ALBUKHARY INTERNATIONAL UNIVERSITY

ASSESSMENT BRIEF

PROJECT (25%)

Course Code	CDE2243	**Course Name**	Internet of Things (IoT)
Instructor(s)	Ts. Mohd Zulkifli Mohd Zaki (Lead) Madam Halawati Abdul Jalil Safuan (Co-Lead)		
Semester/Year	1/2025-2026	**Submission Date**	
Assessment	Project (Group)	**Marks/Weightage**	100 marks / 25%
Course Learning Outcome (CLO)	**CLO3:** Assemble an IoT-based device or a system equipped with the necessary hardware and software to interact with the environment for simple real-life applications (P5, PLO3)		

Title

Harnessing the Power of IoT to Tackle Real-World Challenges.

Objectives

This assessment requires students to collaboratively **design, build, and demonstrate an IoT-based system or device** that captures environmental data, processes it, and produces real-time outputs or insights. The project ensures hands-on experience with IoT hardware, embedded software, data management, and analytics, thus fulfilling the psychomotor domain. The assessment aligns with:

> *CLO: Assemble an IoT-based device or a system equipped with the necessary hardware and software to interact with the environment for simple real-life applications. (Psychomotor Level: P5 – Complex Overt Response, PLO3)*

This assessment evaluates your ability to design, assemble, and present a real-world IoT system using appropriate sensors, hardware, data management techniques, and cloud integration. Instead of a written report, each group will create a technical poster and deliver a live demonstration, showcasing the system's implementation, data flow, analytics, and practical functionality. This approach emphasises hands-on performance and applied understanding of the IoT pipeline, starting from hardware integration to data analytics.

Requirements

1. This is a **GROUP WORK ONLY.** Any individual submission or plagiarism will be penalised. Individual submissions are not allowed. Each student must be registered in a valid group of three members to be eligible for marks.
2. Complete all tasks. There is **NO EXCEPTION** except with special permission.
3. All deliverables must be **submitted exclusively via the AIU Moodle LMS**, following this naming convention format:

   Project Files : **`CDE2243_IoT_Solutions_012526_Project_<GroupNo>.zip`**
   Poster : **`CDE2243_IoT_Poster_012526_Project_<GroupNo>.pdf`**
   Reflections Form: **`CDE2243_IoT_Reflection_012526_Project_<StudentName>.pdf`**
   Declaration Form: **`CDE2243_IoT_Declare_012526_Project_<StudentName>.pdf`**

4. The **submission deadline** is on **Week 13 – Friday, 30 January 2026, at or before 11:59 pm** through the AIU Moodle LMS. Late submissions will incur a penalty of 5 points per day for each day late.
5. Originality and personal reflection are vital. **Any instances of plagiarism and AI-generated content will be penalised**, as outlined in the Section on Academic Integrity and AI Misuse Policy.

Assessment Scenario

Each group will design, build, and present an **IoT-enabled prototype** that interacts with the physical environment via sensors, sends data to a cloud platform or database, processes and visualises that data, and implements basic analytics or decision logic

This assessment evaluates your ability to **design**, **implement**, and **annotate** the code for an IoT-based systems. Your group will create a **technical poster** and deliver a **live demonstration**, showcasing your system's **implementation, data flow, analytics**, and **practical functionality**. This approach emphasises hands-on performance and applied understanding of the IoT pipeline — from hardware integration to data analytics.

You are to form groups of **3 students** and develop a **working IoT prototype system** for a real-life application. Students must design a simple real-life IoT application in one of the following domains:

- Smart Environment (e.g., smart agriculture, air quality monitoring)
- Smart Health (e.g., patient vital tracking)
- Smart Energy (e.g., power consumption monitoring)
- Smart Home / Campus (e.g., smart lighting, motion sensors)
- Industrial IoT (e.g., equipment monitoring)

The system must demonstrate data sensing, communication, cloud integration, and analytics capability. The system should:

- **Use at least two environmental sensors** (e.g., temperature, humidity, gas, motion).
- **Include a microcontroller or development board** (e.g., ESP32, Arduino, Raspberry Pi).
- **Use a network communication protocol** (e.g., MQTT, HTTP) to transmit data.
- **Send data to a cloud platform** (e.g., Firebase, AWS IoT, Azure IoT).
- **Perform data aggregation and basic analytics** (ETL or filtering techniques).
- **Implement a basic AI/ML model or threshold logic** to take autonomous actions or provide predictions.
- **Display outputs via a dashboard** (e.g., Grafana, Kibana, ThingsBoard, etc).

Focus on solving a real-life societal or industrial problem by building a prototype that integrates data acquisition, embedded OS interaction, networked communication, basic analytics or AI-based decision-making, and secure cloud storage. Some of the recommended project topics (not limited to) include:

- Smart Plant Monitor – With real-time soil moisture/temp data + alert system using MQTT + AWS IoT.
- Air Quality Detector – Includes gas sensors, data push to Firebase, simple ML model to forecast unsafe levels.
- IoT Parking Monitor – Ultrasonic sensors with ESP32 + cloud dashboard + prediction of slot availability.
- And other logical project topics.

