

CS-422 MOBILE COMPUTING

Prerequisites:

1. Computer Networks (CS-321)

Upon successful completion of the course, the students will be able to:

Course Outcomes		Programme Outcomes											
		1	2	3	4	5	6	7	8	9	10	11	12
CO1:	Learn about the concepts/principles of mobile computing and explore both theoretical and practical issues of mobile computing	3	2										
CO2:	Understand the architecture of modern mobile computers and will be able to develop novel applications	3	3	3				3					
CO3:	Understand wireless communication and networking principles, that support connectivity to cellular networks, wireless internet and sensor devices	3	3				3	3	2				
CO4:	Comprehend the design and development of context-aware solutions for mobile devices	2	3	3				3					
CO5:	Appreciate the social and ethical issues of mobile computing, including privacy			3			3		3				

Introduction

Challenges in mobile computing, coping with uncertainties, resource poorness, bandwidth, etc. Cellular architecture, co-channel interference, frequency reuse, capacity increase by cell splitting.

Medium Access Control

Motivation for a specialized MAC: Hidden and Exposed terminals. Near and Far terminals; SDMA, FDMA, TDMA: Fixed TDM, Classical Aloha, Slotted Aloha, Carrier sense multiple access, Demand assigned multiple access, PRMA packet reservation multiple access, Reservation TDMA, Multiple access with collision avoidance, Polling, Inhibit sense multiple access; CDMA: Spread Aloha multiple access.

Telecommunication Systems

GSM: Mobile services, System architecture, Radio interface, Protocols, Localization And Calling, Handover, Security, New data services; DECT: System architecture, Protocol architecture; TETRA, UMTS and IMT-2000: UMTS Basic architecture, UTRA FDD mode, UTRA TDD mode.

Wireless LAN

Infrared vs. Radio transmission, Infrastructure and Ad hoc Networks, IEEE 802.11: System architecture, Protocol architecture, Physical layer, Medium access control layer, MAC management, Future development.

HIPERLAN

Protocol architecture, Physical layer, Channel access control. Sublayer, Medium access control Sublayer, Information bases And Networking.

Bluetooth

User scenarios, Physical layer, MAC layer, Networking. Security, Link management.

Mobile Network Layer

Mobile IP: Goals, assumptions and requirements, Entities and Terminology, IP packet delivery, Agent advertisement and discovery, Registration, Tunneling and Encapsulation, Optimizations, Reverse tunneling, Ipv6; Dynamic host configuration protocol, Ad hoc networks: Routing.

Mobile Transport Layer

Traditional TCP: Congestion control, Slow start, Fast retransmit/fast recovery, Implications on mobility; Indirect TCP, Snooping TCP, Mobile TCP, Fast retransmit/fast recovery, Transmission/timeout freezing, Selective retransmission, Transaction oriented TCP.

Data Dissemination and Management

Challenges, Data dissemination, Mobile data replication, Mobile data caching, Mobile cache maintenance, mobile web caching, caching in ad hoc networks.

Context Aware Computing

Ubiquitous computing, concept of context, context aware computing and applications, middleware support.

Mobile Middleware

Service discovery, adaptation, mobile agents.

Wireless security

Traditional security issues, mobile and wireless security issues, Problems in ad hoc networks.

Text and Reference Books

1. Frank Adelstein, S.K.S. Gupta, Golden G. Richard III and Loren Schwiebert, "Fundamentals of Mobile and Pervasive Computing", McGraw-Hill Professional.
2. Charles Perkins, "Ad hoc Networks", Addison Wesley.
3. David Taniar, "Mobile Computing: Concepts, Methodologies, Tools, and Applications".
4. Asoke. K Talukder, Roopa R. Yavagal, Asoke K. Talukder, "Mobile Computing".
5. J. Schiller, "Mobile Communications", Addison Wesley.