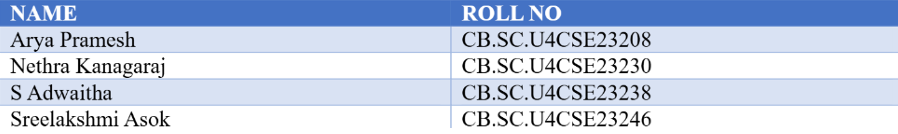
REPORT\_Project Review 1

TEAM NO: 30

TEAM MEMBERS:



**Q&A:**

1. **Why not run the ML on the edge itself?**

Due to resource constraints, complex ML is delegated to the fog node. However, basic threshold checks still run locally.

1. **Can this idea be applied to other diseases?**

Yes, this system can be applied to other diseases as well.

For example, in the case of diabetes, the same architecture can be used to monitor glucose levels.

1. **I saw something about a backup node on the slides, can you elaborate? Will the user be wearing 2 esp32 modules on their body?**

No, the backup node will be near the fog node, in the hospital. We use it as a standby node, if the main fog node fails.

1. **You guys talked about running an ML model. In which layer are you planning to do this, if it is the edge node - how feasible is it? You also mentioned about no cloud layer, how are you planning to store the data?**

The ML inference will be done in the fog node and not in the edge. I mentioned that as per our paper workflow they are only relying on edge device for the whole data processing so no cloud. But our project has cloud for data storage

1. **Is the diet plan ML model only based on the user logged food or can it predict from the blood readings.**

It is based on the user logging, from the blood readings we could only determine the phenylalanine (component A) and tyrosine levels (component B).

1. **For your Smart PKU Monitoring System, are there any specific metrics you're planning to track for false positives or error handling? Also, you mentioned that phenylalanine (A) reacts with a cofactor (C) to form tyrosine (B). Could you explain how you're detecting or modeling this conversion in your implementation?**

As for the accuracy, we set a healthy threshold for the components. Additionally, we have set 2 level thresholds so the immediate alerts will be sent only if it crosses the second threshold. For the conversion part, the conversion happens in a healthy person, which apparently is missing in PKU patients. Due to which it directly affects their brain, and if left untreated could lead to severe disability.

1. **What happens if a patient happens to miss the alerts? How often is the PHE levels measured on the patient and how long will the edge device run for per checkup?**

If at all patient miss alerts, we are also having a hospital alert system which is happening at the fog node. So that won’t be a problem. PHE levels are measured periodically, our system is configured to take a reading every 15-30 minutes. This interval can be adjusted based on the patient’s condition.

1. **How are you planning to simulate this conversion process — especially the threshold detection and the absence of conversion in PKU patients? Are you using any biosensor data or synthetic datasets to replicate real conditions?**

Based on clinical references, we define threshold ranges where healthy individuals typically have phenylalanine levels between 0.5 to 2 mg/dL and tyrosine levels in the same range. In PKU patients, due to the absence of conversion, phenylalanine (comp A) accumulates (above 6 mg/dL) while tyrosine (comp B) remains low (below 0.5 mg/dL).We haven't considered the dataset aspect yet. We are working on it.

1. **I don't remember you guys displaying the Architecture diagram. I was pretty confused about how your edge node works (how will it handle if the node fails and how does we detect it) and what exactly is the fog node and where is it present. If possible, how are you going to implement it?**

The fog node receives data from the wearable, prioritizes tasks, runs ML models, and sends alerts. We have a backup fog node that stays in sync.  It uses a heartbeat system that keeps checking if the main fog node is active. If it doesn’t reply, the backup takes over automatically. The fog node is present at the hospital hub. We thought of simulating the architecture, not deploying it physically.

1. **Correct me if I am wrong. The edge node is the wearable where it offloads the data to the fog node where the ML model is running and sends alerts as you have mentioned here and back up is available for the fog node only. What is the processing which takes place at edge node and what about failure of edge node.**

At the edge level, it verifies the 2-level threshold criteria and sends the alert, respectively, also It will be recording the day's data and send it at the end of the day. For backup of the edge, we haven't planned to have any extra setup, but as of now, there will be a notification sent if the battery is low. Maybe we can further modify it to cover all the possible issues in the future.

**SUMMARY**

Our Smart PKU Monitoring System uses an edge–fog architecture to continuously monitor phenylalanine (A) and tyrosine (B) levels in PKU patients, with a 2-level threshold mechanism to reduce false alerts and prioritize emergencies. Basic checks and immediate alerts are handled on the edge device, while advanced ML processing and dietary suggestions are done at the fog node, which also manages hospital alerts and stores daily reports, with a backup node ensuring failover. The system is designed to work even offline, log readings locally, and sync when possible. Phenylalanine accumulation and low tyrosine, which indicate impaired conversion in PKU, are detected using simulated thresholds, and alerts are escalated if patients miss notifications. Overall, our approach focuses on reliable, low-latency monitoring, fail-safe operation, and task prioritization to support real-time patient care.