

# Biometric Standards, Performance, & Assurance (BSPA) Laboratory

*Biometrics and Healthcare*



**Shimon K. Modi, Ph.D.**  
*BSPA Lab Director of Research*

**Stephen J. Elliott, Ph.D.**  
*BSPA Lab Director & Associate Professor*

Biometric Standards, Performance, and Assurance Laboratory | [www.bspalabs.org](http://www.bspalabs.org)  
Purdue University, Department of Industrial Technology

- Overview of the BSPA Lab
- Research in Biometrics and Healthcare
- Future Work



# Overview of the BSPA Laboratory



- Established in 2001
- **The mission** of the BSPA laboratory is to excel in the applied research of biometric technologies with a continued commitment to education and innovative research, as well as engaging academia, government and industry in all activities.



Education

Applied Research

Standards Development

Testing and Evaluation Services



# Biometrics and Healthcare Research



Hygiene issues with biometric devices

How well does the system work in the healthcare environment?

Privacy concerns about biometric data

- Healthcare application specific policies

Can they work with mobile devices?



- Need for stronger identity management in the healthcare environment
- Examined performance of fingerprint recognition in hospital environment
- Collected data from 30 healthcare professionals and 30 non-healthcare professionals
- Each individual provided 3 successful fingerprint images on a capacitive swipe sensor and an optical touch sensor
- Also collected oiliness, moisture content, and elasticity of the finger skin
- Partnered with Howard Regional Health System

- Reference: Proceeding Blomeke, C.R., Elliott, S.J., Senjaya, B., and Hales, G.T. (2009). Comparison of Fingerprint Image Quality and Matching Performance between Healthcare and General Populations.



	Quality	Oiliness	Elasticity	Moisture
<b>Optical</b>				
Healthcare	63.64	1.00	92.00	28.40
GP <sub>O</sub>	66.21	19.00	69.50	28.90
p-value	0.437	<0.001	0.001	0.910
<b>Capacitance</b>				
Healthcare	73.54	1.00	92.00	28.40
GP <sub>C</sub>	73.58	13.50	71.50	34.33
p-value	0.589	<0.001	0.002	0.187

Fig. Statistical Test

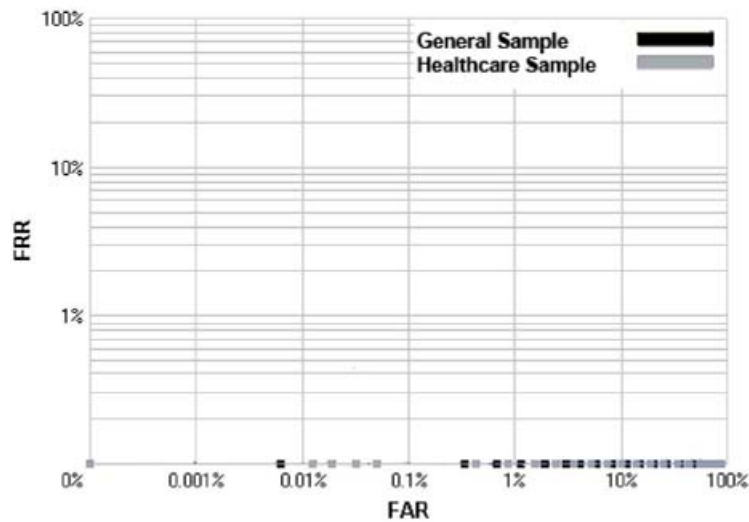


Fig. Optical Sensor DET Curve

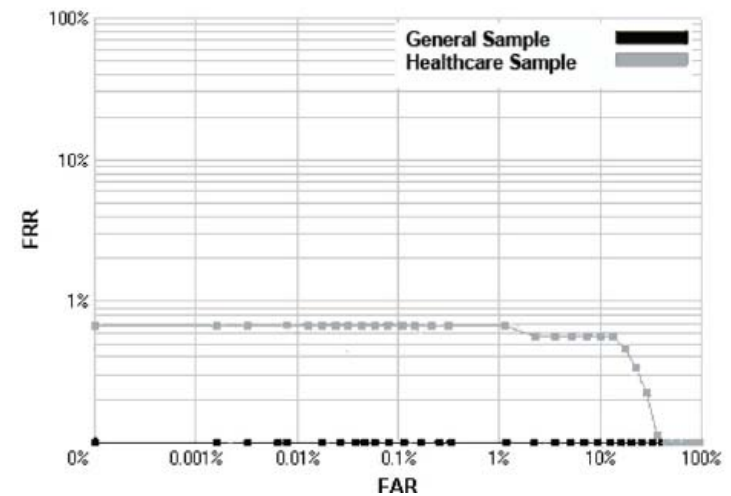


Fig. Capacitive Sensor DET Curve



## ■ Motivation

- Growing concern about physical interaction with surfaces on biometric devices
- What are the hygiene implications of using biometric devices in common places and sterile environments?

