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ELG 5121 / CSI7631

Multimedia Communications

Université d'Ottawa | University of Ottawa

uOttawa.ca
www.mcrlab.uottawa.ca

Introduction, applications, standards. Networking technologies. Image, video and audio compression. Quality of Service and resource management. Scheduling issues for real-time MM transport. Multimedia synchronization. Multimedia and the Internet. Multimedia conferencing. Multimedia to the home. Advanced Media: Virtual Reality.

Course Description

- Lecture Schedule
  - Thursday: 19:00am – 22:00pm
  - Room: FSS 1007

Lecture

- Website
  - http://www.site.uottawa.ca/~elsaddik/abedweb/teaching/elg5121.html
  - Students are required to check the course website frequently

- Textbook
  - There is no assigned textbook
  - Various web sites are suggested on the course web site.

Website and Textbook

- Paper Essays and/or Ad-hoc Quizzes (50%)
  ◦ A) Ad-hoc Quizzes covering all the classes so far
    ▪ Max 1 quiz can be missed
  ◦ B) Essays: Every student must send me max 10 slides covering the essay and about 1000 words short report.

- Project (50%)
  ◦ Presentation and Project Demo and code/HW explanation (40%)
  ◦ Project documentation :Technical report including formal design methodologies and implementation details (10%)

Tentative Workload and Evaluation

- Oct. 20 - Projects deliverables deadline (11:59pm)

  ◦ Submission of final project, demo and presentation materials
  ◦ Every group has a max of 12 minutes to present
  ◦ Submission of final documentations

- Presentations will start Oct. 24

- Essays and Quizzes are given at any class through out the semester

  ◦ Essays' deadline is the subsequent Monday 11:59 pm

*Late submissions are NOT accepted. No exceptions!

Important Dates

- At the end of the course YOU will be able to:
  - have an excellent understanding of multimedia enabling
    - technologies
    - services and
    - applications
  - master basic Networking concepts and protocols
  - Understand how Multimedia and Networking (Communications) play together

Objectives of the course

- Introduction to Multimedia Applications and Standards

- Digital Image, Video and Audio Compression

  (Compression needs in Multimedia, Video services, bandwidth and storage needs, Source Coding and Entropy Coding, Image and video coding standards, JPEG, MPEG, H.263, JPEG 2000)

- Networking Technology for Multimedia

  (Local Area Networks (LAN) Internetworking, Wide Area Networks (WAN), Wireless WANs, Wireless LANs, Wireless Personal Area Networks)

- Multimedia to the Home

  (Access Technologies: Telephone, DSL, Cable, Wireless cable)

- Multimedia and the Internet

  (OSI reference model, Internet Protocols: TCP, UDP, IP, IPv6, Unicast, Broadcast, Multicast, Protocol requirements for multimedia, RSVP, RTP, Internet telephony, The World Wide Web, WWW Architecture and HTTP, Hypertext and Hypermedia: (SGML, HTML, XML, DHTML, WAP, etc.)

- Multimedia Synchronization

  (Basic synchronization concepts and methods, Synchronization Quality of Service (QoS) Parameters, Multimedia synchronization reference model , Synchronized Multimedia Integration Language (SMIL))

Course Contents -1-

- Quality of Service (QoS) and Resource Management for Multimedia

  (QoS: model, description, parameters, negotiation, QoS Negotiation in the ST-II protocol, QoS and IP: Integrated Services (IntServ), Resource Reservation Protocol (RSVP), QoS and IP: Differentiated Services (DiffServ), Resource management: connections, scaling, reservation, monitoring, etc, Rate-control and scheduling algorithms, End-to-end error control)

- Scheduling Issues for Real-Time Multimedia Transport

  (Real-time and multimedia applications, Real-time processing requirements, Real-time CPU scheduling algorithms: EDF, Rate Monotonic, and Diskscheduling algorithms)

- Multimedia conferencing and collaboration tools

  (Conferencing standards, Conferencing market evolution, Conferencing systems, Tele-collaboration tools)

