DECEMBER 4, 2014

8:30 am – 8:45 am
Welcome — Sue Ballou

8:45 am – 12:30 pm
Ballistics/Toolmarks

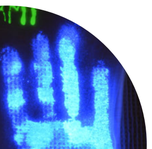
8:45am – 9:00 am
Introduction: John Murdock
Contra Costa Sheriff's Forensic Services Division
Martinez, CA

9:00 am – 9:15 am
Program overview: Rick Silver
Firearm and Toolmark Forensics: A Program Overview

TECHNICAL PROGRAM

9:15 am – 9:40 am
Robert Thompson — Congruent Matching Cells (CMC)—Theory and Application in Firearm Evidence Identification

The Congruent Matching Cells (CMC) method was invented at NIST for accurate ballistic identifications. The measured forensic topographies are divided into correlation cells. Three sets of identification parameters are devised for identifying correlated cell pairs originating from the same firearm. Initial validation tests on 780 pair-wise images from 40 cartridge cases fired with 10 consecutively manufactured pistol slides did not produce any false identifications or false exclusions.



9:40 am – 10:05 am
J. Song — Estimating Error Rates for Image-related Forensic Evidence Identification

Reporting an error rate for firearm identification is a fundamental challenge in forensic science. Based on the Congruent Matching Cells (CMC) method recently developed at NIST, an error rate procedure is proposed which can serve as a statistical foundation for estimating error rates of image-related forensic evidence identifications, thus emulating methods used for forensic identification of DNA evidence.

10:05 am – 10:20 am Q&A session

10:20 am – 10:50 am BREAK and POSTER session

TOURS — individuals signed up for the tours please go to the registration booth. Your bus will depart or your walking venture will commence at 10:30 am.

10:50 am – 11:15 am
Xiaoyu Alan Zheng — Objective 2D and 3D Analysis of Consecutively Manufactured Tools

Consecutively manufactured tools have the highest likelihood of possessing similar surfaces that may lead to false toolmark identifications. It's considered one of the more difficult comparisons and exemplifies the worst case scenario in case work. The goal of this project is to provide objective mathematical comparisons of toolmarks created by 10 consecutively manufactured chisels (striated toolmarks) and punches (impression toolmarks).

11:15 am – 11:40 am
Johannes A. Soons — Development of a Ballistic Toolmark Research Database

NIST is developing an open-access research database of bullet and cartridge case toolmark data to facilitate the development and validation of algorithms, metrics, and quantitative confidence limits for objective firearm identification. The database will contain traditional reflectance microscopy images and three-dimensional surface topography data acquired by NIST or submitted by database users. Our goal is a collection of datasets that: 1) represent the large variety of ballistic toolmarks encountered by forensic examiners, and 2) represent challenging identification scenarios, such as those posed by consecutively manufactured firearm components.

11:40 am – 12:05 pm
Brian Renegar — Advancements in Polymer Bullet Replication Techniques

Building on past research, NIST continues to develop an advanced polymer replication process for the replication of bullets and cartridge cases. New techniques being used in the molding and casting steps are discussed. Metal deposition coatings are also being employed to increase the durability of the polymer replicas.

12:05 pm – 12:30 pm Q&A

12:30 pm – 1:45 pm LUNCH and POSTER session

1:45 pm – 4:15 pm
Statistical Measurements

1:45 pm – 2:00 pm
Introduction: Christine Funk, Esq.
General Counsel, Department of Forensic Sciences, Washington, DC

2:00 pm – 2:15 pm
Program overview: Dr. Antonio Possolo

TECHNICAL PROGRAM

2:15 pm – 3:00 pm
Simone Gittelson —From Inferences to Decisions in the Analysis of Low-Template DNA Traces

Forensic science casework involves making a series of decisions. Given the serious consequences that these decisions can lead to in the administration of justice, they should be based on coherent foundations and take into account the circumstances and objectives of the case at hand. A decision-theoretic approach to these decision problems provides a transparent framework for accomplishing this. This presentation illustrates such a decision-theoretic approach to two decision points in the analysis of low-template DNA traces: (1) choosing how to designate the genotype of the trace's donor, and (2) choosing how many replicate PCR amplifications to perform. From a broader perspective on forensic science, the decision problems treated here are not restricted to the domain of low-template DNA traces. They represent the two fundamental types of decision problems: one-stage decision problems and two-stage decision problems. This theoretical framework therefore also lends itself to applications addressing decisions in other domains of forensic science.

