



## INDIA TO BENEFIT SOON FROM HI-TECH FORENSIC METHODS

By **Dr. Mrs. Rukmani Krishnamurthy** and **Ms. Nisha Menon**



India's noted Forensic Scientist Dr. Rukmani Krishnamurthy aims to keep pace with the recent advancements in the field of Forensic Science. Her recent visits to the FBI (Federal Bureau of Investigation) and IRS (Internal Revenue Service) in the United States has opened up new avenues and path breaking technologies for forensic science in India. She strongly feels that white collar crimes

resulting in huge financial scandals are the areas that call for use of high-end crime detection technologies. In the following article, Dr. Krishnamurthy and Ms. Nisha Menon present an insight into the latest technology used by the FBI in solving white collar crimes.

Sir Arthur Conan Doyle opened the door to a new generation of law enforcement when he created the character of Sherlock Holmes. With dry humor and typically British reserve, this accidental detective solved crimes by way of keen observation, deduction, and a brilliant assembly of the facts.

Forensic Science is one of the few areas of law enforcement where science and crime solving meet. Here, the laboratory scientist deals with inanimate objects that cannot lie, fight, or flee.

Forensic Science is based on the theory of transfer; that is, when two objects meet, some evidence of that meeting generally can be established and verified at a later time. Fingerprints left inside a burgled house, shoeprints outside a window, tool marks around a door—there are thousands of examples of the minute bits of evidence found at a crime scene that are later used to incriminate, associate, establish, or convict. And with the advent of DNA profiling, these bits of evidence keep getting smaller and smaller, to the point that a link between suspect and crime can be made with as minute as one skin cell or a Nano particle..

The ability of forensic experts to detect evidences is continually improving, and many court cases rely on it. It is presented to juries and judges by expert witnesses and helps solve crimes ranging from fraud and forgery to assault, rape, murder and terrorism.

The reality may be more mundane, but forensic scientists do invaluable work linking evidence from crime scenes and technology has now bridged the gap between the evidences and investigation leading to acquittal or conviction. Supporting the advancement of law enforcement and putting state-of-the-art technology in the hands of state and local police have been

primary goals of hard-core forensic scientists. Forensic science is a rapidly growing discipline and the tools available to forensic researchers are also evolving quickly.

The latest technology used by FBI mainly in the field of age of ink and paper, analyzes the inks on documents to determine the date of manufacture, the manufacturer and the availability of a particular ink formulation. This unit also analyses the physical, chemical and optical properties of paper which may lead to the manufactured date of the paper items. This type of forensic evidence could be extremely useful in an attempt to prove that changes were made in a particular document or that a document or parts thereof were created subsequent to the time of its alleged creation. The latent print examiners routinely processed and compare latent finger prints and / or palm prints card of a suspect. Due to advances in processing techniques examiners are very successful in developing latent prints on paper which accounts for 95% of the evidence which they process. The use of new techniques has enabled the development of previously undetectable prints. Besides paper evidence, the unit also processes other types of evidence including: weapons, glassware, metal, computer equipments (monitors, key boards, diskettes and tapes), leather goods and plastic items.

The unit can search unidentified latent prints through computerized latent prints data basis throughout the country if the need arises. With the use of computers, the unit is able to use digital image enhancement in the examination and analysis of forensic evidence. This unit supports the laboratory providing full forensic photography services. The unit also offers a variety of services in support of field operations. Black and white



Gautam M. Chakrabarti,  
ADGP - West Bengal.

**The Citizen's expectation from the police is always high at such times. We have to rise to every occasion and deliver service without fault and fear. The citizens of any city in India today are being made aware of the participative role citizens can play in aborting terror attempts by being vigilant and giving timely information to the police when they notice something suspicious in their surroundings. As a matter of fact, citizens should be readied to come forward to help in all situations and spot dangers lurking in any quarter of their lives and help us prevent disasters.**

and C41 color processors enable the photographers to process large quantities of film. These are used in the processing of large quantities of surveillance film submitted by the special agents from across the country. Photographic Hi-Tech

equipment to analyse the fake documentation are of great value in the present stamp markings and photocopies. The unit has been successful in the construction of damaged documents including shredded and burnt documents.

This unit also examines documents which may have erasures, rite over's or other types of alterations. Through different non destructive tests, and using EDXRF etc., they are able to ascertain the original information. ★

## INDIA'S PROGRESS IN FORENSIC SCIENCE LAUDED AT GLOBAL MEET

**D**r. Rukmani Krishnamurthy, noted Indian forensic scientist, along with her Indian colleague, Ms. Nisha Menon, recently attended BITs World Conference of Forensics -2011 held at Chongqing, China, where more than 200 leading forensic experts across the globe shared their knowledge.

Dr. Krishnamurthy finds International conferences, discussions, knowledge forums and think-tanks to be appropriate platforms where a lot of knowledge pertaining to innovative and informative technology can be grasped at a single go.

"The Conference provided excellent insight into the current status of forensic science and future applications in various disciplines. It gave an opportunity for forensic experts to share ideas and discuss issues that all our experts encounter during the investigation and analysis," she said.

The Conference also showcased the first hi-tech traffic patrolling unit controlled by women aged between 20-24yrs with highly advanced GPS, mobile detection software, safety kits etc.. There were highlights of foolproof traffic



controls and excellent management by the Municipal Public Security Bureau, Chongqing, which investigates, detects and counters all hi-tech national and international crimes of China.

