**The Scenario – IoE**

Systems Design Report (2500 words including system design documentation)

**Suggested requirements for the project: Raspberry pi/ Arduino/ ESP32/ ESP8266. *You* can also develop and test the whole system in simulation software like Tinkercad, programme language, connectivity network, output devices (i.e. LED/ MQTT Lens, I2C or SPI LCD or even Serial Monitor).**

You need to build a complete IoT system that can have real life application related to home, healthcare, transportation, and community, etc. For example, one can create a system that can measure and monitor humidity & temperature of home, measuring distance between the two objects, creating a Burglar alarm or any other security system.

For this development, you need to develop a system using at least 1 esp32/ Arduino/ raspberry pi, 1 sensor device (any active or passive sensor) and 1 output device (Serial monitor/ LCD/ LED/ MQTT lens). Finally, you should also make use of wireless communication using either Wi-Fi or Bluetooth.

1. The solution could use any type of output devices (i.e. LED/ MQTT Lens, I2C or SPI LCD or even Serial Monitor).
2. Solution could use any type of input devices (i.e. Passive Infrared sensor, Ultrasonic sound sensor or DHT sensor).
3. You can use any development IDE (Integrated development environment) and any programming language (Arduino C or Python, etc) of your choice.
4. You should demonstrate the use of Wi-Fi or Bluetooth to send or receive data from IoT devices to output devices.
5. You can further publish the sensors data to any MQTT broker or HTTP server.

**Specific Deliverables: The lab report should include the following:**

* Provide the explanations of the chosen system covering its functionalities.
* Description of the solution (what IoT system has been implemented? What does it do? What sensors and output devices have been used?)
* Provide the whole architectural design of the chosen IoT system.
* Provide the explanations and working of all protocols used in your designed system.
* Provide the whole programming codes used in the whole system.
* Provide the snapshots demonstrating the testing and working of the system.
* End the report with a section containing discussion on the issues and application areas of the system including an understanding of the commercial context and privacy/security issues.

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| **Functionality** | **Criteria/Deliverables** |
| System Analysis | * You should provide basic explanation on the uses of Internet of Everything, including (passive and active) sensors, physical communications layer, communications protocols, programming frameworks, and an understanding of energy and bandwidth constraints * You should provide the functional requirements of the system * You should include all the components/ resources needed. |
| System diagram | * You should include diagram of the system. * You should also describe the components used and their functions |
| Codes | * You should provide the codes for both the client and server side (whichever applicable to your project). * You should add appropriate comments throughout the codes |
| Implementation and conclusions | * You should demonstrate the design of your system by providing all snapshots. * You should provide a description of how the system works. * Critically discuss issues and application areas of your system including an understanding of the commercial context and privacy/security issues and make well-informed speculations on the future of the area. |
| References and Presentation | * Citations provided in Harvard’s style and the report is well organized and presented. |
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