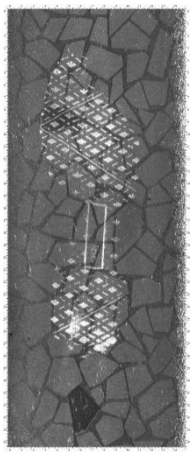


[Fig2-b] photo slantly

[Fig2-c] FSS Dust mode

Fig2 shows an orange peel like tile, it is a non-slip type, laidin bathroom usually. The tiny grains of the surface produce great scattering phenomenon just like dust has done, so we

[Fig3-a] photo right above floor, glancing light.



[Fig3-b] FSS Dust mode

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can not find any footprints just above it (Fig2-a). But there is a clear footprint really on the surface when you observe from a special angle (Fig2-b). The contrast of this image is not bad, but the inclination angle makes a trapezoid distort and a non-confocal footprint. Fig2-c taken by FSS overcomes all these faults undoubtedly. And the faux-leather floor in Fig3 shows the same comparison.

3，Footprint in low contrast

[Fig4-a] photo right above floor, glancing light.

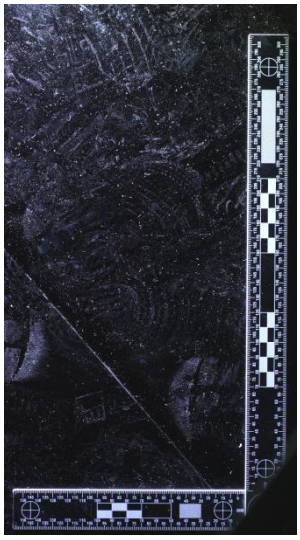
[Fig4-b] FSS Dust mode

[Fig5-a] photo right above floor, glancing light.

[Fig5-b] FSS Dust mode

Fig4 shows the fawn composite wood floor with uneven wood grain surface, usually found in office and bedroom or living room. Fig4-a must be in low contrast because the hue of dust traces is very similar to the floor; In addition, the interference from the wood grain makes it worse. While FSS does not depend on the color difference to catch footprints, but on dust scattering effect, just like what we have seen in Fig4-b. Material in Fig5 is tile used in family with a nature style in earthen colors. We can see that the comparison here just looks like in Fig4.

4，Footprint of water and dirt stains



[Fig6-a] electrostatic adsorption

[Fig6-b] FSS
Water stains mode

[Fig6-c] FSS
Dust mode

Crimes in rainy days often make scenes with water and dirt stains on the floor. These traces are bonded so tightly that can't be adsorbed by the electrostatic film, as you see in Fig6-a. Fig6-b comes from FSS by the water stains mode, there are only footprints of water and dirt stains in it, almost no dust trace, that's just what we want. While Fig6-c (FSS by dust mode) gives the mixed image of the twos, it's difficult to extract the water and dirt stains from the chaotic dust traces . Taking a photo directly is NOT a good idea too, because the light source always appears in the picture, it drowns a part of footprint while displaying the other part.

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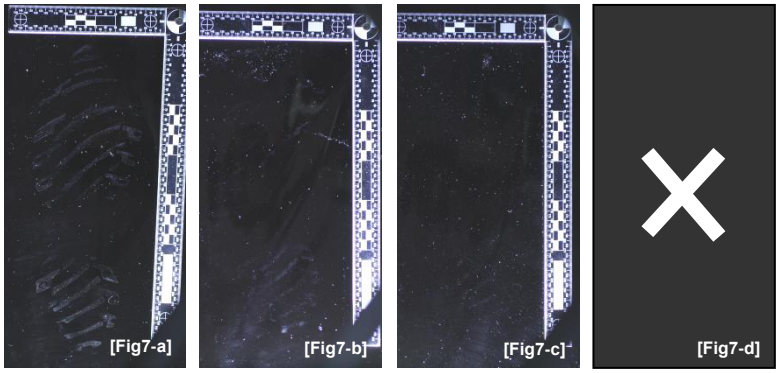
Excellent Sensitivity

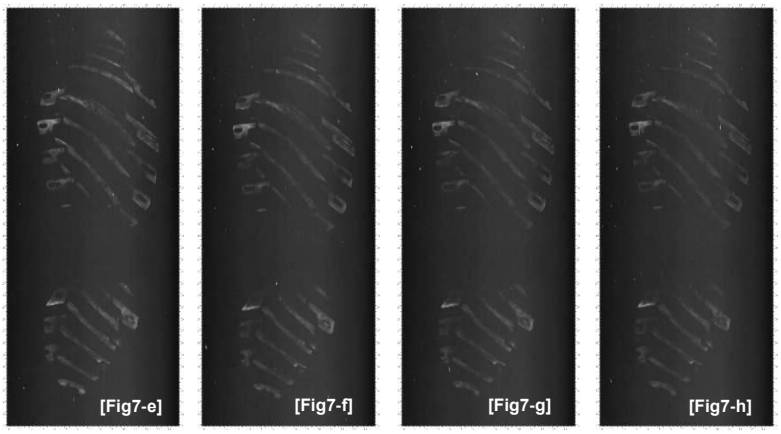
Besides all above, FSS meets the requirement of high sensitivity for dust footprints. The following 8 pictures show a comparative test between the electrostatic film and FSS.

The first 4 figures (Fig7-a~d) are taken by a Canon EOS digital camera aiming the adsorption film, record the footprint respectively after each electrostatic adsorption of the total 4 times. The last 4 (Fig7-e~h) by scanning the floor with FSS, record the same area on floor respectively after the 4 times adsorption. We can see that electrostatic adsorption damages the traces on scene obviously, Fig7-a shows a whole footprint, Fig7-b a half, Fig7-c a little, and Fig7-d nothing after the 4th adsorption; While Fig7-e to h keep the footprint in excellent integrity and definition even after the 4th adsorption. That means FSS has excellent sensitivity, we can use it to scan the scene floor that has been electrostatic adsorbed, and FSS may get footprints with enough quantity and quality.

Take pictures of adsorption film:



Scan floor by FSS:



Unique Honor

In China, FSS and its technical solution are included in *Footprint Science*, a university course textbook on forensic science; and in *Footprint Test Atlas*, a reference book for the forensic specialty.

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