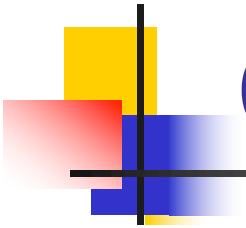
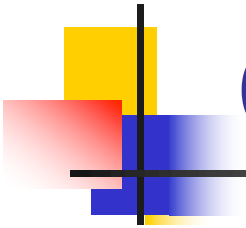
Introduction

Course Information



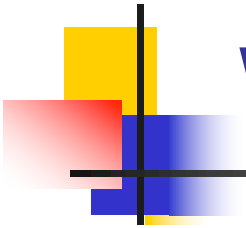
Course information

- Prof. Dr. Suat Özdemir
  - New in the department, has 20 years of teaching and research experience
  - https://web.cs.hacettepe.edu.tr/~ozdemir/
  - https://www.linkedin.com/in/suat-ozdemir-308764b/
  - https://twitter.com/_suatozdemir
- Course web page
  - Main info, static, everything will be posted on Piazza
  - https://web.cs.hacettepe.edu.tr/~ozdemir/teaching/wmn/
- Piazza
  - piazza.com/hacettepe.edu.tr/fall2020/bbm458/home



Course information

- There will be HWs (both written and programming), quizes, midterms and a final.
- Grading on the web (tentative due to Covid-19)
- What are we going to learn
  - The basic fundementals of wireless communicaiton
  - Details of several wireless technologies



What about BBM460?

- Online?
- We will try to make it fun
- Still in progress
- There will be One Big Fun Project involving implementing one or more wireless Technologies
  - Will need 1-2 Raspberry PI or similar single board computer and its communication module(s)
  - Implement something usefull

Introduction

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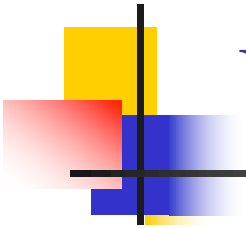
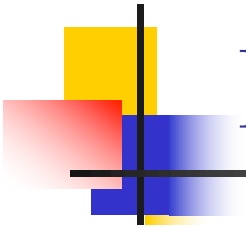


Wireless Comes of Age

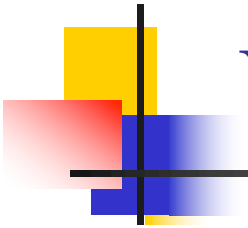
- Guglielmo Marconi invented the wireless telegraph in 1896
  - Communication by encoding alphanumeric characters in analog signal
  - Sent telegraphic signals across the Atlantic Ocean
- Communications satellites launched in 1960s
- Advances in wireless technology
  - Radio, television, mobile telephone, communication satellites
- More recently
  - Satellite communications, wireless networking, cellular technology



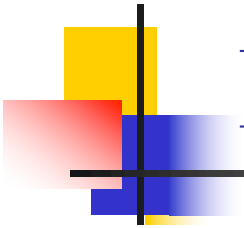
Broadband Wireless Technology

- Higher data rates obtainable with broadband wireless technology
  - Graphics, video, audio
- Shares same advantages of all wireless services: convenience and reduced cost
  - Service can be deployed faster than fixed service
  - No cost of cable plant
  - Service is mobile, deployed almost anywhere

Limitations and Difficulties of Wireless Technologies



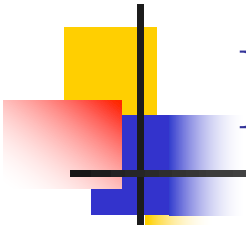
- Wireless is convenient and less expensive
- Limitations and political and technical difficulties inhibit wireless technologies
- Lack of an industry-wide standard
- Device limitations
  - E.g., small LCD on a mobile telephone can only displaying a few lines of text



Part One: Background

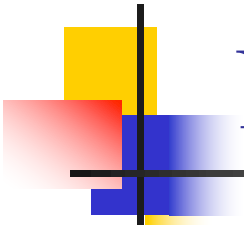
- Provides preview and context for rest of book
- Covers basic topics
  - Data Communications
  - TCP/IP

Chapter 2: Transmission Fundamentals



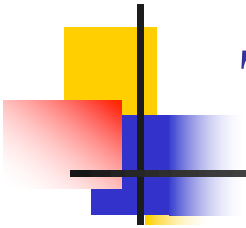
- Basic overview of transmission topics
- Data communications concepts
  - Includes techniques of analog and digital data transmission
- Channel capacity
- Transmission media
- Multiplexing

Chapter 3: Communication Networks



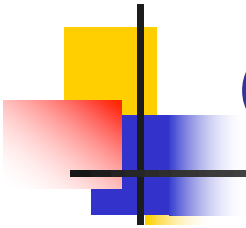
- Comparison of basic communication network technologies
  - Circuit switching
  - Packet switching
  - Frame relay
  - ATM

Chapter 4: Protocols and the TCP/IP Protocol Suite

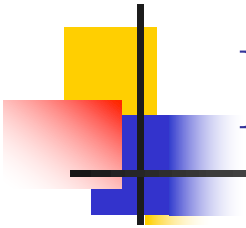


- Protocol architecture
- Overview of TCP/IP
- Open systems interconnection (OSI) reference model
- Internetworking

Part Two: Wireless Communication Technology



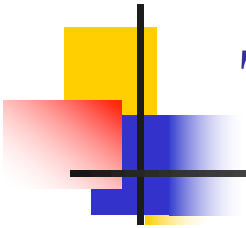
- Underlying technology of wireless transmission
- Encoding of analog and digital data for wireless transmission



