

The *iWitness* CR-Photogrammetry System Used In Close-up Photography

DeChant Consulting Services - DCS Inc
July 2005

BACKGROUND:

These steps were prepared for camera calibration and mapping with the *iWitness* close range photogrammetry system in "close up" mode; with the camera approximately one foot (.3m) away from the measurement object(s). This procedure assumes the reader has basic familiarity with the *iWitness* software system.

STEPS:

1. Set the camera in Manual Focus setting. It is assumed for this procedure that one is using a fixed lens (lets say a 20mm fixed lens).

2. Rotate the lens focus counter clockwise to the .25m setting on the lens barrel. If you're using a moderate to high-end digital camera with a zoom lens, you can typically go into the 'custom zoom settings', and set the zoom (i.e., focal length) to the desired setting -- again, it is recommended the .25m focus setting is used for this procedure. This means you should take the images at about 10" to 12" away from the objects of measurement interest. Remember, you're trying to map very *small objects* to measure their height and width (e.g., like the shape of blood spatter to assist in calculating the direction of the blood flight-from-origin).

3. Start a new *iWitness* project and create a new *Camera Unique ID*. You can use the "**close_up_cal.pdf**" for the calibration targets, for the close up calibration procedure. Take about 8 calibration pictures in landscape and portrait, filling the frame similar to the below image thumbnails. Then run the calibration after marking/ referencing the printed black dots, (i.e. click on the **Camera Parameters** icon, then the **DETAILS** and then **RUN CALIBRATION BUNDLE**). Note: it's best to set at least one of the small paper dots "off the plane" (see below as it relates to point 17 off the plane).

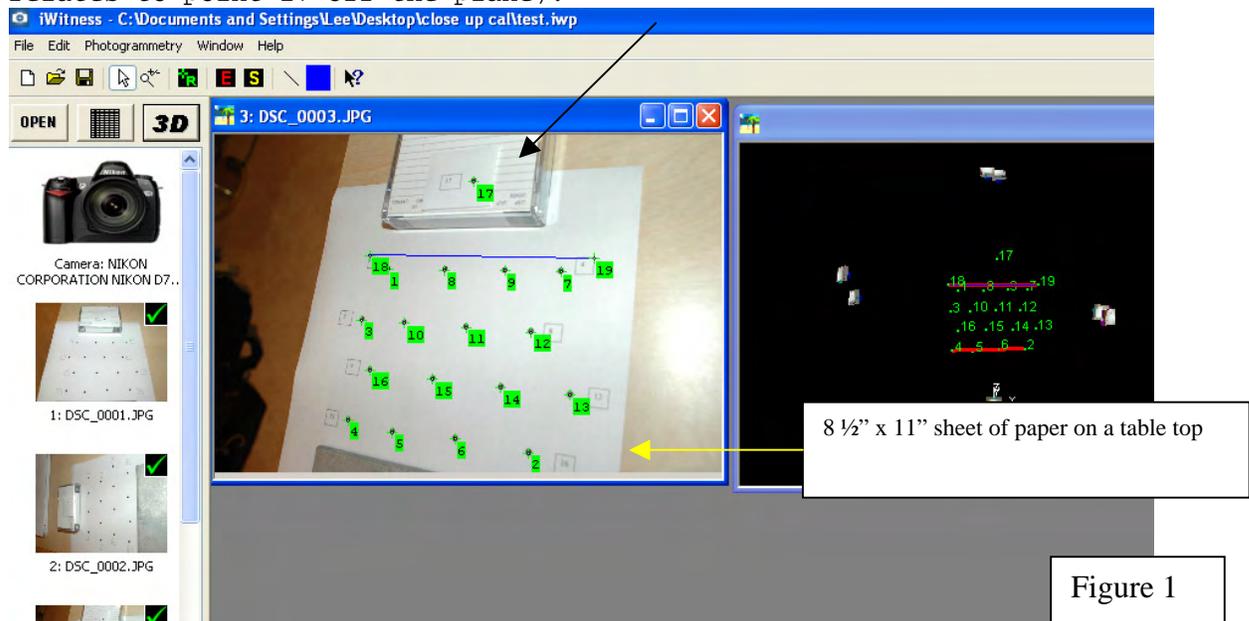


Figure 1

4. With the camera calibrated, you're now ready to 'map the scene'. Assure the lens barrel is **rotated to the .25m** focus setting. Set the camera in MANUAL Focus. Set the camera in "A" (**aperture priority** mode) and set the F-stop to **F22**. Use the **camera flash** too.