Tasks Description

Based on the provided scenario, each group must complete these tasks:

1. Design and build a functional **IoT-based prototype** that:
    - Interacts with the physical environment via sensors
    - Send data to a cloud platform or database
    - Processes and visualises that data
    - Implements basic analytics or decision logic

2. Submit a **technical poster** (A1 size, landscape or portrait, PDF format) that communicates:
    - Problem, design, system architecture, implementation, and outcomes
    - Visual diagrams, data samples, graphs, and photos of the system
    - Clear hardware-software integration and data flow explanation

3. Submit a project solution, consisting of **source code and a documentation bundle** (zip). The source code and solution files serve as evidence of the original technical implementation of your IoT system. This submission allows the lecturer to:
    - Verify the functionality and authorship of code and configurations.
    - Evaluate how the group applied technical skills in real-time assembly.
    - Cross-check claims made in the poster and live demonstration.
    - Confirm constructive alignment with the course learning outcome, particularly hands-on system development.
    - It also acts as a safeguard against plagiarism and excessive reliance on AI-generated code.

4. Submits a **1-page reflection (individual) with the Declaration Form** on your role, challenges, and learning. The individual reflection helps assess your:
    - Personal involvement in the IoT project.
    - Understanding of the technical tasks you contributed to.
    - Application of psychomotor skills aligned with learning outcomes.
    - Critical thinking about challenges, collaboration, and learning outcomes.
    - This component ensures accountability and helps verify authorship, original thinking, and genuine learning, especially in environments where AI tools are available.

5. Participate in a **live demonstration and Q&A**.
    - Each group must provide a task division breakdown, with equal contribution expected.
    - All members must participate in the final demonstration and answer questions.

Deliverables/Submission Components

1. Complete Project Solution (Group)
   - Provide a fully working project solution
   - Include in-line comments explaining each logic block
   - Source code/scripts used
   - Circuit diagrams or schematics
   - Sample datasets or logs
   - Link to cloud dashboard (if applicable)

2. Technical Poster (Group)
   - Prepare 1 A1 technical poster.
   - The poster should clearly present the following sections:
     - Project Title and Group Members
     - Problem Statement and Objectives
     - System Architecture Diagram
     - Hardware & Sensor Configuration
     - Cloud/Data Pipeline Architecture
     - Data Flow and Sample Logs
     - Analytics/Decision Logic
     - Security & Privacy Considerations
     - Photos of Working Prototype
     - Results and Observations
     - Conclusion and Future Enhancements
     - References (APA style)
     - QR code to project repo/demo/dashboard (if available)

3. Reflection Form (Individual)
   - Upload a reflection form.
   - Upload the signed PDF form.

4. Declaration Form (Individual)
   - Upload an academic honesty and AI usage declaration.
   - Upload the signed PDF form.

Academic Integrity and AI Misuse Policy

1. Plagiarism

Plagiarism is a form of cheating and a serious academic offense. It involves taking and using another person's ideas or expressions and presenting them as your own without giving proper credit.

Plagiarism includes presenting someone else's work as your own in various ways. This can involve copying information directly from websites or books without citation, submitting group work as if it were your individual effort, copying another student's work, or stealing coursework and claiming it as your own. Any suspected plagiarism will be investigated, and if confirmed, it will be addressed according to the university's established procedures.

All material that is copied or modified from any source (e.g., the internet, books, or AI) must be referenced correctly according to the specified citation style you are using. This work will be submitted for plagiarism detection using AI detection tools. Any attempt to circumvent our plagiarism detection systems will be treated as a serious academic offence.

2. Generative AI

Generative AI tools **CANNOT** and are **NOT ALLOWED** to be used in this assessment task. In this assessment, you must not use generative AI to generate any materials or content in relation to the assessment task.

Students are prohibited from using AI tools like ChatGPT, Copilot, Gemini, etc. to:

- Write their slides or poster content
- Design architecture or component analysis
- Generate technical justification

Permitted: Grammar checking tools or citation tools (Grammarly, Zotero) – with disclosure.

Penalty Framework:

Level	Severity	Example	Penalty
1	Minor (<20% AI use)	Reworded abstract	-10% to -20%; warning; must reflect on usage
2	Moderate (20–50%)	AI-generated comparisons or diagrams	-30% to -50%; rework with reflection
3	Major (>50%)	Entire poster or script AI-generated	0% for the task; formal misconduct report
4	Severe (repeat)	Second offence or full ghostwritten work	Fail course; disciplinary referral

Students will submit a Reflective Statement explaining their design process and tools used and may be called for oral defence. If the student cannot explain the technical rationale, reproduce calculations, or describe architecture decisions, the case is considered substantiated.

