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**Major Project Progress Report**

**Device Monitoring and Management Using Eclipse Ditto and Digital Twin Technology**

MCA - IV Sem

Subject Code: CA7270

Submitted By

Dheeraj Sharma

23FS20MCA00065

Faculty Coordinator

Dr. Arpana Sinhal, Associate Professor

DEPARTMENT OF COMPUTER APPLICATION

**Objective:**

To design and deploy a scalable IIoT-based solution for remote motor monitoring and predictive maintenance, integrating advanced frameworks such as Eclipse Ditto, MQTT, Apache Kafka, and Grafana.

**Project Status:**

**Partially Completed**  
The project is progressing well, with all phases up to deployment successfully completed. Testing is currently pending and planned for completion soon.

**Completed Phases:**

1. **Requirement Analysis**:
   * Problem Definition and Feasibility Study.
   * Identified system and software requirements.
2. **Planning and Scheduling**:
   * Developed a detailed timeline and allocated resources efficiently.
3. **System Design**:
   * Created Data Flow Diagrams, ER Diagrams, and Schema Designs.
   * Built a modular system architecture for scalability and ease of integration.
4. **Development**:
   * Configured Tasmota Firmware on ESP32 devices for sensor data collection.
   * Deployed MQTT for lightweight communication between devices.
   * Integrated Eclipse Ditto for managing digital twins.
   * Designed dashboards using Grafana for real-time data visualization.
5. **Deployment**:
   * Successfully containerized the system using Docker.
   * Hosted services on AWS EC2, ensuring scalability and consistent performance.
   * Overcame deployment challenges, including MQTT connection errors and payload mapping issues.

**Pending Phase:**

**Testing**:

* **Objective**: Validate system accuracy, integration, and performance under real-world conditions.
* **Planned Activities**:
  + End-to-end testing of data flow (sensor to dashboard).
  + Payload transformation validation.
  + Resilience testing in simulated challenging environments.
  + Alert generation for predefined thresholds.
* **Estimated Completion Date**: 30-04-2025

**Challenges Faced and Solutions:**

1. **MQTT Connection Errors**:
   * Resolved by optimizing Tasmota configurations and broker settings.
2. **Authorization Issues in Eclipse Ditto**:
   * Addressed by using a stable Docker image version and updating configurations.
3. **Payload Mapping for Ditto**:
   * Implemented Python scripts to normalize data structure.

**Next Steps:**

1. Complete system testing and validate performance.
2. Generate final project report, including results and analysis.
3. Prepare a presentation for project demonstration.

**Remarks:**

The project is on track, with significant progress made. Once testing is completed, the system will be fully operational and ready for deployment in production environments.

Let me know if you need further modifications or additional details!