If you're using a zoom lens on your digital camera, then program-set the digital camera zoom to the .25m setting, and fulfill the same requirements for your camera as noted in the last paragraph.

5. Take the pics at the .25m setting, and record at least 5 images with good angles with camera 'roll angles' (landscape and portrait images of the blood spatter. You'll want to stick some retro reflective targets at least qty 12, will work fine adjacent the blood spatter (in an area of about 8" around the blood spatter) - see **Figure 3**. Note: small 1/4" "Avery Dennison" brand florescent orange sticky-back dots will also work, but are not illustrated in this procedure.

6. The next page illustrates an example sketch in **Figure 2**. Note: get at least 2 sets of scale distances (for the *iWitness* photogrammetric scaling). **Figure 2** only denotes one scale distance. Try to get at least 2 scale distances, measured as accurately as possible. If one uses the **retro reflective roll tape (Figure 3)** the *iWitness* scaling can be applied from the distances between the retro reflective dots. In our **Figure 3** example, two distances were used for scale, both distances of the retro reflective tape measured as 3.600". When measuring other sample distances, *iWitness* measured accurate better than .004" (.1mm) using these scaling features.

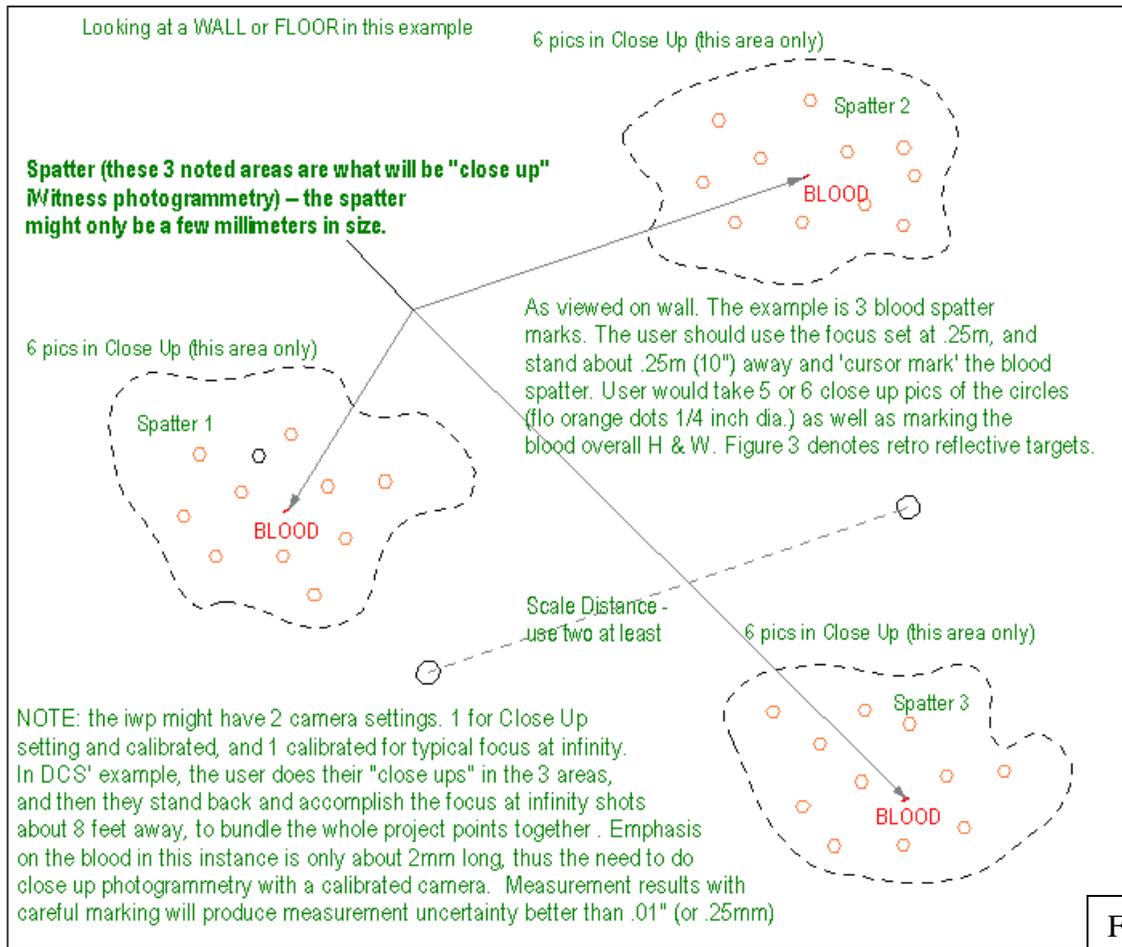


Figure 2

7. Stand back from the wall and now take some 'overall pics' at the calibrated 'focus at infinity' setting. You'll be tying the blood spatter measurements in with the overall pics, because the close up pics, and the focus at infinity (overall pics), were all marked extremely accurate with the *iWitness target centroiding* capability re: the florescent orange dots, or using the retro reflective dots. We recommend the retro reflective dots.

KEY ADVANTAGES TO THE *iWITNESS* MAPPING APPROACH:

- With the proper images taken at the scene, and careful image marking, the measurement accuracy of the *iWitness* program for mapping the height and width of the e.g., blood spatter will typically be better than .01" (.25mm). The images create an irrefutable record of the measurements, that can be recreated in court, months, and years after the incident.
- The speed of randomly placing (inexpensive) florescent orange dots or retro reflective strip tape dots adjacent the blood spatter, while taking the digital camera pictures is fast on-scene, and the measurements can be made long after the scene is contaminated and/or cleaned up.

