



Photogrammetry



Deputy Tim Robbins

ACTAR #1445

Arenac County Sheriff's Office

Defined

- Photogrammetry is the use of photographs to obtain measurements of crash or crime scenes.
- Essentially, by using a “calibrated” camera and photographing the scene using specific and consistent settings then one can ‘measure’ objects, points, lines, etc.”

Types of Photogrammetry

- X-Y rectification
 - Just as sounds, x & y axis only
 - Can be done with one photograph taken with appropriate scale
 - Can be done with multiple photograph with points of known position
- 3D rectification, XYZ
 - Can locate points in 3D
 - Must have multiple overlapping photographs

Why Use Photogrammetry

- Photographs need to be taken anyway.
- Speeds up scene clearance
 - Increased responder safety
 - Increased public safety
 - Reduction in secondary crashes
- Taking photographs can be learned by anyone, including road officers
- Can be used on all crashes or crime scenes



How Does It Work?

- Photographs are taken with specific camera settings
- Camera must be calibrated (may be done after taking photographs or before)
- Photographs are taken at angles to each other
- Evidence is captured in at least three overlapping photographs (sometimes less)



- Photographs are imported into Photogrammetry program.
- Photographs are referenced.
- Program calculates lens distortion and determines location of camera when each picture was taken.
- Locate points of interest.
- Draw lines if desired
- Export points into CAD program.
- Draw Scene



Accuracy

- Verified accuracy on a crash in Greater Detroit area.
- Crash started on freeway, ran up an embankment, and ended on a surface street
- Elevation was approximately 20 ft
- Distance was approximately 200 ft.
- Shot with a total station & Photogrammetry
- Photogrammetry was within fractions of an inch of total station measurements
- Inaccuracy not necessarily from technology, but due to human error, which plays into all measurement methods

Time Savings

- Scene time for typical 2 car intersection crash- 20 minutes
- Drawing time when proficient- 45 minutes

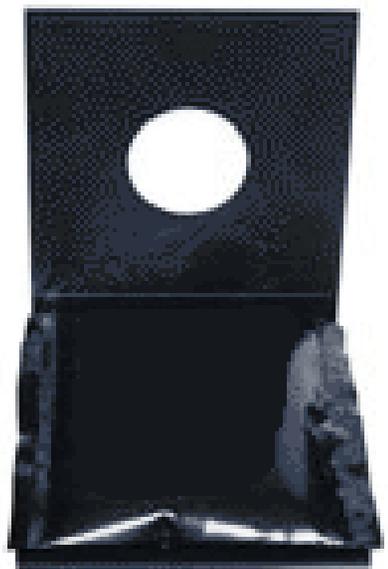


Advantages

- Anyone can be trained to take the pictures.
- Person taking pictures does not need to know anything about evidence identification.
- EVERYTHING in the pictures (taken appropriately) can be measured.
- You're taking pictures anyway, so two steps are combined into one (measuring and photographing)
- One person operation







3D List 3D

Camera: FUJIFILM FinePix S9100 (unique ID: default)

