PROGETTO CARIPLO
"AZIONI DI INTERNAZIONALIZZAZIONE PER IL POST-LAUREA NELL'AMBITO DELLE TECNOLOGIE DELL'ICT E BIOMEDICHE"

fondazione cariplo

SHORT COURSE ON
"PARALLEL PROCESSING FOR REMOTE SENSING AND MEDICAL IMAGING APPLICATIONS"

October 2010 – Department of Electronics, University of Pavia

INSTRUCTOR

Antonio J. Plaza
Hyperspectral Computing Laboratory
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COURSE OUTLINE

This course will cover recent advances in parallel processing for two different types of image analysis applications: 1) remotely sensed hyperspectral image processing, in which an Earth Observation (EO) sensor provides high-dimensional imagery with very high resolution in the spatial and spectral domains, and 2) magnetic resonance imaging, one of the most important steps in computer-aided surgery and diagnosis. Given the background of the instructor, most of the examples illustrated in the course will be focused on remote sensing applications, although medical imaging will also be addressed. Particular attention will be given to the analysis of remote sensing applications with real-time constraints, such as monitoring wildfires, oil spills and other types of chemical contamination using remotely sensed imagery. The course will cover not only methodological developments for image processing and analysis, but also efficient implementations using different types of parallel processing techniques and architectures, including cluster computers, heterogeneous networks of workstations, and specialized hardware devices such as field programmable gate arrays (FPGAs) and commodity graphics processing units (GPUs). The course will include algorithm demonstrations in software as well as practical sessions including utilization of image processing algorithms and high performance computing infrastructure.

CONTENTS

1. Introduction to remote sensing and medical imaging applications
- 1.1. Remote sensing image processing: algorithms and challenges
- 1.2. Medical image processing: algorithms and challenges

2. Parallel processing in remote sensing and medical imaging applications
- 2.1. Data partitioning strategies
- 2.2. Parallel processing using clusters of computers
- 2.3. Parallel processing on heterogeneous networks of computers
- 2.4. Parallel processing on specialized hardware devices
  - 2.4.1. Field programmable gate arrays (FPGAs)
  - 2.4.2. Graphics processing units (GPUs)
- 2.5. Other parallel processing strategies

3. Application case study: hyperspectral remote sensing processing example
- 3.1. Parallel processing of a hyperspectral image using a Beowulf cluster
- 3.2. Parallel processing of a hyperspectral image using specialized hardware

4. Summary, taxonomy of presented techniques and future directions

5. Test and evaluation

COURSE SCHEDULE

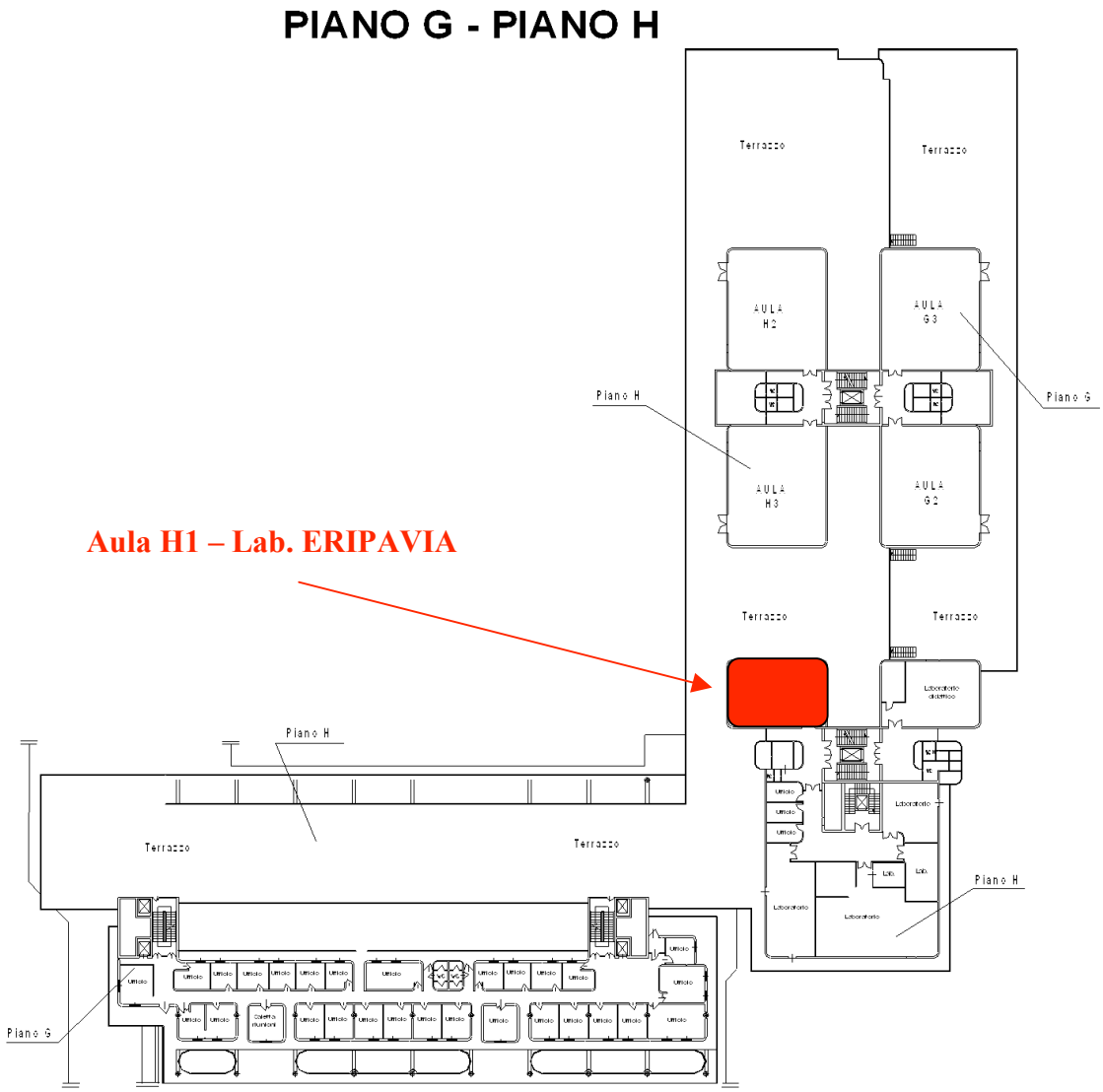
Day	Time	Location
October 4	10.00 – 13.00	Aula H1 (Lab. ERIPAVIA)
October 5	10.00 – 13.00	Aula H1 (Lab. ERIPAVIA)
October 7	10.00 – 13.00	Aula H1 (Lab. ERIPAVIA)
October 7	14.00 – 17.00	Aula H1 (Lab. ERIPAVIA)
October 8	10.00 – 13.00	Aula H1 (Lab. ERIPAVIA)

Day	Time	Location
October 11	10.00 – 13.00	Aula H1 (Lab. ERIPAVIA)
October 12	10.00 – 13.00	Aula H1 (Lab. ERIPAVIA)
October 14	10.00 – 13.00	Aula H1 (Lab. ERIPAVIA)
October 14	14.00 – 17.00	Aula H1 (Lab. ERIPAVIA)
October 15	10.00 – 13.00	Aula H1 (Lab. ERIPAVIA)

The final test will be held in the last week on October and will be agreed with the instructor

To reach the Department of Electronics, please look at the following web page: http://www-3.unipv.it/ingegneria/organizzazione/dove.php

Aula H1 is located on the “H” floor (see plan in next page)



CONTACT INFO

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