University of Colorado Denver

National Center for Media Forensics
College of Arts & Media

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Forensic Analysis and Authentication of Digital Audio

Course Description: Students explore techniques to address challenges in the authentication of digital audio with regard to evidence admissibility and counterfeit detection. Digital data analysis, compression level analysis, and ENF collection and comparison will be discussed.

*Please note that some of the methods and software discussed and presented may only be available 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.
  - 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.
- Practice audio authentication procedures.
- Work with digital evidence.
- 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
    2.2. Forensic Audio Authentication
        2.2.1. Structure and Format Analysis
        2.2.2. Time Domain Analysis
            2.2.2.1. Zero Levels
            2.2.2.2. DC
            2.2.2.3. Power
            2.2.2.4. Butt-Splice
        2.2.3. Frequency Domain Analysis
            2.2.3.1. Spectrum
            2.2.3.2. Long-Term Average Spectrum
            2.2.3.3. Compression Level
            2.2.3.4. MDCT
        2.2.4. ENF Analysis