UNIVERSITI SAINS MALAYSIA

CPC357: IoT Architecture & Smart Applications

Project

Group Members:

1. Name: _____ Matric No. : _____

2. Name: _____ Matric No. : _____

3. Name: _____ Matric No. : _____

You are required to develop a practical IoT system addressing real-world urban challenges while contributing to UN Sustainable Development Goal (SDG) 11 – Smart Cities. This project integrates theoretical knowledge with hands-on implementation, culminating in a working prototype, visualization application, and comprehensive documentation.

Project Objectives

1. Design and implement a functional IoT system for smart city applications
2. Demonstrate practical understanding of IoT architecture
3. Apply cloud computing and data analytics concepts
4. Visualize sensor data through web or mobile applications

Technical Requirements

Hardware

You may use any suitable hardware platform including:

- Raspberry Pi
- Maker Feather S3
- Any appropriate microcontroller with sensors

Justify your choice of sensors based on your smart city application

Cloud Platform

You may choose any cloud platform including:

- AWS (Amazon Web Services)
- GCP (Google Cloud Platform)
- Other suitable cloud platforms

Data Visualization
Develop a web or mobile application to visualize sensor data. The visualization must clearly demonstrate real-time or historical data from your IoT system

The core requirement is successful integration between your chosen hardware and cloud platform, demonstrating a complete IoT system with data collection, processing, and visualization capabilities.

Deliverables

You must submit **a comprehensive technical report** containing the following:

1. System architecture
    - Detailed architecture diagram of your IoT system
    - Component descriptions and their interactions

2. Hardware Documentation
    - List of sensors and hardware components used
    - Justification for sensor selection based on your smart city application
    - Hardware setup and configuration guide

3. SDG 11 Impact Analysis
    - How your system addresses smart city challenges
    - Potential real-world impact

4. GitHub/GitLab Repository Link
    - Link to your source code repository
    - Your repository must include:
        - All source code files
        - Comprehensive README file with project description
        - Setup and installation instructions
        - List of dependencies and requirements

5. YouTube Video Link
    - Link to your demonstration video (public or unlisted)
    - The video must demonstrate:
        - System overview and architecture
        - Live demonstration of the working prototype
        - Data visualization (web/mobile application)

Submission Instructions

- This is a group submission – submit ONE technical report per group
- Upload the technical report to eLEARN@USM
- Marks will be deducted if:
    - Repository link and/or YouTube video link are not included in the report
    - Links are broken, incorrect, or inaccessible
- Verify that your links are correct and accessible before submission

- Email submissions of links will NOT be accepted – all links must be included in the PDF report

⚠ **IMPORTANT**: Your IoT system implementation must be your own original work.

- Do not copy existing projects from the internet.
- Do not duplicate another student's work.
- While you can use online resources for learning, your implementation must be unique.
- Any form of plagiarism will result in serious academic consequences.

Assignment Due Date: 11 January 2026, 11pm (MY time)

All projects MUST be submitted before/on the given date. Late submissions will NOT be entertained.

Plagiarism/pirating and copying are serious academic offence. Students that are found to plagiarize/or copying will get an F for the assignment/report or for the whole coursework grade.

Thank you

GRADING RUBRICS:

Criteria	Weight	Excellent (70-100%)	Sufficient (52-69%)	Fair (36-51%)	Poor (0-35%)
IoT system design concepts, plan and implementation	40%	Student presents a well-developed IoT system with clear architecture, appropriate sensor selection with strong justification, seamless hardware-cloud integration, and effective data visualization.	Student provides sufficient information on system architecture, sensor selection with adequate justification, functional hardware-cloud integration, and working data visualization.	Student presents basic system architecture, limited sensor justification, basic hardware-cloud integration, and simple data visualization.	Student presents inadequate system design, weak or no sensor justification, poor hardware-cloud integration, and minimal or non-functional data visualization.
Technical Documentation	30%	Comprehensive technical report with clear architecture diagrams, detailed hardware documentation, well-organized source code with complete README, and accessible GitHub/GitLab repository. All links included and functional.	Clear technical report with adequate architecture diagrams, sufficient hardware documentation, organized source code with README, and accessible repository. Links included and functional.	Basic technical report with simple diagrams, limited hardware documentation, basic source code organization. Some links may be missing or unclear.	Incomplete or unclear documentation, missing diagrams, poor code organization, missing README, or inaccessible / missing repository and video links.
SDG 11 Impact and Innovation	15%	Highly innovative solution with clear, significant impact on smart city challenges. Strong alignment with SDG 11 goals and demonstrable real-world applicability.	Original approach addressing smart city challenges with moderate innovation. Clear connection to SDG 11 with practical applications.	Standard implementation with basic connection to smart city challenges and SDG 11. Limited innovation.	Minimal creativity with weak or unclear connection to smart city challenges and SDG 11.

Presentation	15%	Clear, professional, and engaging demonstration showcasing system overview, live prototype functionality, data visualization, and SDG 11 impact within time limit.	Clear and effective demonstration covering system functionality, data visualization, and SDG 11 connection within time limit.	Basic demonstration with acceptable quality showing main system features. May exceed time limit or lack clarity.	Unclear demonstration with poor quality, missing key components, or video link not provided / inaccessible.