

Important Instructions:

- 1) Open this MS-Word document and start writing answers below each respective question given on page 2.**
- 2) Answers the question in the same sequence in which they appear.**
- 3) Provide to the point and concrete answers.**
- 4) First read the questions and understand what is required of you before writing the answer.**
- 5) Attempt the paper yourself and do not copy from your friends or the Internet. Students with exactly similar answers or copy paste from the Internet will not get any marks for their assignment.**
- 6) You can contact me for help if you have any doubt in the above instructions or the assignment questions.**
- 7) All questions must be attempted.**
- 8) Do not forget to write your name, university ID, class and section information.**
- 9) Rename you answer file with your university ID# before uploading to SIC.**
- 10) When you are finished with writing your answers and are ready to submit your answer, convert it to PDF (no MS Word) and upload it to SIC unzipped, before the deadline mentioned on SIC.**
- 11) Do not make any changes to the format provided.**
- 12) Failure in following the above instructions might result in deduction of marks.**

Final Exam, Course: - Mobile Computing

Deadline: - Mentioned on SIC

Marks: - 50

Program: - BS (CS), BS-SE

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Q1: Provide the names of 4 challenges that exist in Adhoc Networks.

(4)

Answer: Above are mentioned a few challenges that Adhoc Network faces;

1. Infrastructure-less Design: Adhoc Networks are based on infrastructure-less design which means that it is very hard to detect issues, faults in the system and it is hard to trace and troubleshoot these faults. It is also hard to maintain an infrastructure-less design.
2. Pricing Scheme: The devices, equipment used in Adhoc Networks is very expensive, it is costly to setup an Adhoc network, furthermore it is costly to maintain and making changes is also expensive.
3. Scalability: Scalability issues occur during routing, addressing, interoperability, configuration management.
4. Energy Constraints: In these challenges the processing power is limited, each node is dependent on another node which acts as the node.

Q2: How the nodes in the Adhoc Network know about the changing network topology. (2)

Answer: Mostly nodes within an Adhoc network are not familiar with the topology of their networks. So, the nodes have to discover the routing topology by themselves. This happens when a new node announces its presence and listens for announcements broadcast by its neighbors. Each node learns about others nearby and how to reach them, and may announce that it too can reach them. With the help of “**Link State Algorithm**” Each node shares its link information so that all nodes can build a map of the full network topology.

Q3: Why is it important to minimize flooding of control packets in Adhoc Networks and how MPR achieves it? (4)

Answer: It is important to minimize flooding of control packets in Adhoc Networks because flooding naturally utilizes every path through the network it will also use the shortest path. Multipoint Relay minimizes the flooding of broadcast packets in the network by reducing duplicate retransmission in the same region. Thus, saving a lot of processing power and time.

Q4: Explain briefly how Mobile Cloud Computing is different than simple mobile computing and simple cloud computing? (4)

Answer: Mobile Cloud Computing is the mixture of cloud computing and mobile computing. Mobile Cloud Computing uses infrastructure where both the data storage and data processing happen outside of the mobile device. Where in mobile computing the data storage & data processing both occur within the device itself. Cloud Computing does not offer mobile features, for example a mobile device is portable, such as laptops, phones etc. In a modern portable device sensor data, biometric data each & everything is stored and synchronized from time to time. Mobile cloud computing has a few advantages over simple cloud computing and simple mobile computing. Mobile cloud computing has more storage, faster processing, permanent storage, accessible anywhere, anytime. it also allows us to seamlessly share data without any hurdle since everything is stored in the cloud.

Q5: Explain the term MBaaS in your own words? (4)

Answer: MBAAS is also known as Mobile Back-end As a Service refers to the practice of using a service provider to power the backend services such as business logic and data management of an application. The purpose of using an MBaaS provider is to take care of all the technical infrastructure necessities needed behind the scenes for an app to work properly. MBaaS is used to save time, it uses easier scalability. Without MBaaS developers will have to deal with the following factors in building the software; Setup and maintenance of the Servers, Prepare the infrastructure for scaling, Building APIs, Setup and maintenance of the Database, Security, Deployment process.

Q6: Imagining you visit a completely new city. What kind of services a modern LBS can provide you at your location automatically? (6)

Answer: If I visit a new city, I can take various advantages from Location Based Services. First off, I will need a map to help me travel around the city, I will have to find a nearby hotel through the navigation software system. I will also need a nearby restaurant to have something to eat. I will need recommendation of social events happening around the city. I can also locate an ATM or bank for money transactions. I can also locate any healthcare facility in case of any emergency. If I am willing to stay for long, I will need a flat, or place to stay for low price, for this I will have to look for location-based advertisements in order to find a place or a job. If I am willing to visit a friend or a relative, I can directly access his mobile location. All of these LBS services can be provided to me automatically if I visit a new city.

Q7: Use your imagination as to how the following context can be used by a context aware application in mobile computing environment?

