University of Colorado Denver

National Center for Media Forensics
College of Arts & Media

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Audio Authentication for Forensic Casework (AA1)

Course Description: Students will explore techniques to address challenges in the authentication of digital audio with regard to evidence admissibility and counterfeit detection. Foundations for forensic audio authentication, digital recording techniques, audio formats, and time domain analyses will be discussed. Students will complete hands-on exercises using real audio examples and forensic casework.

Previous experience/formal training with digital evidence is recommended.

*Please note that some of the methods and software discussed and presented may only be available for demonstration purposes and/or to law enforcement agencies.

Course Outcomes:

KNOWLEDGE
Students will:
- Gain new perspectives to understand:
    - The latest forensic audio authentication techniques.
    - Advanced principles of forensic audio authentication.
    - Forensic techniques, emerging science, and limitations of the forensic expert.
    - Digital evidence seizure and acquisition.
- Acquire knowledge that either enhances or is not covered in scientific literature.

SKILLS
Students will:
- Take entrance and exit exams to gauge course's effectiveness while informing student regarding the advancement of their knowledge.
- Understand the questions that a forensic expert can answer.
- Know how to manipulate digital evidence and apply advanced techniques for forensic audio authentication.
- Demonstrate a familiarity with general topics related to forensic audio.

DISPOSITIONS
Students will:
- Gain an appreciation for advanced issues in forensic audio.
- Be able to critically evaluate different forensic audio equipment, software, and methods.
- Enhance awareness of needs and opportunities in the field of forensic audio.

Course Schedule:

1. Foundations for Forensic Audio Authentication
    1.1. Digital Recording Techniques
    1.2. WAV Format
    1.3. Lossy Compression Formats
2. Theory, Demonstration, and Practice
    2.1. Digital Evidence Seizure and Acquisition
        2.1.1. Structure and Format Analysis
        2.1.2. Time Domain Analysis
            2.1.2.1. Zero Level Padding
            2.1.2.2. Direct Current (DC)
            2.1.2.3. Power
            2.1.2.4. Butt-Splice Detection
            2.1.2.5. Stereo Phase Analysis
        2.1.3. Frequency Domain Analysis
            2.2.3.1. Long Term Spectrum Analysis (LTAS)
            2.2.3.2. Modified Discrete Cosine Transform (MDCT) Analysis
        2.1.4. Other Analysis
            2.2.4.1. Electric Network Frequency (ENF)
            2.2.4.2. Copy-Insert (Clone) Detection