IARPA Nail-to-Nail Challenge Registration

All Stage 1 Registrations need to be submitted to Challenge.gov by <u>March 17, 2017</u>

Company Info		Technical POC	
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N2N System Description			
Title:		☐ Software Solution (uses conventional sensor) ✓ Hardware/SW Solution (custom hardware and software)	

Abstract

At a high level, what do you propose to do?

- FlashScan3D will develop a single finger scanner which uses a structured light acquisition technique to capture a 3D fingerprint that contains more data than a traditional slap fingerprint captured on a contact based device. FlashScan3D will utilize and continue to refine existing unrolling and flattening algorithms that convert the 3D data to a 2D equivalent print which is backward compatible with existing contact based collection techniques. Further FlashScan3D will explore modifying optics to collect more information across the full nail-to-nail region.
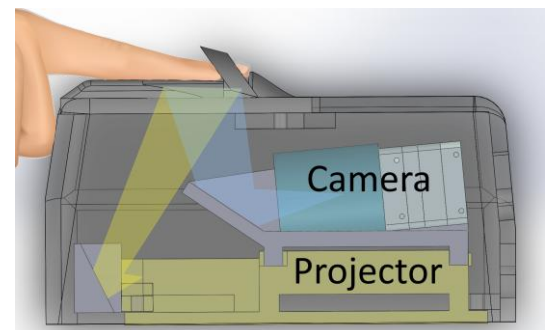
Concept of Operations

How would a user interact with the device?

- A user would walk up to the device and place a single finger over the opening of the scanner. The operator will initiate the scan sequence. After the scan is captured the operator would ask the user to advance to the next finger and repeat the process. Alternatively, the user could be prompted through onscreen displays eliminating the need for an operator altogether.

System Diagram

What are the main system components and their interrelationships /dependencies?

- *Electric/Power source (supply voltage, current:*
  Projector power supply: Either of 5V, 3A or 12V, 7A.
  Camera: Powered over USB 3.0 from computer.
  Computer: 19.5V, 11.8A.
- *Materials of construction:*
  Aluminum and/or Nylon
- *Optics/"light" information (type, wavelength, frequency, power)*
  Visible Light Spectrum in range of 400nm - 700nm from projector.
  Current projector at rated 50 lumens max.
- *Original specs from any COTS parts, plus info about any modifications*
  Projector:
    - Website - http://www.ti.com/tool/dlplightcrafter
    - User Guide: http://www.ti.com/general/docs/lit/getliterature.tsp?baseLiteratureNumber=dlpu006&fileType=pdf
  Camera:

- Website - https://www.ximea.com/en/usb3-vision-camera/xiq
- Current model used: MQ013MG-ON
    - Manual - http://www.jmakautomation.com/documents/xiQ_TechnicalManual_v1.02.pdf
    - Abbreviated tech sheet - https://www.lambdaphoto.co.uk/pdfs/Ximea/xiQ_Camera_LAMBDA_1213.pdf
- *Description of any mechanical movements*
  No mechanical movements are anticipated.

Anticipated Equipment

What are the software packages and/or hardware components?
- Single finger scanner developed by FlashScan3D
- A laptop or small desktop build will be used to communicate with the scanner and process the data to be sent over the network.
- Custom developed software from FlashScan3D to run and operate the scanner and produce 2D prints compatible with existing matching algorithms and fingerprint databases.

Devices

Will you be constructing a new device for this challenge or will you be extending the use of an existing device for this challenge? Please select one: Creating New Device or Augmenting Existing Device.
- FlashScan3D will be building a new device for this challenge. Familiar hardware will be selected, as referenced above, but optical paths may be re-evaluated in consideration of the N2N goals of the challenge to capture as much surface area as possible of the fingerprint.

Matchers

*A) Which Matcher will your team use for the **tenprint** to **tenprint** comparison? Please select one:*
____ Government   ___ Custom   __x__ Not Sure [we typically use Neurotechnology or Innovatrics]

*B) Which Matcher will your team use for the **latent** to **tenprint** comparison? Please select one:*
____ Government   ___ Custom   __x__ Not Sure [we typically use Neurotechnology or Innovatrics]

Safety Assessment

Are there any components (electrical components, illuminators, etc.) in your design which may cause safety concerns with human subjects testing?
- There are no concerns with the current hardware.
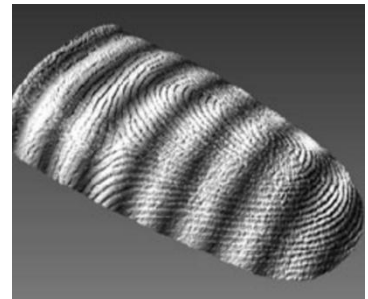
Innovation

What makes this approach unique?
- The non-contact nature of our 3D acquisition technique allows us to capture more information than traditional slap fingerprint acquisitions while not requiring the user to "roll" their finger. Our 3D acquisition technique allows us to retain scale of all parts of the fingerprint within the scan volume. The device will acquire a 3D print that has no distortions compared to prints acquired through a traditional contact based technique. Our unrolling process can mimic the traditional rolling technique to ensure backwards compatibility. The non-contact nature also allows for increased usability and throughput as no contact surfaces need to be cleaned to retain image quality. Under a current study with the National Science Foundation, FlashScan3D is developing a device for 3D digital acquisition of latent prints with the benefit of contactless acquisition, removal of correlation between operator experience and collection quality as well as acquisition of latent prints of non-planar surfaces that can be unrolled to a to-scale contact print equivalent. In the future, utilizing the undistorted 3D print information, one could model the distortion caused by the surface caused where the latent print was collected.