## ■ Goal

- Investigate bacterial recovery and transfer from three biometric sensors and the survivability of bacteria on the devices

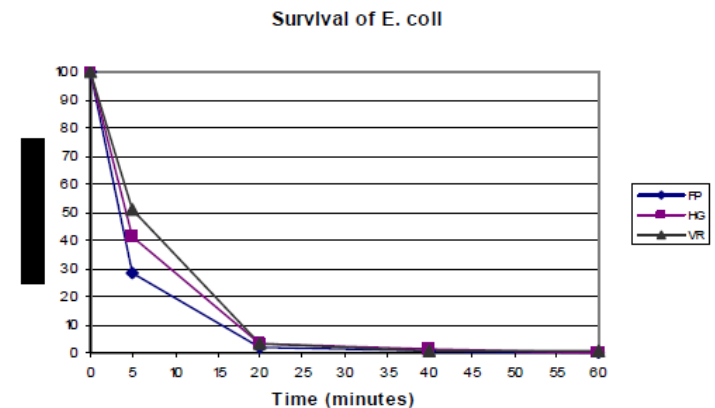
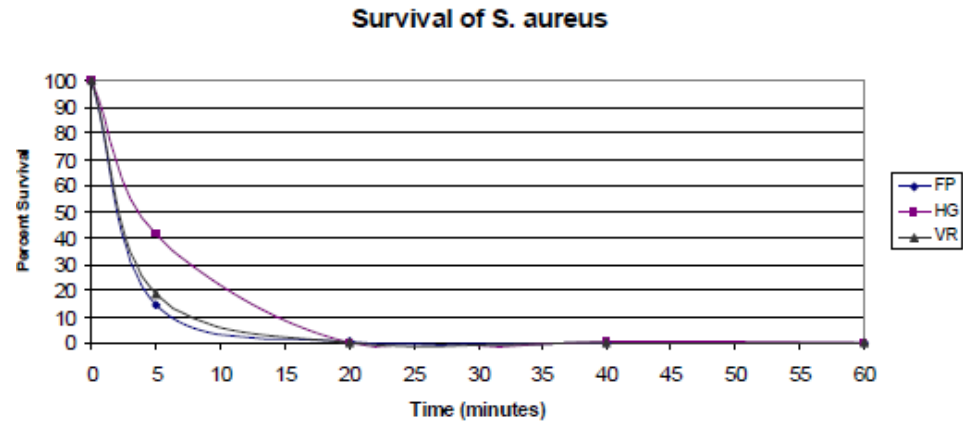
- Paper reference: Blomeke, C. R., Elliott, S. J., & Walter, T. M. (2007). Bacterial Survivability and Transferability on Biometric Devices.



- Methodology
  - Biometric Devices: Hand Recognition, Fingerprint and Vein Recognition
  - Control Device: Metal Doorknob
  - Staphylococcus aureus and Escherichia coli
- Examined Survivability and Transferability



- The result of comparison showed that neither bacterial species survived for a long time on the device surface
- The bacterial survival curves indicate they could survive on an infrequently touched surface
- However, a frequently touched surface is essentially cleaned within five to ten touches, as the bacteria are moved to the hand
- Future work: Need to investigate infectivity

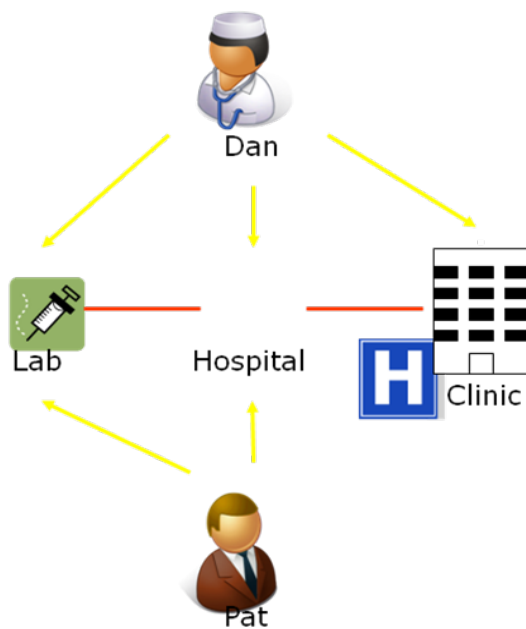


- Goal: Improve the business and clinical intelligence in the healthcare delivery system by facilitating information exchange of medical information while increasing privacy and security of information and the individuals involved
- VeryIDX adopts cryptographic techniques to support the privacy-preserving verification of identity attributes
  - Such verification allows a party to prove the knowledge of some information to a verifier without having to reveal such information to the verifier
  - The healthcare application is designed to protect access to healthcare records in a distributed environment
- Multifactor authentication is the core of VeryIDX
- Collaborating with CERIAS