- 1: DSCF3839.JPG
- 2: DSCF3843.JPG
- 3: DSCF3844.JPG
- 4: DSCF3851.JPG
- 5: DSCF3842.JPG

1: DSCF3839.JPG



3: DSCF3844.JPG

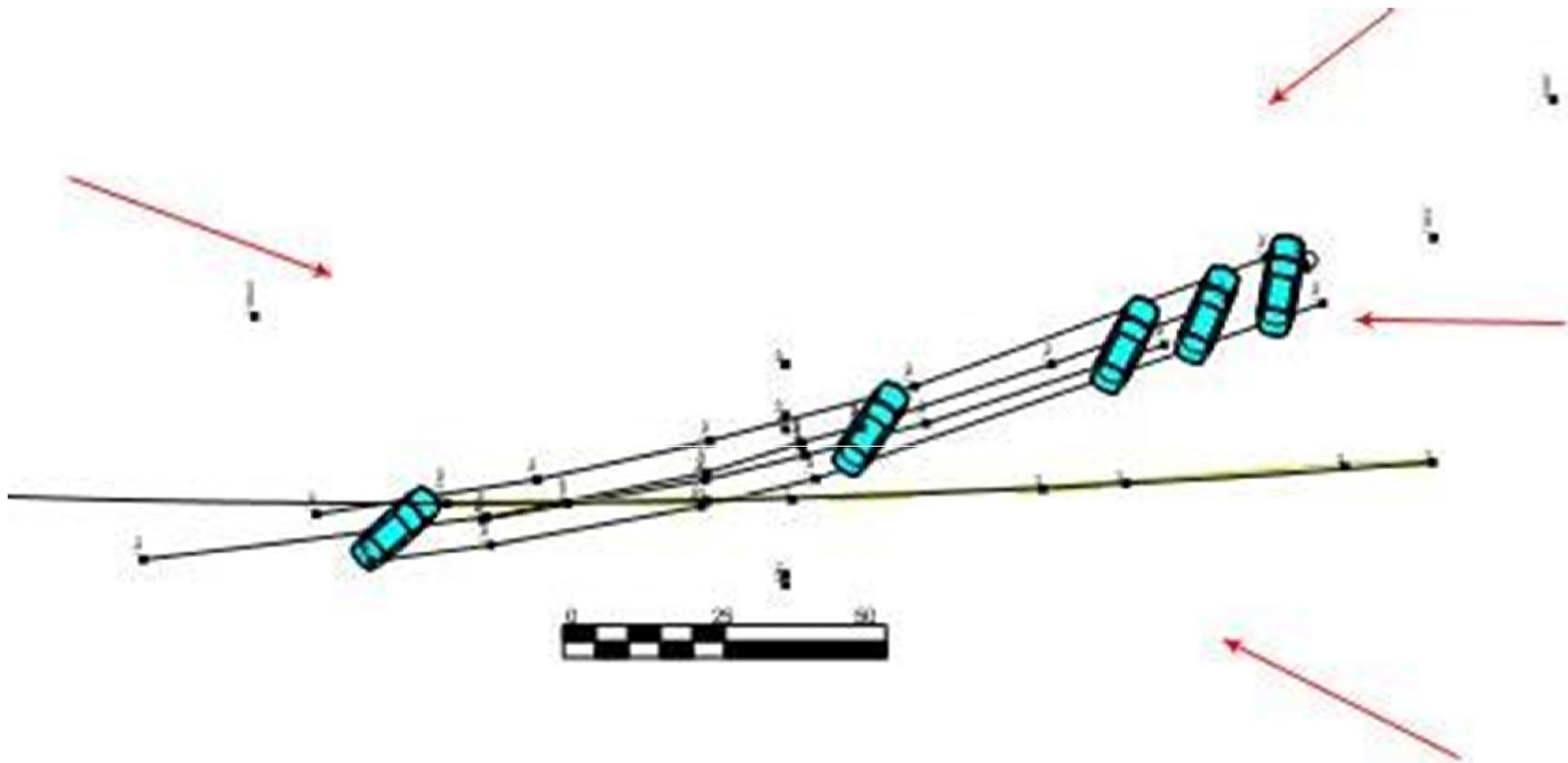


5: DSCF3842.JPG



4: DSCF3851.JPG





DISADVANTAGES

- Weather (same as total station or scanner)
- Foliage – you MUST see what you want to measure (same as total station or scanner)
- Night time photographs- take good ones!
- Must be proficient with a camera!
- Must be proficient in the program (same as total station or scanner)



Costs

- Cost of your camera
 - Cost of camera
 - Can actually be accomplished with point and shoot camera, but prefer good digital SLR like camera
 - Cost of templates
 - \$500
 - Cost of program
 - \$1000 basic program
 - \$2000 Pro program



GOALS

- Clear the scene as quickly as possible
- Be as safe as possible
- Collect all evidence needed
- Formulate appropriate conclusions
- Provide appropriate exhibits



Concerns

- Proficiency
 - Not everyone should own the program
 - Should use at least twice a month to stay proficient
 - No different than total station or other technology
 - Most officers can take appropriate photographs
 - Should have yearly updates for proficiency
 - Should have quarterly photo review for quality assurance