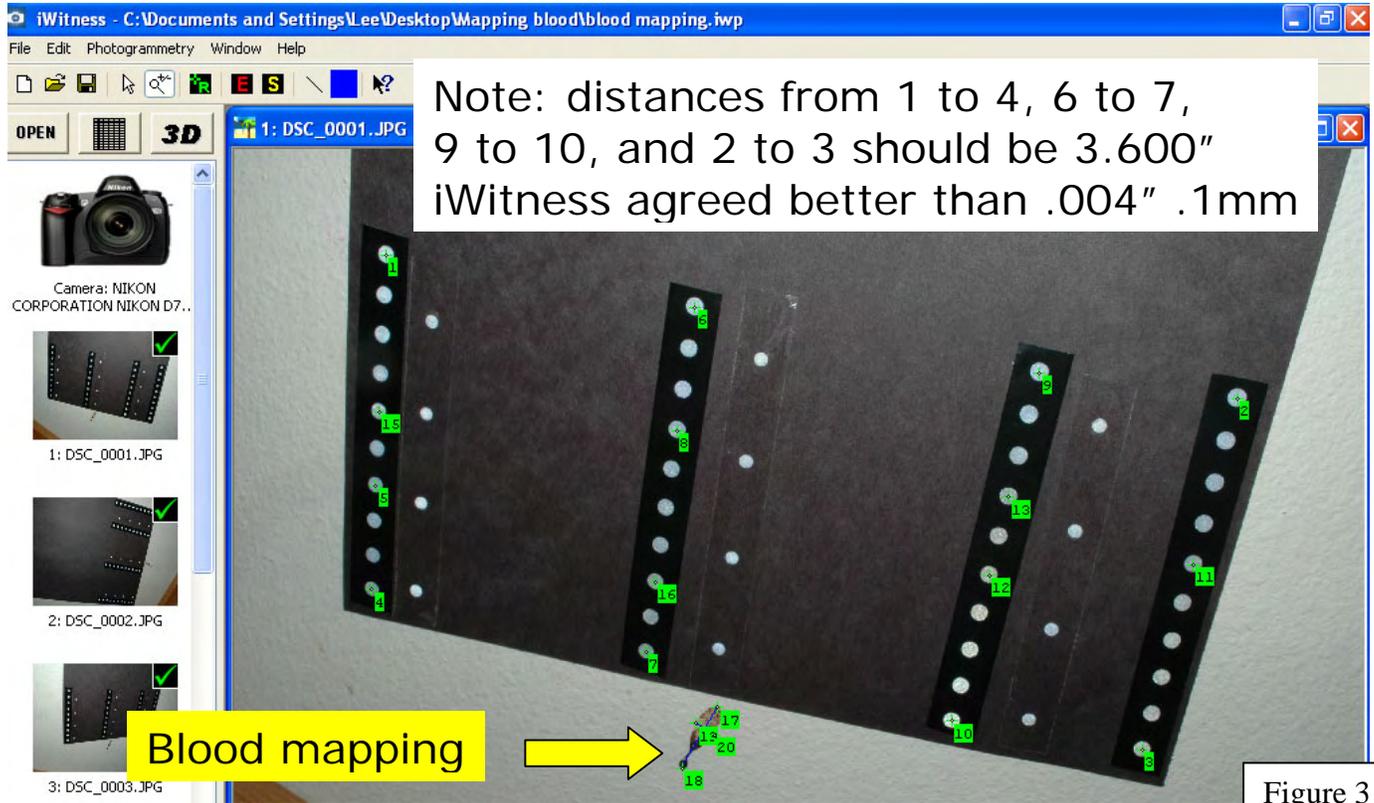