3:00 pm – 3:45 pm BREAK and POSTER session

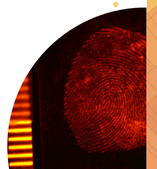
TOURS — individuals signed up for the tours please go to the registration booth. Your bus will depart or your walking venture will commence at 3:15 pm.

3:45 pm – 4:30 pm
Hari Iyer, Soweon Yoon, Elham Tabassi
Statistical Friction Ridge Analysis: Algorithms for Matching Minutiae Configurations and Evaluating Likelihood Ratios

Our project is aimed at developing statistical methods for quantifying the uncertainty associated with claims of exact match between latent fingerprints obtained at crime scenes and reference prints. As part of this effort we have developed algorithms for partial matches of minutiae configurations and for computation of empirical likelihood ratios. In this talk we will discuss our approaches, their underlying theoretical rationale, and their performance on real data.

4:30 pm – 4:45 pm Q&A

4:45 pm Closing Remarks



FORENSICS @ NIST

December 3-4, 2014

DECEMBER 3, 2014

8:30 am – 8:45 am
Welcome – Dr. Willie May; Acting Director, NIST
Moderator – Ms. Sue Ballou; Manager, Forensic Science Research Program

8:45 am – 9:15 am
Keynote
JED S. RAKOFF
US District Court, Southern District of New York

Are Judges Losing Confidence in Forensic Science?

The honorable Judge Rakoff has served since March, 1996 as a United States District Judge for the Southern District of New York. Judge Rakoff also holds the position of Adjunct Professor at Columbia Law School, where he teaches courses in white collar crime, science and the law, class actions, and the interplay of civil and criminal law. He has co-authored five books and written over 125 published articles.

9:15 am – 12:35 pm
Biometrics/Computer Forensics

9:15 am – 9:30 am
Introduction: Eoghan Casey, Lead Cyber Security Engineer
The MITRE Corporation

9:30 am – 9:45 am
Program overview: Barbara Guttman

Overview of Computer Forensics and Forensic Biometrics at NIST including an overview of the focus area and summary of accomplishments

TECHNICAL PROGRAM

9:45 am – 10:00 am
Doug White, National Software Reference Library (NSRL)
The NSRL has been providing reference data since 2001. New areas of software collection include mobile device apps, historic software, and live updates. The NSRL is also providing a research base for new types of software identification.

10:00 am – 10:15 am BREAK

Tours – individuals signed up for the tours please go to the registration booth. Your bus will depart or your walking venture will commence at 10:15 am.

10:15 am – 10:35 am
Mary Laamanen and Alex Nelson, NSRL Next Generation — Diskprinting

The NSRL has focused on software as delivered. Diskprinting looks at software as installed. As software in installed, used and uninstalled, it leaves traces across the system, including changes to the registry, to memory, and to network traffic.

10:35 am – 10:55 am
Jim Lyle — Computer Forensics Tool Testing (CFTT)

Update on recent key accomplishments of the CFTT program in deleted file recovery and file carving and a look to the future for work on memory analysis.

10:55 am – 11:15am
Rick Ayers, CFTT — Mobile Forensics

NIST recently released Special Publication 800-101 Rev 1. Guidelines on Mobile Device Forensics and has started a new round of mobile devices forensic testing with greater emphasis on smart phones and tablets.

11:15 am – 11:35 am
Ben Livelsberger, CFTT — Federated Testing

It is not feasible for the Computer Forensics Tool Testing (CFTT) project to test every digital forensics tool used by law enforcement, much less every version. Federated Testing expands CFTT to provide law enforcement with test materials, methodologies, and report formats to validate tools themselves and share the results.

