IEEE Biometrics Council

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Newsletter

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Highlights

- Interview with Secretary, TSE, Brazil
- Face Search using Meta-Recognition
- BIOSIG 2012
- EAB Awards

Privacy Impact Assessment Report on Biometrics Data

The Ministry of Business, Innovation, and Employment, New Zealand Government, has released a privacy impact assessment report on the collection and handling of biometrics data. This study has been conducted with the objective of ensuring best practices during the acquisition and handling of biometrics information that is principled and consistent with the privacy and immigration laws in the New Zealand, and international obligations and agreements. This assessment also reviews and summarizes various privacy risk mitigations procedures already in place while handling or acquiring biometrics, *i.e.*, face and fingerprint, data in a sensitive and culturally appropriate manner. This report identifies key biometrics related privacy risks and categorized them as governance, handling or security risk. Each of such risks have been identified with respect to existing policies and procedures, and accompanied by a set of recommendations to mitigate them. This report can be can be downloaded from the following web-link; http://www.immigration.govt.nz/NR/rdonlyres/

FTC Releases Best Face Recognition Practices

The Federal Trade Commission (FTC) of USA has released a report in October 2012 that recommends best set of practices for commercial entities that are using or plan to use face recognition technologies in their products or services. Increasing use of face recognition technologies for photo tagging on social networks, mobile phone applications, consumer engagements, video games and efforts to identify moods and/or emotions, has generated ethical, security and privacy related concerns. These set of developed guidelines are intended to promote privacy by design, meaningful choice, and transparency at early stage in a way to encourage innovation for the benefit of consumers while respecting their privacy. These guidelines synthesized after detailed discussion and comments, and are not intended to serve as a template for regulators or law-enforcement agencies. The application scenarios for the application of best practices are also detailed in the FTC report at this web-link http://www.ftc.gov/os/2012/10/121022facialtechrpt.pdf

Spotlight

Tribunal Superior Eleitoral (Supreme Electoral Court, or TSE) is the highest institution of Electoral Justice in Brazil. It has recently undertaken a project to *automatically verify about 190 million citizens' during the 2018 elections using their fingerprints*. During the recent municipal elections held in October 2012, 7.7 million voters in 299 municipalities, are believed to have used such fingerprint based electronic voting . While it would be a large-scale and challenging project to collect the fingerprints of all the citizens, the automated vote system could bring a huge benefit to Brazil.

Brazil is the largest country in South America, and the world's fifth largest country in terms of geographical area and population. It is a great problem when it comes to verifying every vote manually in the presidential election involving 190 millions of voters. Therefore an automated vote system using fingerprint to verify the voters is being introduced to simplify the voting process and *shorten* the time of counting votes. Results are usually available within hours, and it is highly accurate. This project proves that Brazil has emerged as a leader in deploying biometrics technologies for e-governance.

However, it is not easy to register all 190 millions of voters from a country with diverse cultures and regions. It will take a long time to educate the illiterates the use of biometric identification system in rural areas. Besides the difficulty in practice, there are security concerns about the biometric identification system and the storage of large amount of biometrical data. How does the TSE address this issue and respond to these concerns? What is the biggest challenge faced by the government in the project?

In this issue of newsletter, we have asked a few questions from Mr. Giuseppe Dutra Janino, Secretary of Information Technology at the *Tribunal Superior Eleitoral*. These questions have been answered in our spotlight section which appears on next two pages and bring new insights on this enormous project.

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Spotlight: Biometrics and Democratic Election

INTERVIEW QUESTION

Giuseppe Dutra Janino, Secretary
Tribunal Superior Eleitoral, Brazil

The on-going project to verify the identities of the190 million people in 2018 elections by their fingerprints is fine examples of how Brazil have emerged as a leader in deploying biometrics technologies for e-governance. There are open challenges concerning the security of biometric identification systems such as vulnerability to spoofing attacks, storage of templates, privacy, among other. Have there been attempts to address these issues or others? Have you detected security problems during the initial stages of this project?

The biometrics project of Electoral Justice (EJ) takes full advantage of all the expertise and security deployed for the security of the voter databases, the electoral process and the exchange of communications between the entities of EJ, namely electoral registries, regional courts and top court. This security has as main base in the use of user certificates, applications for the validation control and communication and data traffic on the internal corporate network. There were no security problems in the three stages of the project carried out between 2008, the pilot project until 2012 (end of the second stage).

