

Near Infrared Imaging

Non-Contact Vein Recognition Biometrics

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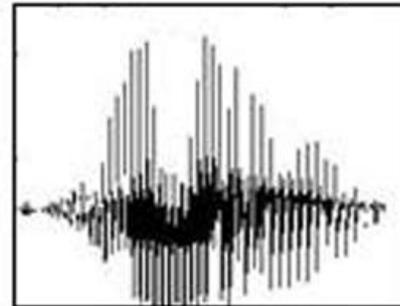
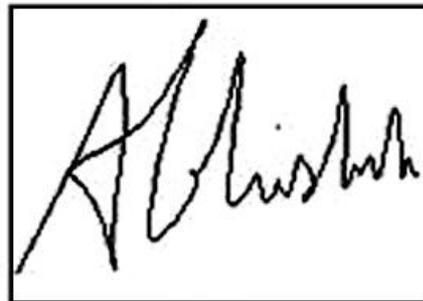
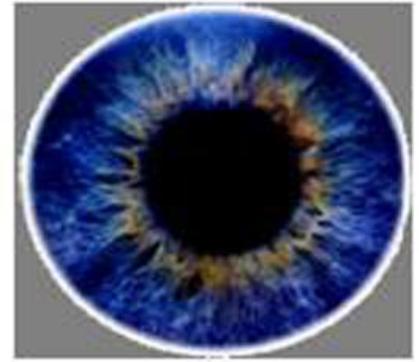
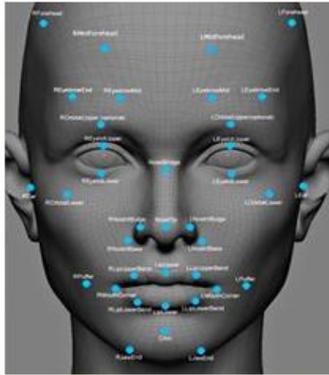
Near Infrared Imaging

- ❑ NII's technology is multiple modality "non-contact" vein-recognition biometrics, the visualization of sub-surface veins and blood vessels.
- ❑ Vein recognition biometrics is the fastest growing area of biometrics. The technology has an "anti-spoofing" capability to prevent hacking.
- ❑ The technology was developed at Lawrence Livermore National Laboratory, a division of the Dept. of Energy (DoE) and the National Security Agency (NSA). NII is owned in part by Lawrence Livermore National Laboratory.
- ❑ The FBI has adopted facial recognition software, even though facial recognition could not recognize the clear faces of the Boston Marathon bombers.
- ❑ Both bombers had Massachusetts driver's licenses and one of the bombers was in the FBI database.
- ❑ The automated face recognition simply wasn't up to the task.