11:35 am – 12:00 pm
Mike Garris — Biometrics Overview

NIST has decades of experience and impact in the innovation, evaluation, and standardization of Biometric pattern matching technologies. This talk will provide an overview of how this work is relevant to the science of forensic patterns.

12:00 pm – 12:25 pm
Elham Tabassi — Latent Fingerprints

This talk will provide an overview of Statistical Friction Ridge Analysis, which is a new project at NIST. The project aims to develop a statistical measure of the uncertainty of the decisions made on the friction ridge evidence (i.e., evidential value of fingerprint comparison). We will present the motivation, scope, technical plan and progress so far.

12:25 pm – 12:35 pm Q&A
12:35 pm – 1:30 pm LUNCH on your own

1:30 pm – 5:00 pm
DNA

1:30 pm – 1:45 pm
Introduction: Jennifer G. Breaux , DNA Technical Leader
Montgomery County Crime Laboratory, Rockville MD

1:45 pm – 2:00 pm
Program Overview: Peter Vallone
Overview of Forensic Genetics at NIST

TECHNICAL PROGRAM

2:00 pm – 2:25 pm
Becky Steffen — Update on NIST SRM 2391c PCR-based DNA Profiling Standard

The U.S. is in the process of adding more Short Tandem Repeat markers (STR) to the current core set of 13 CODIS loci. In parallel, NIST is updating the SRM 2391c to include the new candidate STR loci, new Y STR loci found in commercial kits and providing full sequence information on the markers to support next generation sequencing platforms.

2:25 pm – 2:50 pm
Mike Coble — Complex DNA Mixture Interpretation

Complex mixtures of two or more contributors can be difficult for the forensic scientist to interpret. In 2010, the SWGDAM published Autosomal STR Interpretation Guidelines to provide guidance for labs to establish thresholds for mixture interpretation. In 2013, NIST conducted an interlaboratory study (MIX13) to gauge the consistency in mixture interpretation across the U.S.

2:50 pm – 3:15 pm —
Margaret Kline — The Use of Digital PCR for SRM Characterization

The current DNA Quantitation Standard (SRM 2372) has been characterized by UV absorbance methods. In the next 2 years SRM 2372 will be superseded with a new material. The candidate SRM 2372a will be characterized for copy number using the technique of digital PCR (dPCR). dPCR allows for a count of PCR targets in the human genome allowing for a direct determination of DNA copy number.

3:15 pm – 3:30 pm BREAK

TOURS — individuals signed up for the tours please go to the registration booth. Your bus will depart or your walking venture will commence at 3:30 pm.

3:30 pm – 3:55 pm
Erica Butts — Rapid DNA Typing and PCR Protocols

Rapid PCR protocols decrease DNA amplification times from 3 hours down to 15 minutes. Fully integrated rapid DNA typing instruments employ rapid PCR methods and can type a reference sample (buccal cells in a swab) in approximately 90 minutes. Results from laboratory and integrated rapid typing methods will be presented.

3:55 pm – 4:20 pm
Kevin Kiesler — Typing SNPs with Next-Generation Sequencing

The advent of next generation sequencing has provided an instrumental platform for multiplex typing of single nucleotide polymorphisms (SNPs). SNP markers can be used for human identity testing application such as one-to-one matching, estimation of biogeographical ancestry and externally visible traits such as eye/hair color.

4:20 pm – 4:45 pm
Katherine Gettings — Sequencing STRs: Variation and Nomenclature

The ability to fully sequence short tandem repeats (STRs) has the potential to unlock more information contained within the markers compared to traditional PCR fragment-based methods (e.g. capillary electrophoresis). The results of typing a subset of NIST population samples will be used to illustrate the benefits of new sequencing methods.

