Orchestrix – Batching Plant Module

Technical Documentation (No Source Code Shared)

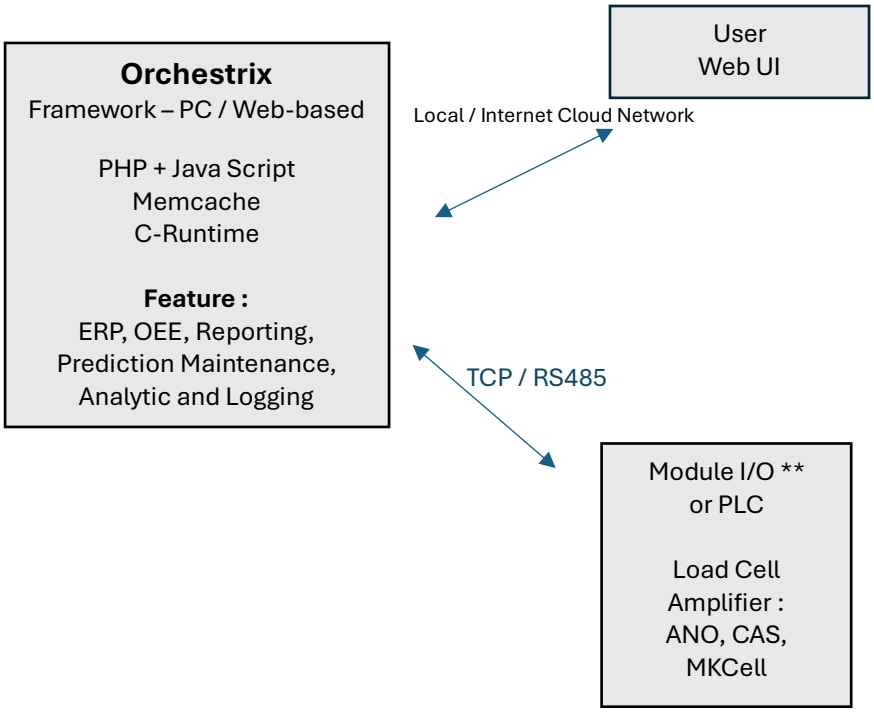
Overview

The **Orchestrix Batching Plant Module** is part of a lightweight industrial orchestration framework designed for real-time batching automation, ERP integration, OEE data collection, predictive maintenance, and centralized monitoring.

It connects directly to PLCs and load-cell amplifiers without requiring external bridges, making it extremely fast, reliable, and brand-agnostic

System Architecture

***Comparison with existing batching plant Architecture on the last page**



Frontend

- Web-based UI (JavaScript)

Backend

- PHP
- Custom C/C++ runtime modules
- Memcache (queue + caching layer)
- MySQL database

PLC Communications

Supports multiple industrial PLC brands:

- Mitsubishi Dedicated Protocol (reverse-engineered engineering protocol)
- Omron Protocol
- Schneider / Modbus
- Modbus TCP

Deployment

- FTP deployment via **WinSCP** (legacy industrial environment)

Batching Plant Features

Core Features

- ERP → Automatic batching job creation
- Real-time ingredient weighing
- Automatic sequence control (mixing, dosing, loading)
- Load cell amplifier integration
- Remote I/O & PLC command execution
- Real-time runtime logging
- Event monitoring + alarms
- Full traceability (batch history)

Operational Features

- Multi-plant centralized web control
- 1 operator can run multiple batching lines
- Remote troubleshooting & maintenance
- Brand-agnostic hardware support
- Very lightweight (no middleware bridge needed)

Performance & Impact

- **2+ years continuous operation** in real industrial environment
- Reduced downtime via predictive maintenance
- OEE insights for cycle time, machine utilization, quality
- Faster troubleshooting with centralized logs
- Reduced staffing → 1 operator can handle multi batching plant
- Seamless remote access lowers onsite technician visits

Data Intelligence & Analytics

Orchestrix generates:

- Material accuracy variance
- Cycle time distribution
- Batch quality metrics
- Equipment error patterns
- Predictive failure alerts
- Production volume summaries
- Capable of weighing operations without job order
- Minimizes material corruption and theft
- Provides deep analysis and historical quality records for batching plant performance

PLC Edge Integration

Orchestrix communicates directly with:

- Mitsubishi PLCs
- Omron PLCs
- Schneider PLCs (Modbus)
- Modbus TCP devices
- Load cell amplifiers

This allows:

- Fast message response
- Custom low-level C/C++ driver handling
- No OPC server required
- High performance in constrained environments

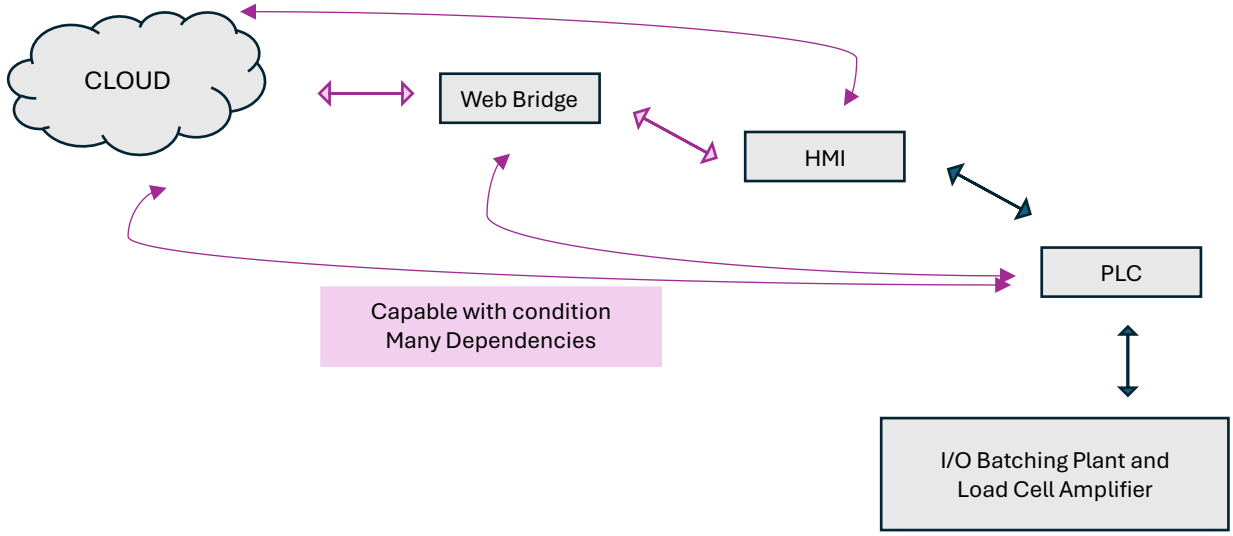
Author Contribution

This system and all components described in this document—including the architecture, PLC protocol implementation, runtime modules, backend services, data intelligence layer, and on-site commissioning—were fully designed and developed by the author.

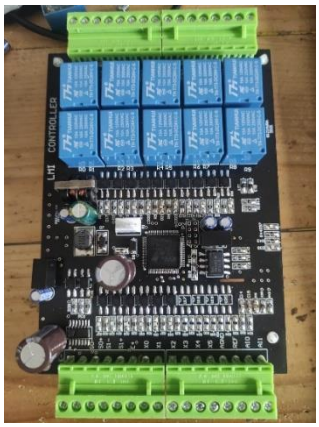
Note :

***Comparison with existing batching plant Architecture**

(not support OEE, ERP, or Reporting, just history of Batching plant)



** Custom Module I/O



ARM Based, high speed and support multiple machine types.