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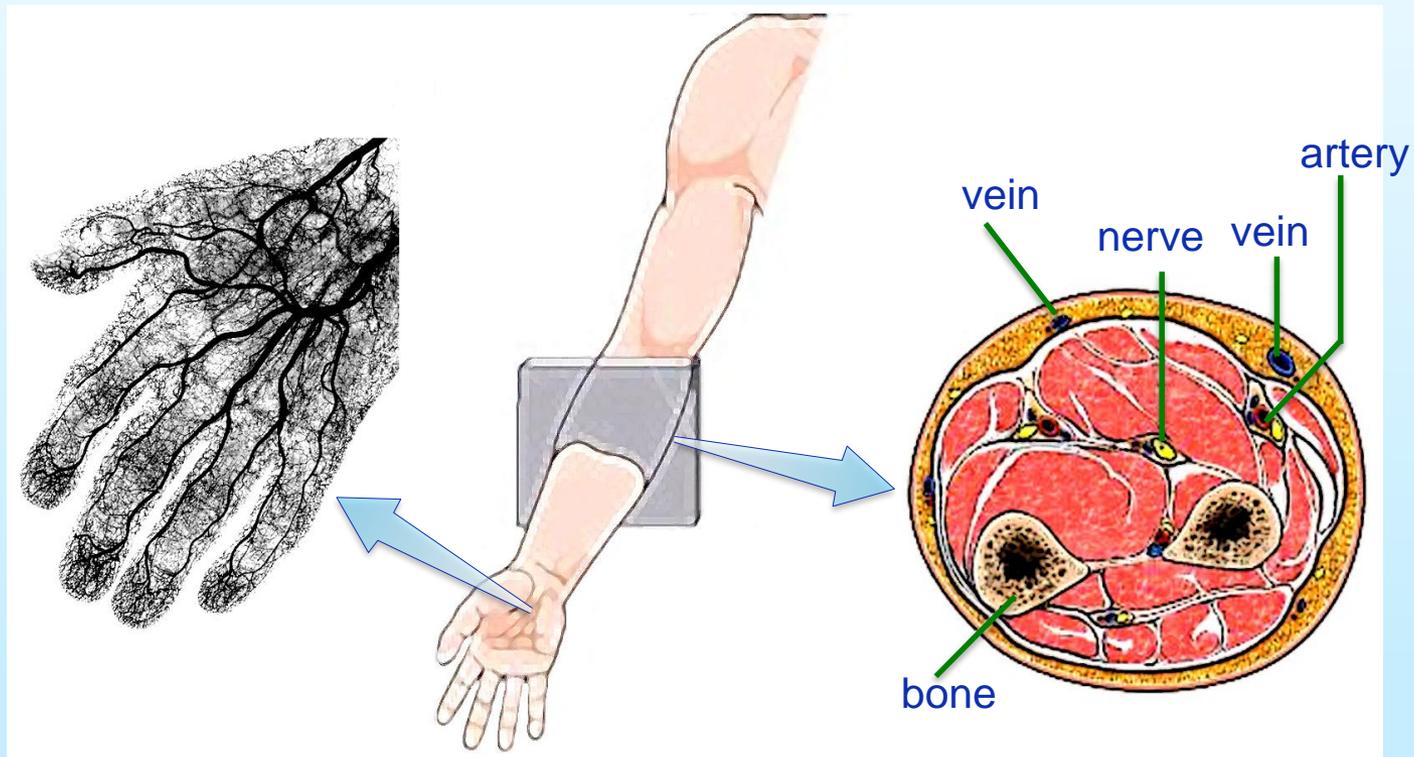
- ❑ The average cost of a corporate security breach is \$7.2M.
- ❑ Retailers lose an average of 7% of annual revenues to theft and fraud by employees.
- ❑ Patient “misidentification” errors cost more than \$55B annually in the U.S.A. alone.
- ❑ Globalization, mobility and decentralization are driving a worldwide adoption of biometrics.
- ❑ Determining true identity - in a physical or virtual environment - empowers the individual, corporation and the government to protect what’s important and to increase efficiency and service levels.

Different types of biometric identification schemes



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NII's optical imaging of the human hand