Analytic Evaluation Rubric – Internet of Things Project (100 marks)

Part A: Technical Poster (50%)

Criteria	Excellent (5 points)	Good (4 points)	Satisfactory (3 points)	Fair (2 points)	Poor (1 point)	Unavailable (0 point)
System Architecture & Design	Highly modular, clearly labelled diagram; complete data flow and logic	Mostly complete and clear; minor gaps in flow or detail	Basic flow presented; missing component links	Incomplete or unclear design diagram	Diagram incoherent	No diagram
Hardware & Sensor Integration	All components are detailed and documented with labelled photos/screenshots	Components shown with minor omissions	Partial coverage or unclear integration	Major gaps in explanation or visuals	Hardware poorly presented	Not addressed
Data Acquisition & Cloud Flow	Real sensor data + detailed cloud transmission explanation; logs included	Mostly real data with some missing details	Generic flow or unclear cloud description	Weak cloud explanation; artificial or reused data	No cloud flow or data evidence	Not addressed
Analytics & Decision Logic	Custom logic or algorithm shown; real output or inference explained	Some processing shown; logic explained at the surface level	Basic analytics or threshold logic with little originality	Minimal effort: unclear logic or copied flow	Inappropriate or unclear	Not addressed

Visual & Technical Clarity of Poster	Professional layout, readable fonts, all sections well-structured, technical visuals strong	Mostly clean layout, clear sections, some minor visual/design inconsistencies	Acceptable layout with crowded sections or minor formatting issues	Disorganized or hard-to-follow layout	Poster lacks structure, readability, or is incomplete	Missing
Security & Privacy Considerations	Clearly integrated privacy and security handling in system design	Security aspects considered and explained	Brief mention of security, but lacking implementation detail	Weak or generic security statements only	No mention or evidence of security/privacy measures	Not addressed
Programming & Customisation	Flawless and deeply technical	Highly accurate with strong terms	Accurate and technical	Mostly accurate	Some inaccuracies	Multiple errors
Cloud & Analytics Integration	Real-time dashboard, clear visualisation, ETL applied	Dashboard is functional with minor issues	Basic dashboard, limited analytics	Static charts or screenshots only	No cloud or dashboard integration	Not addressed
Poster Design & Visual Quality	Professional design, highly informative and technical	Visually strong & readable	Clear, relevant visuals and layout	Basic structure with some visuals	Unclear layout, hard to interpret/read, cluttered	No submission
Citations & Referencing	Perfect and relevant technical sources	Accurate and consistent referencing	Mostly correct referencing	Few references, some errors	One or two, inaccurate format	Missing referencing

Part B: Practical Demonstration (50%)

Criteria	Excellent (5 points)	Good (4 points)	Satisfactory (3 points)	Fair (2 points)	Poor (1 point)	Unavailable (0 point)
Verbal Communication Clarity	Excellent clarity, confident, deeply analytical	Clear explanation with technical confidence	Adequate explanation with some gaps	Basic clarity	Unclear or lacking technical clarity, hard to understand	Not submitted
Prototype Functionality	System works as designed; full real-time operation demonstrated	Mostly functional; small issues that don't affect core functionality	Partially working; several features are missing or buggy	Prototype is unstable; limited functionality shown	Non-functional prototype or no system presented	No prototype shown
Justification of Technical Decisions	All members show deep understanding; explain code/hardware clearly	Most members explain with minor support	Members rely heavily on notes or struggle to explain their part	Only one/two members present core details	No coherent explanation; unclear ownership	Missing justification
Hardware & Software Integration	Seamless integration: hardware and software interact without issues	Good integration; minor latency or response issues	Components function, but the integration logic is weak	Poor integration: the system seems fragmented	Components don’t work together, or are not tested	Non-used or utilised.
Data Visualisation / Dashboard	Live dashboard with real-time updates and a clean interface	Functional dashboard with minor display or refresh issues	Dashboard is basic or only shows static data	Dashboard is weak, has limited use or is inaccessible during demo	No visualisation or placeholder only	Non-used or utilised

Demonstration Structure and Timing	Exceptionally structured, perfect pacing and closure	Clear transitions and logical order	Structured and well-paced	Structured, minor issues	Missing sections	Disorganised
Technical Accuracy in Spoken Content	Flawless and deeply technical	Highly accurate with strong terms	Accurate and technical	Mostly accurate	Some inaccuracies	Multiple errors
Demonstration Quality	Professional-grade, high clarity	Clear audio/visuals	Good quality, understandable	Acceptable quality	Poor audio/visual	Unusable quality
Response to Questions	All members confidently answer technical questions accurately	Mostly accurate answers with minor prompting	Answers are vague or overly reliant on one group member	Avoidance or inaccurate answers; lack of ownership	Inability to answer; evidence of non-participation	No response
Team Collaboration & Roles	Equal participation: roles clearly defined and demonstrated	Mostly equal; small imbalance in engagement	Uneven contribution; one or two dominate	Obvious imbalance; members unfamiliar with project parts	Only one person presents; others disengaged	No coordination