Contents

COMMITEE’S GREETING........................................................................................................... 7

1

AUTHENTICATION......................................................................................................................... 9
1-1 Detecting Butt-Spliced Edits in Forensic Digital Audio Recordings........................................... 11
Alan J. Cooper, Metropolitan Police Digital & Electronics Forensic Service, London, UK
1-2 Visualization of Magnetic Features on Analogue Audiotapes Is Still an Important Task........ 22
Dagmar Boss, Bayerisches Landeskriminalamt, Munich, Germany
1-3 Statistical Tools for Multimedia Forensics................................................................................. 27
Catalin Grigoras, National Center for Media Forensics, University of Colorado, Denver, CO, USA

2

SPEECH AND FORENSICS—VOICE IDENTIFICATION.......................................................... 33
2-1 Digitally Disguised Voices........................................................................................................ 35
Eddy B. Brixen, EBB-consult, Smørø, Denmark
2-2 Characterizing Formant Tracks in Viennese Diphthongs for Forensic Speaker Comparison................................................................................................................................. 47
Ewald Enzinger, Acoustics Research Institute, Austrian Academy of Sciences, Vienna, Austria
2-3 Channel Compensation for Forensic Speaker Identification Using Inverse Processing........ 53
Andrey Barinov, Sergey Koval, Pavel Ignatov, and Mikhail Stolbov, Speech Technology Center Ltd. (STC), Saint Petersburg, Russia
2-4 Importance of the Relative Delay of Glottal Source Harmonics............................................. 59
Ricardo Sousa and Aníbal Ferreira, University of Porto, Porto, Portugal

W

WORKSHOP 1

Frontiers of Forensic Audio Investigation
Chair: Gordon Reid, CEDAR Audio Ltd., UK; Panelists: Anil Alexander, Griff Comm Ltd., Oxford, UK; Alan French, FTS, UK; Phil Manchester, West Midlands Police, UK

Session 1: Phil Manchester, “Critical Listening and Region Specific Filtering”
Session 2: Anil Alexander, “Audio Windowing: Finding Whom or What You Want to Hear from a Recording”
Session 3: Alan French, “Time, Tide, and Technological Changes Wait for No Person”
Session 4: Phil Manchester, “It Can All Go Wrong, Even After Successful Speech Enhancement”

T

TUTORIAL 1.................................................................................................................................... 71

Forensic Comparison of Audio Recordings in the Same Framework as Is Standard for Forensic Comparison of DNA Profiles (Morrison book excerpt)........................................ 73
Geoffrey Stewart Morrison, School of Language Studies, Australian National
This tutorial provides an introduction to the forensic comparison of audio recordings in the likelihood-ratio framework. Examples are drawn from audio recordings of human voices, but the principles and techniques can be applied to audio recordings of any source. The tutorial covers the topics essential for an understanding of the likelihood-ratio framework and its application to the forensic comparison of audio recordings including: What is a forensic likelihood ratio? Why is the likelihood-ratio framework the logically correct way to evaluate forensic evidence? How is a forensic likelihood ratio calculated? How is the validity and reliability of the likelihood-ratio output of a forensic-comparison system evaluated? What factors affect the validity and reliability of a forensic-comparison system and how might validity and reliability be improved?
This session will emphasize some of the latest developments in forensic authentication of digital recordings, such as Electric Network Frequency (ENF) and lossy compression analysis. It will also present the most common source of errors, the present technological limits, and the need for quality assurance. The presentation will be interactive, in a lecture-discussion format with images, case studies, and relevant research results.

TUTORIAL 2

SWGDE and Forensic Audio Standards
Presenters: Daid Hallimore, Houston Police Department, Houston, TX, USA, Scientific Working Group for Digital Evidence, USA; Michael Piper, U.S. Secret Service, Washington, D.C., USA, Scientific Working Group for Digital Evidence, USA; John Powell, Los Angeles Sheriff’s Department, CA, USA, Scientific Working Group for Digital Evidence, USA

The Scientific Working Group on Digital Evidence (SWGDE) recently published a position paper on the U.S. National Research Council’s February 18, 2009 report to Congress entitled “Strengthening Forensic Science in the United States: A Path Forward” in which the Council set forth a broad overview of the state of forensic science in the United States along with several recommendations for improvement. An overview of The Report, SWGDE’s response, and its Audio Committee’s current projects will be presented. In each of the topics we intend to touch on (forensic audio best practices, minimum standards, accreditation/certification, training, ENF, etc.), there will be many points suitable for audience input and discussion. One of the key purposes of this presentation is to solicit input from the forensic audio community for the work we are undertaking at SWGDE.
Contents continued

8-2  Objective Speech Intelligibility Measures Based on Speech Transmission Index for Forensic Applications
     Giovanni Costantini, University of Rome Tor Vergata, Rome, Italy, Institute of Acoustics O. M. Corbino, Rome, Italy; Andrea Paoloni, Fondazione Ugo Bordoni, Rome, Italy; Massimiliano Todisco, University of Rome Tor Vergata, Rome, Italy

8-3  Measuring the Effect of Noise Reduction on Listening Effort
     Mark Huckvale and Deizom Frasi, University College London, London, UK

8-4  Practical and Affordable Intelligibility Testing for Engineers and Algorithm Developers
     Ken Worrall and Rob Fellows, Her Majesty’s Government Communications Centre, UK

AUTHORS’ INDEX: ........................................................................................................ 203