Adding 3D Fingerprints to the Standard

William F. Long, PhD
COO, TBS North America, Inc.
December 6, 2005
Disclaimer

This presentation is based on non-proprietary data. It reflects the views of the author. Neither TBS North America nor any other party has necessarily adopted these views.
The Promise of 3D

- Elimination of Distortions Caused by Skin Elasticity and Pressure
  - Level 3
    - Ridge Path
    - Ridge Width
    - Ridge Shape
    - Incipient Ridges
    - Sweat Pore Existence
The Promise of 3D Levels 4 and 5

• Steve Meagher’s small comment about the possibility of Levels 4 & 5, what could it mean?
  – Ridge Slope?
    • LumenIQ technology
    • TBS technology
  – Sweat Pore Shape?
  – Sweat Pore Activity?
The Promise of 3D Ridge Shape

• What is there?
  – Full 256 grey scale, rather than 2 shades with some fuzziness at the edges
  – Results of possible texture variations: ridge, valley, slope
  – Results of illumination
    • Intensity
    • Direction
    • Color
The Promise of 3D Sweat Pore Shape
The Promise of 3D Sweat Pore Activity
The Promise of 3D Resolution Issues

• Slides 5 & 6
  – Extracted from a video with effective resolution of about 8000 ppi
  – 11 second run
  – 95 MB

• Any hope for 3D images taken at reasonable resolution?
The Promise of 3D
1000 ppi Images (1)
The Promise of 3D 1000 ppi Images (2)

• What is in the image? Note: not 3D, touchless flat, close to 3D
  – From TBS
  – Sweat Pores
    • Different stages in the sweating cycle?
      – Closed (not visible?)
      – Opening
      – Sweating
      – Closing
  – Sweat Droplets?
    • Maybe, but might be dirt. We are working on it.
• Simple observations on livescan (not scientific yet)
  – Pore sweats, droplet fills in pore, pressure shows complete contact: no pore
  – Pore is on the side, or maybe even in the valley, no contact with platen: no pore
  – Pore is closed, so orifice is small: possibly no pore
The Uses of 3D

• Forensics, Especially Latent Examination
  – See ‘Fingerprint 3rd Level Details Discussion’
  – More data rather than less

• Liveness Testing
  – Dynamic Photography Possibilities
    • Slide 7
  – Static Photography Possibilities
    • Slide 9
Market Presentation of 3D Images

• LumenIQ – clever work with 2D images

• TBS
  – Surround Imager
    • A few months to first distribution of a small number of devices
  – Touchless Sweep Sensor
    • NIJ Fast Capture Rolled Equivalent Grant

• Carnegie Mellon & University of Kentucky
  • NIJ Fast Capture Rolled Equivalent Grant
Data to Report (1)

- Standard descriptive material
- Images
  - 3D. Use OpenGL to describe the image. Place in dedicated field.
  - 2D
    - Rolled equivalent. Separate field for this.
    - Flat equivalent.
      - Might just use crop of rolled equivalent
      - Might need in addition to rolled equivalent
Data to Report (2)

• Consistency with MedX3D?
  – Finger as a body part
  – Skin as an organ
  – Epidermis, dermis – more fields?
  – Sub-dermal – more fields?
    • Vein pattern
    • Sub-dermal structure beyond veins
Data to Report (3)

• Models to use
  – Appendix N
  – Other Type 14 implementations for fingerprints
  – A totally new type – possibly
    • Signal that this is a new and different finger image type
    • More work, but more definitive information, not so dependent on end user understanding nuances
Recommendations

• Adopt 3D reporting
• Charge ad hoc committee with provision of specific Type details
  – Short time frame
  – All relevant parties, invited to participate
    • Developers
    • Users
  – Coordinate with MedX3D