## **Smart Inventory Pallet System Architecture** for Beverage Warehouses **Cloud Services:** Multi-tenant SAAS Scalable message handling Real-time inventory tracking Business intelligence Cloud Layer - SAAS Platform Cloud Message Broker (MQTT/IoT Core) JSON Payload TLS/SSL (MQTT/HTTP) (Secure MQTT/HTTPS) **Communication Layer** Processing Logic: • Data validation Event classification Business logic Data enrichment Data Ingestion Service Internet (Lambda/Azure Functions) Warehouse Staff & Managers HTTPS SQL Insert/Update TCP/IP (Inventory Data) (Web Browser) SQL Query (Real-time Data) Wi-Fi Network Web Application Inventory Database (Warehouse LAN) (Dashboard UI) (PostgreSQL/MySQL) SQL Query (Historical Data) Reporting & Analytics Module Wi-Fi 802.11 (JSON over HTTP/MQTT) Edge Processing: • Real-time weight monitoring Local display updatesAutonomous operationEvent-driven transmission Edge Layer **Smart Pallet Unit** Core Functions: Analog Signal (mV) SPI Weight calculationTare & calibration (SCK/DOUT) HX711 Amplifier Pallet Structure Load Cell ESP32 MCU Event detection (Wi-Fi + Bluetooth) (20kg) (24-bit ADC) & Enclosure Wi-Fi managementData transmission I2C (SDA/SCL) 5V DC Power 5V DC Power 0.96\" OLED Display 3.3V DC Power Power Supply Unit (Battery/USB-C)