

Topics in Security: Forensic Signal Analysis

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<http://www.cl.cam.ac.uk/teaching/1011/R08/>

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**Introductory examples:
manipulation of photographs**

Fact or fiction?



Hans D. Baumann, DOCMA

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Real



Hans D. Baumann, DOCMA

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or fantasy



Hans D. Baumann, DOCMA

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Political photos may suddenly lack past company ...



Stalin, 1930

<http://www.cs.dartmouth.edu/farid/research/digitaltampering/>

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... unreliable government hardware ...



Iranian missile test, July 2008

<http://www.cs.dartmouth.edu/farid/research/digitaltampering/>

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... or even body parts.



President Nicolas Sarkozy. *Paris Match*, August 2007

<http://www.cs.dartmouth.edu/farid/research/digitaltampering/> ... with many more

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Forensic Signal Analysis

This course looks at the use of digital signal processing techniques in a security context, to uncover hidden information from image, video, audio, electromagnetic, etc. signals, in particular to

- identify manipulation;
- identify/verify processing history;
- identify/verify type or instance of the acquiring sensor;
- eavesdrop on persons or computer systems;
- communicate covertly (steganography).

This is a “reading class”, i.e. the “lecture notes” are selected recent original research publications and the material is mostly presented by the students.

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Prerequisites

A background in digital signal processing, image processing, linear algebra, probability, statistics, data compression, communication technology (modulation and detection) will be useful.

Some background reading beyond the presented papers will be helpful, in particular on

- Fourier transform, linear time-invariant systems, filters
<http://www.cl.cam.ac.uk/teaching/0809/DSP/>
- Discrete Cosine Transform, JPEG, MPEG
<http://www.w3.org/Graphics/JPEG/itu-t81.pdf>
Pennebaker, Mitchell: JPEG still image data compression standard. (Moore Library)
- Digital photography
CCD/CMOS sensors, Bayer pattern and interpolation, “raw” formats, noise reduction algorithms, . . .

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