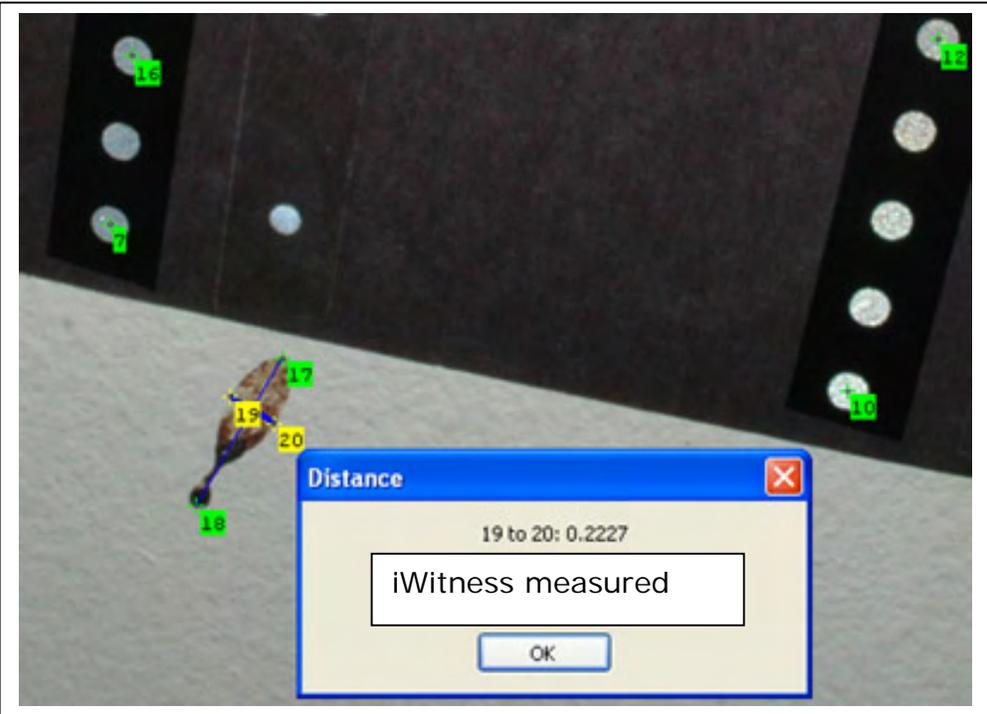


Figure 3



Caliper measured