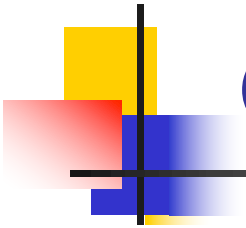
Chapter 5: Antennas and Propagation

- Principles of radio and microwave
  - Antenna performance
  - Wireless transmission modes
  - Fading

Chapter 6: Signal Encoding Techniques



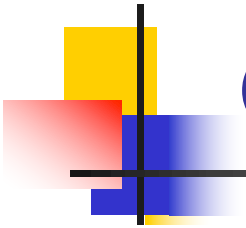
- Wireless transmission
  - Analog and digital data
  - Analog and digital signals



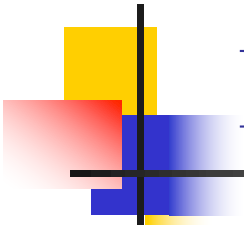
Chapter 7: Spread Spectrum

- Frequency hopping
- Direct sequence spread spectrum
- Code division multiple access (CDMA)

Chapter 8: Coding and Error Control



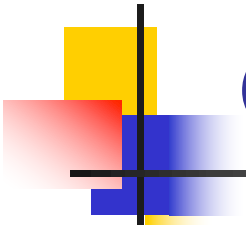
- Forward error correction (FEC)
- Using redundancy for error detection
- Automatic repeat request (ARQ) techniques



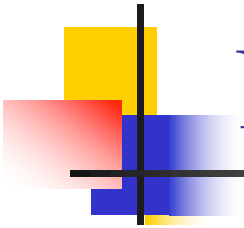
Part Three: Wireless Networking

- Examines major types of networks
  - Satellite-based networks
  - Cellular networks
  - Cordless systems
  - Fixed wireless access schemes
- Use of mobile IP and Wireless Access Protocol (WAP) to provide Internet and Web access

Chapter 9: Satellite Communications



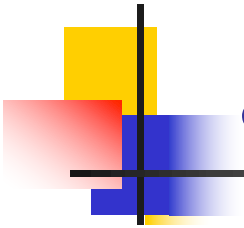
- Geostationary satellites (GEOS)
- Low-earth orbiting satellites (LEOS)
- Medium-earth orbiting satellites (MEOS)
- Capacity allocation



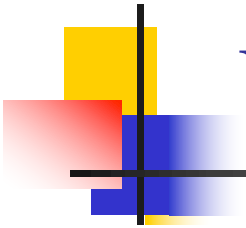
Chapter 10: Cellular Wireless Networks

- Cellular wireless network design issues
- First generation analog (traditional mobile telephony service)
- Second generation digital cellular networks
  - Time-division multiple access (TDMA)
  - Code-division multiple access (CDMA)
- Third generation networks

Chapter 11: Cordless Systems and Wireless Local Loop



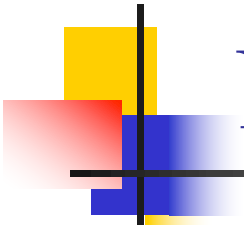
- Cordless systems
- Wireless local loop (WLL)
  - Sometimes called radio in the loop (RITL) or fixed wireless access (FWA)



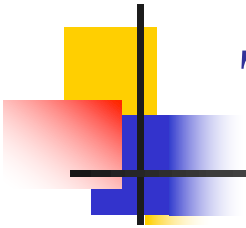
Chapter 12: Mobile IP and Wireless Access Protocol

- Modifications to IP protocol to accommodate wireless access to Internet
- Wireless Application Protocol (WAP)
  - Provides mobile users access to telephony and information services including Internet and Web
  - Includes wireless phones, pagers and personal digital assistants (PDAs)

Part Four: Wireless Local Area Networks



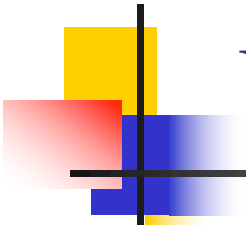
- Examines underlying wireless LAN technology
- Examines standardized approaches to local wireless networking



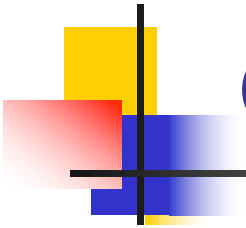
Chapter 13: Wireless LAN Technology

- Overview of LANs and wireless LAN technology and applications
- Transmission techniques of wireless LANs
  - Spread spectrum
  - Narrowband microwave
  - Infrared

Chapter 14: IEEE 802.11 Wireless LAN Standard

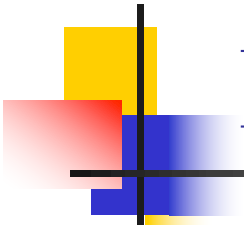


- Wireless LAN standards defined by IEEE 802.11 committee



Chapter 15: Bluetooth

- Bluetooth is an open specification for wireless communication and networking
  - Personal computers
  - Mobile phones
  - Other wireless devices



Internet and Web Resources

- Web page for this book
  - WilliamStallings.com/Wireless1e.html
  - Useful web sites, errata sheet, figures, tables, slides, internet mailing list, wireless courses
- Computer Science Student Support Site
  - WilliamStallings.com/StudentSupport.html
- Newsgroups
  - comp.std.wireless
  - comp.dcom.*