- Paper reference: An Overview of VeryIDX – A Privacy-Preserving Digital Identity Management System for Mobile Devices



- Dan has trust relationship with hospital, clinic and lab
- The patient has trust relationship with hospital and the lab
- The hospital can act as the identity provider to entities that trust it
- Facilitate exchange of information and management of digital identities without revealing any personal information

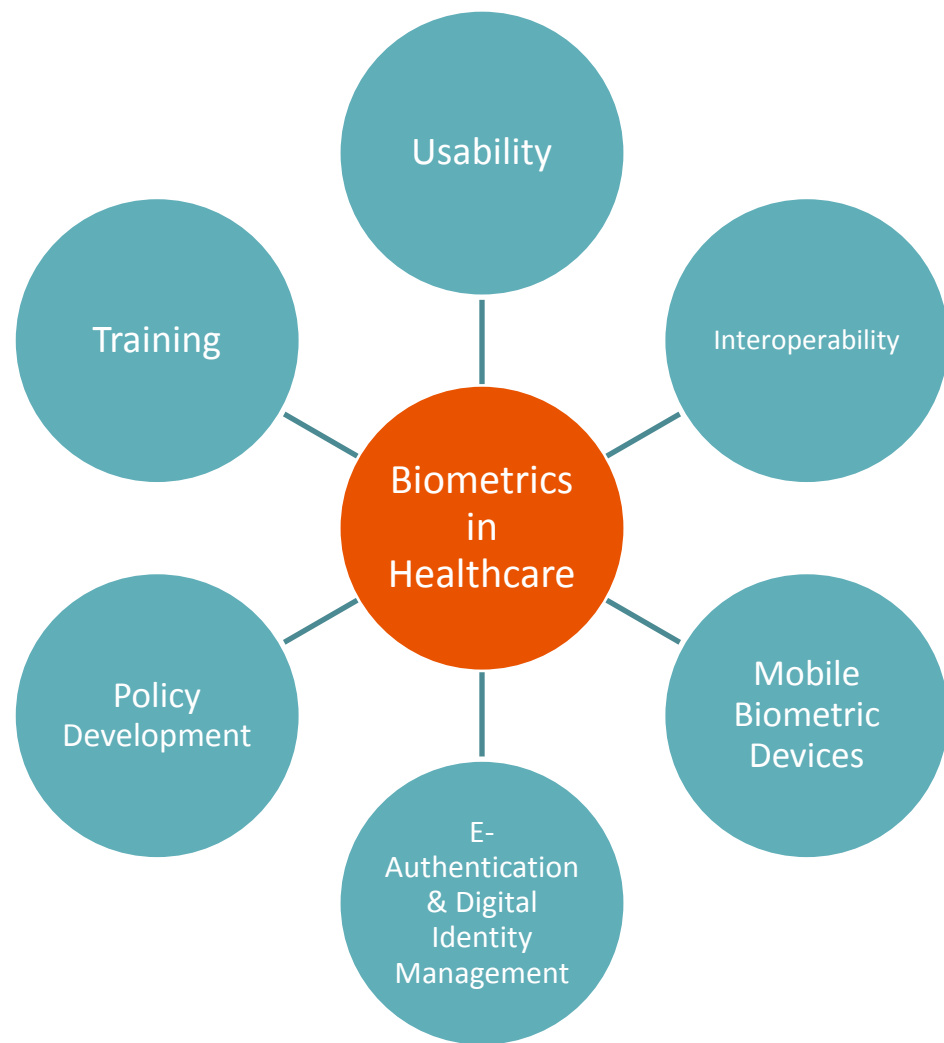


Parties	Dan	Pat	H
Requirements			
Privacy	Minimal Identity Disclosure	Personal & Doctor's Identity	
Confidentiality			Patient Numbers, Doctor Names
Usability	Efficiency, Urgent Access		
Seamless Access	Different Locations, Multiple Identities		



# Future Work Research Vision





- Generate use cases for biometrics in healthcare
- Interdisciplinary research to address challenges
- Create discussion group comprised of end-users, researchers, vendors and integrators



- Planning a conference on biometrics in healthcare in summer 2010
- Attendees will include academia, industry, end-users



# Questions...

## Contact Information:

**Shimon K. Modi, Ph.D.**  
*Director of Research*  
[modis@purdue.edu](mailto:modis@purdue.edu)

**Stephen J. Elliott, Ph.D.**  
*BSPA Lab Director &  
Associate Professor*  
[elliott@purdue.edu](mailto:elliott@purdue.edu)

**BSPA Laboratory** | [www.bspalabs.org](http://www.bspalabs.org)  
Purdue University, Knoy Hall of Technology  
401 North Grant Street  
West Lafayette, IN 47907-2021  
Phone: (765) 494-2311  
Fax: (765) 496-2700