Group Programming Assignment

You are required to design and develop a mobile computing application as part of the Continuous Assessment component of this subject. The project should be based on one of the project ideas given at the end of this guide. Evaluation stages are given next.

1. Project Proposal Document [5 marks]

Submit a project proposal using the Moodle Quiz. This is a hurdle and needed for you to proceed with the assignment. The proposal should include:

1. Name of proposed application.
2. Describe functionality of proposed application.
3. Potential Use Case(s) of proposed application.
4. List of requirements/functions
5. High-level architecture of proposed system (A block diagram showing system boundaries, components/modules, and their relationships)
6. List of deliverables (Clear statements what will be implemented. Should be given in a verifiable manner).

Final evaluation will be made against what you propose here.

2. Final System Delivery (docs + demo + interview) [25 marks]

Final evaluation consists of 3 components.

1. Documentation
    - Architecture/design diagrams (e.g. structural models)
    - List of Tools/APIs/libraries used.
    - Attribute any source code borrowed from the Internet/books/API examples or generated with the assistance of AI tools (e.g. Copilot).
    - User guide if applicable (can be as online help documentation too)
    - Contributions of each group member
2. Demonstration of the developed application/system
3. Interview with the evaluator

3. Notes:

- The application can be a mobile application (as per our definition) or an embedded system.
- Having a backend service is not a compulsory requirement.
- The proposal should be for an application that you can implement within the semester.
- If you propose a large system but implement only a subset, clearly indicate which parts you aim to implement. Those implemented parts should also provide some useful functionality.
- The final demo will be assessed against deliverables mentioned in the proposal.
- If you would like to propose an idea outside of the list given below, send an email to the module lecturer requesting permission and explaining your idea.

4. Project Ideas

Given below are several ideas on which your programming assignment project can be based. You are expected to select one idea and expand on it to come up with your proposal.

Option 1 (Point-to-point messaging)	A messaging app for point-to-point communication between two devices when there is no WiFi or cellular network available. Possible communication mediums include Bluetooth/BLE, Visible Light (VLC) and acoustic signals. (Hint: refer to your knowledge of Data Communications.) - You need to convert a message to appropriate physical medium signals which are captured by the recipient device and then are converted back to the message. - Pay attention to encoding/decoding the message, handling errors, different performance capabilities of devices etc.
Option 2 (Indoor Navigation)	Smartphone based indoor navigation app Develop a solution which allows visitors to navigate inside a building using a smartphone app. For example, assume navigating around the CSE department. You may use an appropriate technology for indoor navigation and make necessary assumptions. Note 1: Do not implement navigation using AR toolkits Note 2: GPS is not suitable for indoor navigation. (Hint: This vendor's site has an overview of various technologies used for indoor navigation https://www.infsoft.com/basics/applications/introduction-indoor-localization/)
Option 3 (Innovative sensor-based app)	Develop an app which recognizes various situations/activities using the phone's sensors. (E.g.: walking, standing, seated, holding phone in hand, travelling by vehicle, phone is stationary, out in the sun, at a music concert). Propose a useful app which makes use of the sensor data collected. You should use basic outputs from sensors and compute any higher-level information on your own. (E.g. Do not use the Android Recording API to retrieve step count, instead implement counting by using basic resources.)
Option 4 (Folder sync)	Peer-to-peer folder syncing between smart mobile devices Develop an App which can synchronize/backup/mirror the contents of a folder between two or more smart mobile devices. Assume that all devices are in a WLAN which is not connected to the Internet.
Option 5 (Other)	Your own idea. (Needs approval to proceed)