The discussions with Dr. Henry Lee, the world's leading forensic scientist was quite enlightening. He also addressed the key note forum and came up with new technologies in crime scene management.

The other forensic experts present during the conference include Mr. Kent Gibson, Forensic Audio/ Video Examiner, Member of AES, USA; Dr. John Zheng Wang, Professor of Forensic Studies Program & Director of Forensic Science and

Hi-Tech Crime Programs  
Department of Criminal Justice,  
California, USA ,

Dr. Anders Persson, Associate Professor, Center for Medical Image Science and Visualization, CMIV, Linkoping University, Sweden, Dr.



Dr. Rukmani Krishnamurthy with Dr. Henry Lee, USA

Takashi Matsumoto, Professor, Waseda University, Japan – for Image-based Authentication Methods, Mr. Henrik Tjernberg, Chairman, Micro Systemation AB, Sweden - for Retrieving Evidence from Digital Mobile Devices, Dr. Stephen V. Flowerday, Professor, University of Fort Hare, South Africa - E-mail

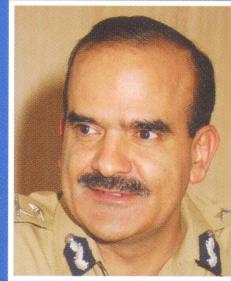
Authorship Attribution: A Discussion on Styliometry, Dr. Jurrien Bijhold, Physicist, Netherlands Forensic Institute, The Netherlands - Analysis of Video Footage from a large number of cameras, Mr. Christopher R. Westphal, Visual Analytics Inc., USA for Detecting Money Laundering Patterns.



Hi-tech traffic patrolling unit controlled by women

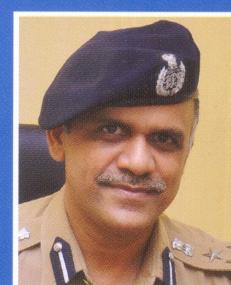


Highly advanced GPS, mobile detection software, safety kits etc. loaded in the patrolling vehicle



**Parambir Singh**  
Inspector General of Police  
- Konkan Range.

**"First and foremost, I believe that the police force needs to be treated with all the fairness on all issues and problems which uplift their morale. Priority should be given to settle their dues, be it salaries or any other dues, at the earliest and at best on time."**



**Sadanand Date**  
Inspector General of Police - Force I

**"26 /11 Night was the most Challenging. I Just did my Duty."**

The topic addressed by Dr. Rukmani Krishnamurthy “**Emerging Trends of Forensic Science in India to Counter National Level Crimes**” drew the participants’ attention to the recent forensic advancement in India in solving some of the very high profile cases. This not only highlighted the growth pattern of forensic in India but also created opportunities with leading forensic scientists for technology collaboration and knowledge sharing forums.

Recent advances in forensic technology are built on centuries of progress in the field; Forensics was born in the middle ages and matured with the growth of science and medicine in the 19th century.

**Some of the recent technological advances made in forensic science and presented during the conference include:**

DNA analysis which unlocks the mysteries of human identity, combining advances in miniaturization and microchip technologies with well-established techniques of forensic DNA analysis. The fusion of these technologies could revolutionize DNA typing. Until recently, DNA analysis had been used mostly in serious criminal cases such as murder, rape, terrorism or genocide. Since advances have streamlined DNA procedures and cut their cost, they are being used increasingly to investigate other offenses such as hit-and-run, burglary, robbery and white-collar crimes.

Advances also have been achieved in many other areas of forensic science, such as fingerprints. Technology also has improved in the ability to detect latent fingerprints, which are among the most valuable types of physical evidence in criminal investigations. There are

many chemical and physical methods for detecting and visualizing latent prints at a crime scene. Advance technology in instrumentation and illumination to enhance latent prints which includes argon laser, X-ray detection, vacuum coating and various light sources including the nanoparticles for Development and Analysis of Latent Fingermarks.

Data mining of databases, such as the Combined DNA Index System (CODIS) and the Automated Fingerprint Identification Systems (AFIS) is useful not only for criminal record but also for handling civilian record.

Video Analytics, Image enhancement technologies to read clues such as fingerprints, footprints and bite marks, Multi-modal Biometric systems and Psychological tools for both criminal and individual assessment in terms of behavior are some of the technologies which will find its way to India soon.

The concept of bringing new technologies into the legal system may be a cumbersome process and will take its own course of time. Therefore, to take this on a rapid pace, private organizations in the forensic field have sprung up which would not only provide services to the corporate and private sector but also extend its arms to assist the police and law enforcement agencies. Helik Advisory Ltd., a premier organization in allied and Forensic Science, the brain child of Dr. Krishnamurthy comes up with the same concept.

Her vision and dream was to bring forensic science and its application for the common man. She transferred her experience of over 35 years in the field of forensic science for the benefit of a common man for a crime free society. With that aim she has come up with Helik Advisory Ltd., the first private laboratory in the field of forensic

science with a team of qualified and experienced forensic experts in varied domains. The team under guidance of Dr. Krishnamurthy has come up with innovative technologies of mind-brain science, fingerprinting and biometric services, digital and cyber forensic which is not so developed in the country.



**Dr. Rukmani with Mr. Kent Gibson of USA.**



**Dr. Rukmani with forensic psychologists of Australia**



**Dr. Rukmani Krishnamurthy during her visit to IRS & FBI, Chicago, USA in May 2011**

### **The Future**

Relatively new discipline & advanced technology has increased credibility and steady acceptance by the courts. Additional benefits from continued cooperation between science and law enforcement are yet to come. To cater to high