- Multimedia Security

  (Internet Security, Secure Sockets Layer, SHTTP, IPSec,SSL, Attacks on e-security, Digital Watermarking for Multimedia, Classification of watermarks, Image, video, audio and text watermarking techniques)

- Advanced Media: Virtual Reality

  (Virtual Reality Modeling Language (VRML), Java3D, Distributed Virtual Environments, Applications in industrial training, e-commerce, tele-collaboration)

Course Contents -2-

- Learning method   % Retention

- What you read   10%
- What you hear   26%
- What you see   30%
- What you see and hear   50%
- What you SPEAK   70%

Don't be Shy!

J.E. Stice, Engineering Education, pp. 291-296, 1987

Harsh Reality

Most 'First Class' students get technical seats, some become Doctors and some Engineers

The 'Second Class' passed, pass MBA, become Administrators and control the 'First Class'

The 'Third Class' passed, enter politics and become Ministers and control both

Last, but not the least, The 'Failures' join the underworld and control all the above

Possible Projects

- Virtual game based on accerleration conditions and kinect : the aim of this project is to reflect a person movement to the avatar in a virtual environment game.
  - objective: map sensory data to a virtual environment using an accelerometer and Kinect camera.

- Avatar detection game based on kinect camera. In a home environment, we want to detect who is in within some room boundries and try to detect individual movement inside the room.
  - Objective: person detection using skeleton shape provided by Kinect camera.

Possible Projects

- Android/iPhone platforms to design and develop:
  ◦ Gaming and entertainment
  ◦ Health care (fall detection, face recognition, etc)
  ◦ Edutainment

- Design and develop a mobile multimedia learning application on the Android/iOS
  ◦ Physics, Math, Science, etc.

Mobile Learning

- Post-Stroke Hand Rehabilitation using Kinect with Haptic feedback.
    - Nowadays, millions of peoples around the world are under rehabilitation programs. Virtual and augmented reality have been introduced as a promising assistive tool to support patients to continue their training by themselves. The purpose of this project is to develop an intelligent low cost rehabilitation gaming system by using Microsoft Kinect sensor with haptic feedback. The game is a goal oriented exercise that target the rehabilitation of patients with chronic pain of the arm.

MCRLab - MH

- Virtual Writing on Board using Kinect
  - Imagine that you can draw and write on a virtual board using only hand gestures. The Kinect Virtual Board gives users the ability to write information and draw shapes via the Kinect's sensor. By developing such application, you can see goodbye to writing boards, chokes, and board's pens.

MCRLab - MH

- Gender recognition using Kinect Skeleton Tracking.
  - In this project we will use the kinect skeleton tracking system in order to measure the static parameters of the person and determine the its gender depending on these parameters. More in this will come later.

MCRLab - MH

- Kinect Puzzle Game
  - The kinect camera takes a photo of the user and then shuffles it. The user has to put all the pieces together in their right places in order to get his/her complete picture again. The game is intended for the people that have had a stroke and they have troubles with their cognition abilities. Also, more on this will come later.

MCRLab - MH

- Design and development of intelligent interfaces
  - Smart mirror
  - Smart clothes
  - Smart chairs
  - Smart home appliances
  - Smart power/energy consumptions
  - Smart car
  - Smart GPS
  - Smart Planet
  - Interactive video message
  - Gait recognition
  - Etc…..

Other Ideas

Thank You!

Ευχαριστώ

ขอบคุณ

Vielen Dank

Merci

DMnvwd

Teşekkürler

شكراً

متشكرم

Gracias

Grazie

Bedankt

Dankie

THANK YOU

Köszönettel

Hvala

Obrigado!

Díky

謝 謝

Asante

شكريا

GADDA GUEY

WAD MAHAD
SAN TAHAY

감사합니다

Urakoze

CANADA

UN EXCELLENT PÔLE DE RECHERCHE
A COOL PLACE TO DO RESEARCH