The Brazilian machines for the biometric identification during elections register the vote directly but don't permit the voter to know what they have voted. Other countries adopt solutions with printed receipts or vouchers. Would you please help to summarize the reasons that led to this choice?

The impression of the vote it is a high-tech spending, with little or no practical use at the end of the voting process and the high possibility of occurrence of problems and may even force the exchange of electronic voting machine used.

1 - On election day, before starting the voting process, are choose a percentage of ballots that would go to polling stations, chosen at random with representatives of outside agencies, political parties, the Organization of Lawyers of Brazil, among others.

These polls will go through a process called "Parallel Voting" in which the above-mentioned representatives will hold a vote controlled, however, following a certain number of votes for each candidate, blank and null votes.

By the end of voting control, in which beforehand, we know the total number of votes each candidate received, is held the finalization of the vote, closed the urn and the report generated with the aggregation of votes. The total votes for each candidate must be the same in the report to ensure that voting no on the part of the electronic voting machine programs, changing the voting conducted by the voter.

2 - When the voter makes the choice of their candidate on the ballot the candidate's electronic information (photo, name, number and party) on the screen to confirm that the voter their vote. After finishing the vote the voter goes to the clerk and receive a voucher that attended and voted. For the Brazilian electoral legislation the vote is secret, it is forbidden that the voter has or receives a voucher indicating whom he voted. The impression of the vote it is only a printed ballot and stored in itself to, if necessary, subsequent recount of the section.

3 - At the end of polling day in the section is the completion of the work performed and the counting of votes the ballot. This aggregation is a report issued by the ballot box where they are very informed, among others, the total electorate, attendance, absentees, blank votes, null votes and total votes for each candidate. This report is issued in five copies, at least, and these routes are posted on the door of the section, delivered to representatives of political parties and follow along with the disk where files are stored voting for the central aggregation. It is worth noting that this report is printed before the data adhere to the totalizing center of the city or state.

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Spotlight: Biometrics and Democratic Election

Registering 190 millions of voters from highly diverse cultures and regions is a challenge that has not been done many times. Would you mind sharing some of the experience gained?

The Electoral Justice 100% computerized elections held since the year 2000. Our main difficulties do not concern the country's cultural diversity, but on its continental size. In this field we can highlight the main experiments using boats, helicopters and support of the Brazilian Army to the polls to reach more distant sites in the northern region, where a boat can take up to weeks to get to the voting machine to the most remote villages, and use of technology for data transmission by satellite so that data can be sent at the end of the day the vote allowing the same day, just hours after the end of voting time, we know the outcome of the vote for president in the whole Brazil.

In addition to the identification during the voting process, have you planned other applications regarding the biometric ID?

The design of biometric identification has several cooperation agreements. Among the main stand out:

Ministry of Justice - Issuance of registration document Civil Identification (BER) which is a unique document identification Brazilian citizen;

Caixa Economica Federal (CF) - The CEF is a joint stock company and the cooperation agreement provides for sharing of biometric information of the Brazilian electorate for the CEF can perform the validation of people who receive any type of financial assistance paid by the government through its agencies.

Ministry of Sport - Cooperation Agreement providing for the sharing of biometric information for identification of the Brazilian electorate of fans in world cup 2014.

The biometric technology employed in the vote systems is based on fingerprint. Many systems based on other human traits are commercially available such as iris, face, palmprint, among others. Did you consider other technologies at the time of the system choice?

The biometrics project of Elections is performed according to the standard of identity defined and used by the Brazilian Department of Public Safety. This cooperation has the main objective to promote partnership working between the institutions and economy of resources to a project jointly developed. Any other technology being considered or decided will be required to pass a joint analysis based on this agreement. We know from other technologies but at the moment there is no change or addition to considerations of technology.

Many of the technological advances come from laboratories in which conditions are well known and far away from real scenarios. What are the biggest unexpected challenges that your government has faced with the implementation of the biometric ID systems? Have you spotted an issue that should be improved by the scientific community?

The main question now identified for improvement is the more detailed verification of the quality of biometric information on the spot where it is collected.

Currently validating the quality of biometric collection at the site of collection is indicated only by a flag with three parameters: poor, average, good.

Upon submission of biometric identification for the central organs and responsible for processing and verifying uniqueness of the data can happen to a digital considered "good" in the collection have a score (more accurate parameter qualifier) not allow their use in processing.

