

RADAR AND REMOTE SENSING LABORATORY

1. KEY INDICATORS

CFU/ECTS: 6

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2. OBJECTIVE OF THE COURSE

The basic principles are presented for: (i) computer simulation of typical operational scenarios for remote sensing systems operation, (ii) computer and/or real-time hardware implementation of the main radar signal processing techniques.

3. ACQUIRED ABILITIES

At the end of the course the student has the knowledge required for the simulation and the implementation of the signal processing portion of the receiving chain for various radar remote sensing systems that can be used for preliminary systems design and/or performance analysis.

4. PROGRAM

The basic concepts related to the operation of the pulse radar system and its measurements are briefly summarized.

Computer exercises are using the Matlab software, with reference to:

- generation of white or colored disturbance, with related first and second order statistical analysis;
- single pulse radar detection for non-fluctuating target, against a disturbance with power level known or estimated from the data (CFAR - Constant False Alarm Rate technique), together with the corresponding Monte-Carlo simulation techniques;
- radar detection based on N radar pulses using coherent integration (filter bank integrator) and incoherent (moving window integrator) for non-fluctuating target against Gaussian disturbance with the corresponding Monte-Carlo simulation techniques;
- radar detection for fluctuating targets;
- radar detection against clutter: cancellation techniques, Improvement Factor evaluation, and MTD scheme performance evaluation;
- generation of chirp waveforms with the corresponding spectral analysis and compression filters;
- elements of non-Gaussian clutter statistics.

Hardware solutions for the real-time radar signal processing are introduced. Implementation exercises are presented for some of the above mentioned techniques in real time mode of operation.

5. REFERENCES

Additional material available on the website [http://infocom.uniroma1.it / ~pier / PASTINA / LAB_TLR / index.htm](http://infocom.uniroma1.it/~pier/PASTINA/LAB_TLR/index.htm)

6. COURSE WEBSITE

http://infocom.uniroma1.it/~pier/PASTINA/LAB_TLR/index.htm