TIE 204: LAB 2

System Architecture & Algorithm Mapping Lab

Lab Objective: The goal of this lab is to translate your product idea into a clear, structured system architecture. By the end of this lab, each team should Define the 4 W's:
- What the system is
- How to define our System architecture.
- What algorithms exist in the system
- Where each algorithm lives and why

Lab Rules: This lab is intentionally non-coding and non-implementation focused.
- No coding
- No SW tools
- No calculations
- Focus on **thinking, structure, and justification**
- **If you cannot explain your system on paper, you are not ready to build it.**

Part 1 – Problem Framing
Task: Each team must clearly scope the problem their system is solving.

Answer the following:

1. Who is the user?
2. What is the core problem or pain point?
3. In what context does the problem occur?
4. What does success look like?

Deliverable: A short written problem statement (5–6 lines).   (done already last week)

Part 2 – Solution Exploration via Algorithms
Task:
- Choose 2 solutions you developed last week.
- Each solution must be expressed as an algorithm (logic), not technology.
- For each algorithm, define:
    o Purpose
    o Inputs
    o Outputs
    o Trigger (when it runs)

Deliverable:
- An Algorithm Intent Table with at least 2 algorithms.

Algorithm Name	Purpose	Inputs	Outputs	Trigger	Notes / Assumptions
Temperature Sampling	Acquire current temperature data	Temperature sensor reading	Current temperature value	Periodic (every 10 seconds)	Sensor is calibrated
Threshold Check	Detect unsafe temperature	Current temperature, threshold value	OK / Violation flag	After each temperature sample	Threshold configurable
Alert Decision	Decide when to notify user	Violation flag, time duration	Alert event	Event-driven (on violation)	Ignore short spikes

- Model each algorithm, use FSMs or Dataflow to describe them or any other technique.

Part 3 – System Architecture Design

Task:
- Design a high-level system architecture that supports your algorithms.
- The architecture must include:
  - Hardware blocks
  - Software blocks
  - External systems or users
  - Clear boundaries and interfaces
- Map each algorithm to a system layer and execution location.
- For each algorithm, answer:
  - Which system layer does it belong to?
  - Where does it run (device, local system, external service)?
  - Why is this placement appropriate?
- Rules:
  - One responsibility per block
  - Separate hardware from software
  - Algorithms must be placed explicitly
- **Deliverable**:
  - A single system architecture diagram.
  - A completed algorithm mapping table with justification for each decision.

Final Lab Deliverables

Each team must submit:
1. Problem statement
2. Initial Algorithms Description & Intent Table
3. Model of algorithms, use FSMs or Dataflow to describe them or any other technique.
4. A single system architecture diagram.
5. A completed algorithm mapping table with justification for each decision.