Currently we are starting a cooperation agreement with a Brazilian university, the University of Brasilia, a project to develop studies and allowing this APPRAISAL of the score, in more details in the collection site.

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Meta-Recognition for Score-level Fusion

Walter J. Scheirer[1] and Terrance E. Boult[2]
[1]Harvard University, Cambridge, USA [2]Univeristy of Colorado, Colorado Springs, USA

The ability to combine score data from a variety of sources (different algorithms, classifiers, modalities and sensors) is desirable for challenging biometric recognition scenarios, where more information is an asset. Two common hurdles to score-level fusion are consistent normalization across different sources of scores and "failing data," which can unfairly bias the final recognition result. Meta-Recognition is a new approach for recognition score analysis with a basis in the statistical extreme value theory (EVT) [1] to specifically address these two problems.

By applying the appropriate EVT model, we can normalize scores in a theoretically grounded probabilistic manner [2], giving us an indication of whether or not a score is a correct match. The algorithm begins by fitting an EVT distribution to the tail of the non-match distribution. The sampling of the top-*n* scores from any recognition system that produces distance or similarity scores will always result in an EVT distribution, and is Weibull if the data are bounded. Applying the CDF of the Weibull model to a raw score after fitting generates normalized **w-scores**. This process applies to scores produced during biometric identification, as well as decision scores from binary SVMs.

An exciting application [3] of this approach exists in the emerging area of visual attributes for face retrieval. Visual attributes are semantically meaningful labels that are assigned by humans to describe parts of a face ("Blonde Hair," "Young," "Smiling," etc.). However, fusing multiple attribute scores – as required during multi-attribute queries or similarity searches – presents a significant challenge. Scores from different attribute classifiers cannot be combined in a simple way; the same score for different attributes generally means different things.

Figure 2: A Search for *Indian Females*.

For face retrieval with binary SVM classifiers, the use of weakly normalized or raw scores often leaves one or more attributes missing in the final result. This can be seen in Figure 2, where a search for "Indian Females" using a popular face attribute technique from the Computer Vision Laboratory at Columbia University yields images of just females - the selected ethnicity attribute is missing. Our w-score approach solves this problem through its probabilistic calibration of the scores across different attribute classifiers.

The w-score approach also enables a new way to search for faces based on similarity to a set of attributes from a specific person. By calibrating attribute distances in a local neighborhood around the normalized target attribute values, we can compute similarity in a consistent manner for any set of attributes and query images. Figure 3 shows an example of this, with a target face of interest on the top left, and similar faces with respect to the specified attributes on the bottom.

Figure 3: Target-based Attribute Search

This work has led to the creation of the world's largest face search engine [4], with nearly 2 million unique images. We encourage interested readers to download our software library [5], which provides interfaces to normalize scores from traditional biometric matching algorithms, as well as decision scores from SVMs.

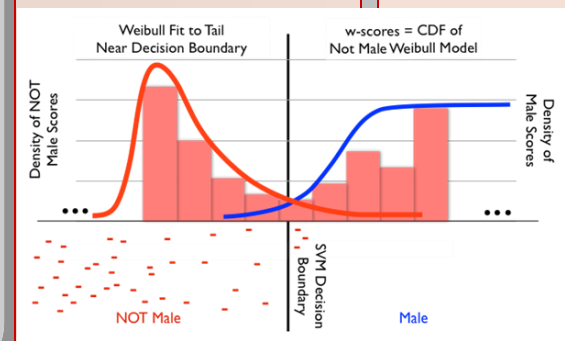

Figure 1: An overview of binary SVM w-score normalization.

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[1] W. Scheirer, A. Rocha, R. Micheals, and T. Boult, "Meta-Recognition: The Theory and Practice of Recognition Score Analysis," *IEEE T-PAMI*, 33(8): 1689-1695, Aug. 2011

[2] W. Scheirer, A. Rocha, R. Micheals, and T. Boult, "Robust Fusion: Extreme Value Theory for Recognition Score Normalization," *Proc. ECCV*, Sep. 2010

[3] W. Scheirer, N. Kumar, T. Boult and P. Belhumeur, "Multi-Attribute Spaces: Calibration for Attribute Fusion and Similarity Search," *Proc. CVPR*, Jun 2012

[4] http://mughunt.securics.com

[5] http://www.metarecognition.com

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BIOSIG 2012 Conference Report

The International Conference of the Biometrics Special Interest Group (BIOSIG) took place on September 6-7, 2012. It was held at the Fraunhofer Institute for Computer Graphics Research IGD in Darmstadt, Germany and attracted 111 participants from 21 countries.