Answer:

Date/Time: This context can be used to trigger an alarm at given date/time. By using the event reminder application, it can alert us about the nearby event at a given date/time. Date/time context can also help us view a record or history of the places we have been based on location, or the history of application usage.

Environment: When context-specific applications detect a specific environment for example if a sensor detects the environment temperature is cold, it automatically adjusts the heating functions to stabilize the temperature, another example is that if the sensor detects that it is daytime it will turn off all unnecessary lights inside the room or house.

Emotional state: When this context is detected the system application tries to stabilize the emotional state for example an application asks the user about his feelings, if the user is feeling sad, the application automatically plays a song that enlightens the emotions of the user, similarly if the user selects the emotions to “Stressed” the application plays relaxing sounds in order to relieve the user from stressful thoughts.

Focus of attention: In this context the application detects the lack of attention towards a specific goal and reminds or encourages the user to pay attention towards that goal, for example the “S Health” application on android uses the pedometer sensor to count steps of a user, if the sensor detects that there has been less walking or excursion by the user, the application then sends a reminder to the user to focus on walking and stay active. Similarly, if a sensor detects that an application is not being used for a long time, it prompts the user to uninstall the application that has never been or rarely used.

Orientation: In this context if the orientation sensor detects that the device is being held upright, it automatically adjusts the orientation of the screen according to the position of the device. Similarly, if the orientation sensor detects that a video or movie is being played, it automatically adjusts the screen to landscape mode in order to give a better or bigger view of the playback.

User preferences: In this context if the user wishes to trigger the device to turn off on specific time of the day the device will automatically trigger to turn off at that time. Similarly, if the user wishes the ringer to be turned off during night time the device will turn off ringer according to user’s preferences at that given time or condition.

Calendar (events): In this context the application reminds user of specific events, such as meetings, weddings, birthdays, whenever the application detects the event time it prompts the user with a ringtone or notification.

Browsing history: In this context the application suggests the user search words with more similar words that have been used in history.

Q8: Explain why energy efficiency is important in technologies like Bluetooth and ZigBEE?

Answer: In technologies like Bluetooth & Zigbee energy efficiency is important because the ability to connect devices swiftly to each other requires higher power in the initial connecting state. Zigbee uses channel 26 which stays uninterrupted but Bluetooth on the other hand faces lags in connections most of the time. Bluetooth uses specific protocol for connection thus, cannot tolerate any interference. That is why energy efficiency is important in such technologies.

Q9: Explain briefly how you use RFID technology at INU on a daily basis when present on the campus? Do you use an active or passive tag? (4)

Answer: RFID (Radio Frequency Identification) is used for attendance and checking in to university. We mark our attendance by swiping the card on the sensor where the computer uses the AIDC method to identify our card & collects our data. Which marks our attendance. In our university RFID system uses the Active RFID tag for the reason because it contains a microchip & antenna which have high power efficiency.

Q10: Explain how Wearable Computing can be employed in computer gaming? (5)

Answer: A wearable computer, also known as a wearable or body-borne computer, is a small computing device worn on the body. Wearable computing devices such as VR headsets, PrioVR devices are in trend in the new era of gaming. Software developers build applications specifically designed for wearable devices that provide an amazing gaming experience. It is known that game applications designed for usable devices have the ability to integrate built-in elements of the device such as gyroscopic motion sensors & motion tracking to provide an interactive gaming experience.

Q11: What kind of facilities and technologies must be present in order to call you own home a Smart Home? (5)

Answer: Smart home technology also known as 'Home Automation' is the use of devices in the home that connect via a network, most commonly a local LAN or the internet. Smart home technology allows users to control and monitor their connected home devices from smart home apps, smartphones, or other networked devices. A smart home consists of many features some of them are mentioned above.

- **Automatic Climate Control:** Sets temperature according to normal mode or desired mode.
- **Smart Home Appliances:** Appliances that are connected to the IOT network & can be controlled or adjusted from anywhere.
- **Smart Entertainment System:** A system that controls entertainment equipment all over the home. And can be remotely controlled from anywhere inside or outside the home.
- **Smart Security:** A 24/7 surveillance system that keeps the doors locked and all the sensors active to avoid any intrusion.
- **Smart Lightning:** This system uses sensors to detect presence anywhere in the home and controls the lightning of all places with respect to presence.

- Smart Wakeup System: This feature automatically opens curtains at daytime and plays a melody to encourage the resident to wake up.
- Remote Phone Setup: A home-based system should be able to initiate with a mobile-phone when the house is empty. The system should provide the ability for the user to enter the name and model number of the phone so it can be verified for use. The user will be able to communicate with the system when approaching home to switch the television or the oven on and any other electrical appliances the house owner may wish to make use of.
- Vehicle Detection System: A smart home should be able to detect a vehicle of the owner approaching towards the parking area where it automatically opens the garage door and light up the basic functions inside the home and relax the security system.