4:45 pm – 5:00 pm Q&A

5:00 pm CLOSING REMARKS

TOURS

WEDNESDAY, DECEMBER 3
10:30 AM – 11:30 AM

Ballistics Range/Body Armor Test Center - Kirk Rice
On this tour, visitors will witness a test of ballistic-resistant body armor and learn about related NIST research on materials used in body armor, as well as test methods, materials, and equipment involved in body armor testing. NIST research and its influence on national standards help to ensure the continued effectiveness of this protection technology.

National X-Ray Standards for Bulk-Explosives Detection
Larry Hudson
National x-ray standards are necessary to insure that security-screening systems for bulk-explosives detection both perform technically and handle radiation safely. NIST has facilitated the development of a comprehensive suite of national x-ray performance and radiation-safety standards that cover all transportation and commercial venues where explosives are screened: checkpoint, checked luggage, cargo, vehicle, and whole-body imaging. This tour stop will highlight various test objects and will demonstrate x-ray screening for contraband beneath clothing.

3:45PM – 4:45PM

Usability & Fingerprints IPad for latent fingerprint examiners and the mobile platforms for FBI – Mary Frances Theofanos
The biometrics usability team is working to develop efficient, effective, and intuitive human to computer interfaces based on human-centered design that support mobile biometric acquisition and related metadata on handheld devices. For demonstration, there are two devices. The first is a latent fingerprint handheld device that models a latent fingerprint examiner's workflow including minutia marking and search results comparison. The second is a handheld multi-modal biometric collection interface developed for the FBI.

Robotic Intelligence Systems - Ann Virts
NIST is developing a comprehensive set of standard test methods and associated performance metrics to quantify key capabilities of emergency response robots. These test methods address responder-defined requirements for robot mobility, manipulation, sensors, energy, communications, operator proficiency, logistics and safety for remotely operated ground, aerial (under 2kg), and aquatic systems.

Interactive Exhibit Tour – Michael Newman
Experience through sight and sound the storied past, innovative present and exciting future of the nation's premier R&D institute.

THURSDAY, DECEMBER 4
10:45 AM – 11:45 AM

Reactor Tour – Dan Neumann

The NIST Center for Neutron Research (NCNR) is a premier neutron research facility in the U.S. and is among the leading facilities in the world. At the NCNR, intense beams of subatomic particles (neutrons) are used to probe the nanoscale structure and properties of novel materials. Research at the NCNR has led to advances in systems of technological relevance such as magnetic storage media technology, improvements to hydrogen fuel cells, rechargeable batteries, advanced coatings, biopharmaceutical preservation and delivery, and biomaterials.

Using the NIST SPHERE (Stimulated Photo Degradation by High Energy Radiant Exposure) to Mimic Environmental Exposure Found at Crime Scenes – Chris White

A mock homicide case, where the clothed body was subjected to environmental conditions, will be presented. Fibers, foreign to the clothing of the deceased were recovered. Fibers from the blanket suspected as being the origin of the collected fibers will be exposed using the SPHERE device and the resulting information will provide a demonstration of NIST's rigorous control over environmental effects in a nominal amount of time.

Interactive Exhibit Tour - Michael Newman

Experience through sight and sound the storied past, innovative present and exciting future of the nation's premier R&D institute

3:30 PM – 4:30 PM

NIST Program for Trace Contraband Detection – Dr. Greg Gillen

This tour stop will include a discussion of our ongoing research and a demonstration of some of the advance metrology tools being used to characterize contraband materials. We will highlight several forensic related projects including age dating of fingerprints, combined chemical and biometric analysis and high throughput screening technologies for illicit narcotics. Finally, we will show some recent results related to development of new standard test materials for trace contraband detection using drop-on-demand ink jet printing.

History of NIST - Kristen Frederick-Frost; Museum Curator

From a 1799 meter bar to polystyrene spheres made in space, the NIST Museum displays artifacts and archival materials related to the research, creation, and dissemination of standards. The Information Services Office invites you to join the Museum Curator for a tour highlighting artifacts that typify challenges in measurement science which NIST has explored since its origins as the National Bureau of Standards in 1901.