The conference had rich and diverse programme that included scientific research results and intriguing perspectives on large-scale biometric applications like the European Union Visa Information System (VIS) and the Indian UID System. In an impressive keynote, Srikanth Nadhamuni, who is the head of technology with the Unique Identification Authority of India (UIDAI), presented the processes of the multi-biometric system that enables biometric de-duplication with low FPIR and FNIR. In addition he outlined the fingerprint based authentication for inclusion services that is expected to provide a digital identity to every Indian citizen.

Srikanth Nadhamuni delivering keynote talk on the progress of Indian UID System.

The second keynote talk was given jointly by Fares Rahmun (Bundesverwaltungsamt BVA) and Oliver Bausinger (Bundesamt für Sicherheit in der Informationstechnik BSI) about the VIS. They presented their first year experience with the application processes in EU member states embassies. Furthermore, Luuk Spreeuwers from University of Twente, presented his evaluation and results about automatic face recognition. He compiled his research from actual data that he recorded from the travellers at Schiphol Airport. Didier Meuwly (Netherlands Forensic Institute NFI) spoke about Forensic Biometrics and inspired the audience to link the two communities.

Poster presentation session during the conference.

In-house lunch break provided another opportunity for interaction among the BIOSIG participant.

Accepted conference contributions included 17 presentations and covered new modalities such as EEG biometrics or new methods such as a topology based approach to analyse fingerprints. The poster session with 19 papers was a good mix of research results from academic and industrial research labs. The social event on September 6 was organized as a late summer barbeque with lots of opportunities for networking.

A panel discussion about the services and benefits of the European Association for Biometrics (EAB) concluded the conference.

The 2012 BIOSIG conference was jointly organized by the Competence Center for Applied Security Technology (CAST) and the special interest group BIOSIG of the Gesellschaft für Informatik e.V. (GI). The conference was technically co-sponsored by IEEE and papers will be added to IEEE Xplore.

Next year the BIOSIG conference will take place on September 5 and 6, 2013 in Darmstadt, Germany.

A panel discussion during BIOSIG 2012.

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European Biometrics Research Award

The European Association for Biometrics (EAB) was founded in November 2011 as Non-profit association by European Stakeholders representing industry, governmental agencies and academia. Its goal is to the promote and beneficial use of biometrics in Europe and to provide a platform to exchange un-biased information on biometric technology and applications. Now with more than 70 members the EAB has established a persistent network for information sharing amongst governments, European institutions, vendors, end users, researchers and academia. It serves not only as a competence pool of experts in biometrics in Europe but also represents the community before high-ranking policy makers in the European Union. A number of events have been organized and co-organized by the EAB, since the associations operates as an umbrella for national Biometric Groups. Furthermore, EAB is home for special interest groups (e.g. Industry SIG, Operator SIG, Academia SIG) and hosts various technical committees (Training and Education (TEC), Evaluation and Testing (ETC), Ethics and Privacy (EPC)). One of the core objectives is to support research and innovation with the European Research and Industry Award.

The European Association for Biometrics awarded young researchers for their outstanding works in the area of biometrics on 5th September 2012 . A renowned jury chose 3 candidates out of a range submitted high quality papers to present their significant contribution in front of the jury, the EAB members and the public audience.

This year's finalist were:

- Christian Rathgeb from University of Salzburg with
  "*Towards enhancing security and accuracy of iris recognition systems*"
- Anindya Roy from Idiap Institute with
  "*A fast parts-based approach to speaker verification using boosted slice classifiers*"
- Daniel Hartung from Gjøvik University College with
  "*Template protected vascular patterns for secure online banking transactions*"

The 6th European Biometrics Research Award that was kindly sponsored with a prize of 2,000 € by GenKey Europe went to Christian Rathgeb from the University of Salzburg, Austria. The selection has been made on the basis of the academic and scientific quality of the submitted works as well as on the quality of their presentations. A separate selection was made during the final presentation in order to appoint the winner of the industry award. Criteria for this award, next to the scientific level are the novelty, impact, applicability and other business aspects. The European Biometrics Industry Award 2012 has been given to Anindya Roy from Idiap Institute (Switzerland) and was awarded by Safran Morpho with a prize of another 2,000 €.

