lamaPLC Comprehensive IoT Prototyping

This prototyping process adopts a multi-disciplinary approach to connect experimental electronics with industrial automation. The workflow is organized into four main stages:

Embedded Core & Intelligence

The system's core is built on versatile microcontrollers such as Arduino, ESP32, or MicroPython-compatible boards.

Firmware development involves implementing real-time data processing and logic in C++ using the Arduino IDE or in Python/MicroPython for quick, high-level scripting.

Connectivity is achieved through the ESP32's built-in Wi-Fi and Bluetooth, enabling smooth data exchange between the edge device and local networks.

Electronic Circuit Design

Conceptual circuits are converted into organized layouts using Fritzing.

Schematic Layout involves designing the physical connections between sensors, actuators, and the microcontroller.

PCB Preparation includes creating a visual breadboard view for initial testing, which is then transformed into a PCB (Printed Circuit Board) layout suitable for prototyping or low-volume manufacturing.

Mechanical Enclosure Design

To guarantee durability and an accurate fit, the physical housing is designed using SolidWorks.

CAD Modelling involves creating custom enclosures that account for component placement, thermal management, and port access.

Rapid Prototyping produces 3D-printable files (STL/STEP) to evaluate the device's ergonomics and mechanical stability before final assembly.

Industrial Integration & Communication

The final stage concentrates on field-level integration, allowing the IoT device to communicate with industrial systems.

Modbus Data Conversion involves implementing Modbus TCP or RTU protocols to connect sensor data with industrial networks.

For **Simatic S7 interfacing**, communication with Siemens Simatic S7 PLCs is established using libraries like Settino or via Modbus mapping. This enables the prototype to act as a smart remote I/O or gateway, transmitting field data directly to the factory automation layer.

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