Remote Sensing for environment monitoring and surveillance applications

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Remote sensing

- **Remote sensing** is the acquisition of information about an object or phenomenon without making physical contact with the object. Connection with surveillance applications is straightforward.

- Geology
- Water quality
- Vegetation monitoring
- Archeology
- Land use
- Material and target detection
Integrated systems

- Recently remote sensing has evolved moving towards more complex systems made up by the integration of complementary sensors. The monitored scene is sensed with different sensors in order to get:
  - Detailed spatial information;
  - Accurate spectral information;
  - Optical properties in different spectral regions;

Platforms are equipped with GPS/INS instrumentation allowing accurate direct georeferencing:
  - 3D structures from multiple images
  - Context analysis;
  - Multitemporal analysis.
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Spatial dimension (across the flight line swath)
Spectral dimension
Reflectance
Wavelength [μm]
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Now focus is on integrated systems

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Integrated systems

- Multitemporal analysis.

Knowledge Acceleration and ICT

Pisa, 20 Settembre 2013
Integrated systems

- Multitemporal analysis.
Our expertise

- Complex systems demand new signal processing capabilities to automatically handle the huge amount of data and drive the operator to what is really of concern for the application of interest.

  - Preprocessing: redundancy reduction, filtering, noise estimation etc.
  - Spatial analysis (shape, length, width, orientation, etc.)
  - Spectral analysis (finding spectral anomalies, detecting a specific material, etc.)
  - Algorithms to build geometry from multiple images (e.g. 3D image reconstruction from the displacement map).
  - Accurate georeferencing and coregistration.
  - Detection and classification of changes in multitemporal images.
The RS&IP Group

Permanent staff
- Prof. G. Corsini
- Prof. M. Diani
- Dr. Ing. N. Acito

Post-Doc Researchers and contractors
- Dr. A. Rossi
- Dr. S. Matteoli
- Ing. A. Zingoni

+ PHD and master thesis students

Facilities
- Image processing laboratory
  WS, SW for image processing, acquisition devices, GPGPU, DSP.
- Remote Sensing laboratory
  WS, SW Remote sensing, analysis tools.

Projects funded by or in cooperation with:
- Italian Space Agency (ASI)
- European Institutions (ONERA, TNO, RMA, FFI, FGAN etc.)
- MIUR
- Tuscany Region
- SELEX
- Local companies (IDS, FlyBy, etc.)