The chairman of the jury, Prof. Patrizio Campisi from the University of Roma TRE (Italy), says about this year's competition: *"I am happy that again the jury had a choice out of a range of submissions of very high quality. This prestigious award, which is unique in its kind, stimulates innovation in high level research in biometrics both in academia and in industry. I am grateful to the members of the jury, who did an excellent job by spending their precious time to the selection process."*

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Winners of the 6th European Biometrics Research

The European Biometrics Research and Industry Award is granted annually to individuals who have been judged by a panel of internationally respected experts to be making a significant contribution to the field of biometrics research in Europe. The intention of the award is to stimulate innovation in academic research as well as in industry.

The international jury of this year's competition consisted of the following members: Prof. Christoph Busch, Gjøvik University College, Norway; Prof. Bernadette Dorizzi, Telecom SudParis, France; Prof. Mike Fairhurst, University of Kent, UK; Prof. Patrick Flynn, University of Notre Dame, USA; Jean Christophe Fondeur, Morpho, France; Prof. Anil Jain, Michigan State University, USA ; Dr. Tom Kevenaar, GenKey, The Netherlands; Prof. Josef Kittler, University of Surrey, UK; Prof. Arun Ross, West Virginia University, USA; Dr. Günter Schumacher, JRC, European Commission; Prof. Raymond Veldhuis, Twente University, The Netherlands. The call for submissions for the EAB Research and Industry Award 2013 will soon be available at http://www.eab.org

The history of the European Research and Industry Award: The first European Biometrics Research Award was announced in 2006. The EAB is continuing this tradition (Click the following table or zoom in for detail).

	Research Award	Industry Award
2006	Albert Ali Salah (Bogaziçi University, Turkey) "2D - 3D Facial Feature Localization with Mixtures of Factor Analyzers"	Julian Fierrez-Aguilar (University of Madrid, Spain) "Incorporating Biometric Quality in User-Dependent Multimodal Biometric Authentication"
2007	Krzysztof Kryszczuk (EPFL, Switzerland) "Improving biometrics verification with class-independent quality information"	Hervé Bredin (GET-ENST, France) "Making Talking-Face Authentication Robust to Deliberate Imposture"
2008	The award has been jointly awarded to : Savvas Argyropoulos (AUT, Greece) "Secure biometric authentication using distributed source coding" Hazim Kemal Ekenel (Universität Karlsruhe, Germany) "A Robust Face Recognition Algorithm for Real-World Biometric Identification"	Ileana Buhan (University of Twente, Netherlands) "Spontaneous Secure Pairing using Biometrics"
2009	Emile Kelkboom (University of Twente - Phillips Research, Netherlands) "Relating the Analytical Template Protection System Performance with the Theoretical Maximum Key Size Under Gaussian Assumption"	Haiyun Xu (University of Twente, Netherlands) "Complex Spectral Minutiae Representation For Fingerprint Recognition"
2010	Xuebing Zhou (Fraunhofer IGD, Germany) "Template Protection – Security and Privacy Assessment"	Budhaditya Goswami (University of Surrey, UK) "Speaker Authentication using Video Based Lip Information"
2012	Christian Rathgeb (University of Salzburg , Austria) "Towards enhancing security and accuracy of iris recognition systems"	Anindya Roy (Idiap, Switzerland) "A fast parts-based approach to speaker verification using boosted slice classifiers"

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IEEE Biometrics Council AdCom Meeting

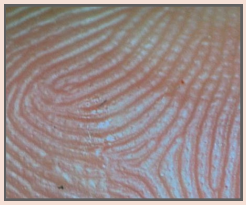
Participants during the *IEEE Biometrics Council AdCom* meeting on 23 September 2012, in Washington DC, USA.

The 2012 IEEE Biometrics Council Administrative Committee (AdCom) meeting was held on September 23, 2012, during BTAS 2012, in Washington DC. The attendees were Nalini Ratha, Rama Chellappa, Vin Piuri, Ioannis Kakadiaris, Patrick Flynn, Arun Ross, Ajay Kumar, Vijavakumar Bhagavatula, Sudeep Sarkar, Venu Govindaraju, Stephanie Shuckers, and Richard. The Region 10 Director, Vin Piuri, firstly welcomed the participants and presented an overview of IEEE activities. He appreciated the new efforts undertaken by the ExCom for the biometrics community and discussed the possibilities of undertaking new activities within the scope of IEEE organization. The VP Technical Activities briefed on the new four sub-committees with specific objectives. Each of these sub-committee is expected to prepare a proposal for the consideration of the BC by the end of the year. The Vice President Education detailed on the Distinguished Lecturer's Program (DLP). This program has been introduced with the objective of increasing awareness about topics relevant to Biometrics by creating a pool of speakers who are willing to speak in meetings hosted by IEEE Chapters and Sections. The DLP program currently features two distinguished lecturers: Prof. Kevin Bowyer, University of Notre Dame and Prof. Jim Wayman, San Jose State University.