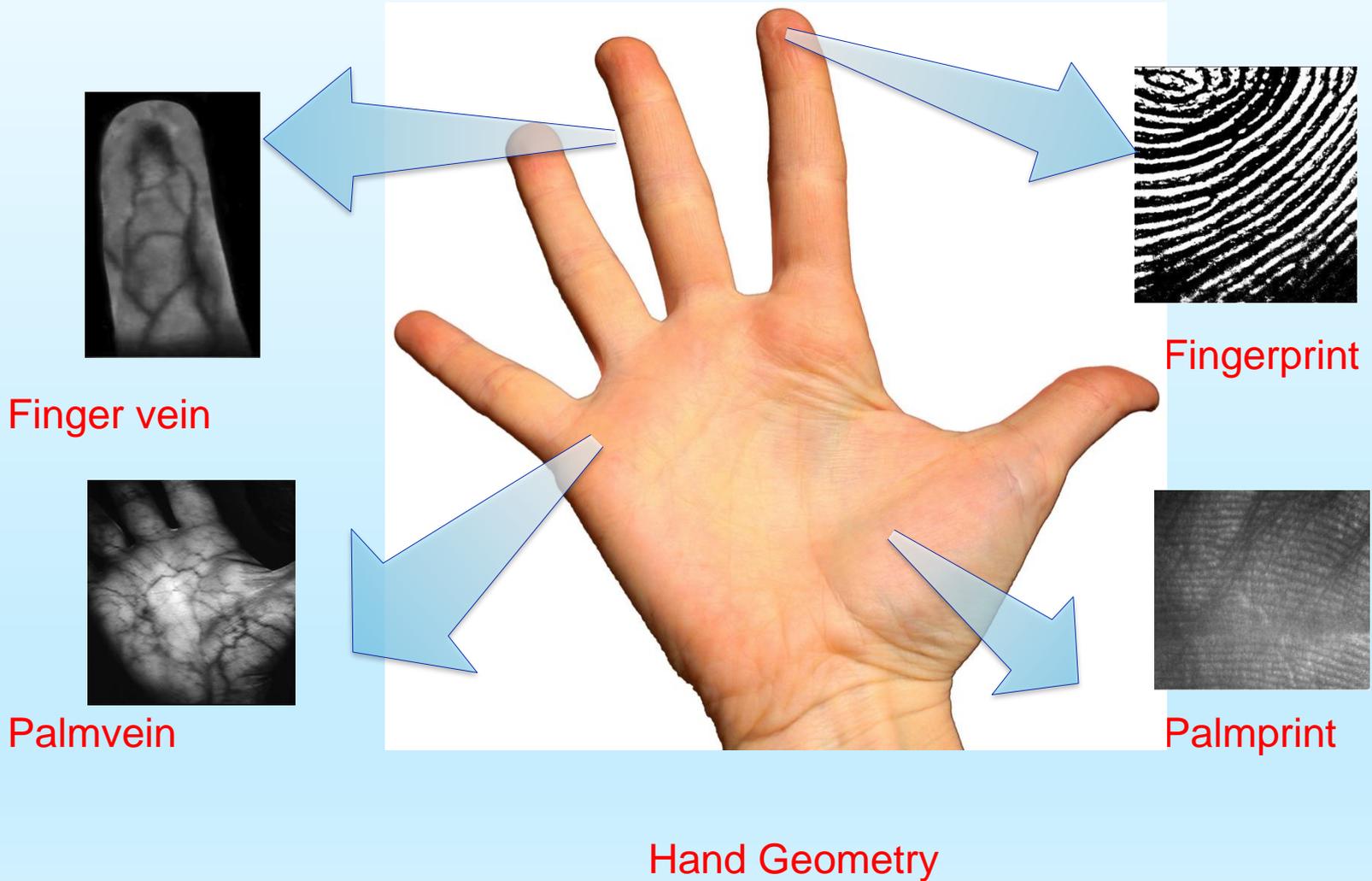
Near Infrared Imaging

- 1) Near Infrared Imaging's "data collection" biometric technology provides a number of characteristics essential for secure verification and identification.
- 2) All individuals (with possibly very limited exemptions) can present it.
- 3) The biometric information is stable, and will not change with time and physiological condition.
- 4) The data is readily measurable, meaning acquisition of the information is fast and straightforward.
- 5) The information is distinct and unique to each individual.
- 6) The technology improves the overall decision accuracy, since it is "multimodal" and resistant to attacks from fraudulent data sources.

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- 7) The technology is non-contact. Fingerprinting presents potential health concerns, such as unintended or intended origination of infection, as well as contamination of the sensor.
- 8) Dirty, damaged or elderly fingers sometimes don't register properly, and some fingerprint readers can be tricked using fake fingerprints made out of gelatin.
- 9) The information is transformable, meaning that it is capable of being reduced to a file that cannot be used for reconstruction of the original information.
- 10) The information is digitally comparable to information from others.
- 11) The information is reliable.
- 12) The characteristics/traits of the technology satisfy privacy laws, generally accepted ethical codes, and present day ethical norms.

Multi-modal Biometric data collection system



Near Infrared Imaging

NII has demonstrated success with imaging veins

- NII's biometric technology will work on our country's borders, in hospitals, at airports, in schools, at military bases, at ATMs, in homes and in commercial and residential buildings – anywhere there is a need to protect and identify.
- **Vein recognition** biometrics is an impressive and promising technology because it requires only a single-chip design. The ID verification process is very fast.
- The Vein-Eye™ vein illumination camera is in over 40 countries.
- NII is owned in part by Lawrence Livermore National Laboratory and the Dept. of Energy, the City University of New York, and the University of California.
- https://www.youtube.com/watch?v=ekDKD_mAFvE
- <http://www.bioopticsworld.com/articles/2014/06/near-infrared-camera-enables-real-time-accurate-vein-procedures.html>