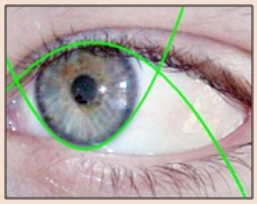
The VP Publications detailed the committee members on the progress of publication activities. He thanked and acknowledged the efforts of the new Editorial Board of in the Biometrics Compendium. The councils financial health was echoed from the budget summarized by the Vice President Finance. The Vice President Conferences summarized his efforts co-sponsor top conferences which have witnessed increasing participation from the biometrics community. The Editor-in-Chief of the Biometrics Compendium briefed on the policies and procedures established to ensure that rich contents generated by the Editorial Board members are timely delivered for IEEE *eXplore* access. The President also outlined the issues relating to biometrics compendium to be raised during the President's forum meeting to be held in November 2012. He also reviewed the plans for the upcoming TAS Society Review Committee Meeting and thanked the ExCom members for their contributions.

IEEE Biometrics Compendium

IEEE introduces its first virtual journal, The IEEE Biometrics Compendium … ..







- A collection of recently published IEEE Transactions and Conference papers
- Includes biometrics papers from *T-IFS*, *T-PAMI*, *T-IP*, *T-SMC* A/B/C, and more…
- Papers organized into face, fingerprint, iris, fusion, hand, spoofing and more…
- Value-added commentary from technology/area experts
- Produced by IEEE Biometrics Council, published quarterly
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Forthcoming Biometrics Conferences

International Conference on Automatic Face and Gesture Recognition
FG 2013, Shanghai, China, 22-26 April 2013
http://fg2013.cse.sc.edu/

The IEEE Conference on Automatic Face and Gesture Recognition (FG 2013) is the premier international forum for research in image and video based face, gesture, and body movement recognition.

International Conference on Biometrics
ICB 2013, Madrid, Spain, 4-7 June 2013
http://atvs.ii.uam.es/icb2013

The 6th IEEE/IAPR International Conference on Biometrics (ICB 2013) will have a broad scope and invites papers that advance biometrics technologies, sensor design, feature extraction and matching algorithms, analysis of security and privacy, and evaluation of social impact of biometrics technology. The deadline for ICB 2013 paper submission is December 15, 2012.

IEEE Workshop on the Applications of Computer Vision
WACV 2013, Clearwater Beach, FL, USA , 17-18 January 2013
http://cvl.cse.sc.edu/wacv2013

The IEEE Workshop on the Applications of Computer Vision (WACV) 2013 will be held 17-18 January 2013 in Clearwater Beach, Florida, USA. Online registration is now available from the following link: http://www.cvent.com/d/8cqs85

IEEE International Conference on Technologies for Homeland Security
HST' 12, Walthma, MA, USA, 13-15 Nov 2012
http://ieee-hst.org/

The twelfth annual IEEE Conference on Technologies for Homeland Security (HST '12), will be held 13-15 November 2012 in Massachusetts. HST'12 brings together innovators from leading universities, research laboratories, Homeland Security Centers of Excellence, small businesses, system integrators and the end user community and provides a forum to discuss ideas, concepts and experimental results.

IEEE International Workshop on Information Forensics and Security
WIFS'12, Tenerife, Spain, 2-5 Dec, 2012
http://www.wifs12.org

The IEEE International Workshop on Information Forensics and Security (WIFS) is the primary annual event organized by the IEEE's Information Forensics and Security Technical Committee (IEEE IFS TC). The scope of WIFS is broader than that of other more specific conferences, and it represents the most prominent venue for researchers to exchange ideas and identify potential areas of collaboration.

Please visit IEEE biometrics council website for more details on council activities. We welcome all your comments/suggestions and our mailing address is: Ajay.Kumar@inet.polyu.edu.hk

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