Test and Demonstrate Your EMS with a Real-Time Microgrid HIL Platform

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A compact, cost-effective, and ready-to-deploy HIL (Hardware-in-the-Loop) platform designed to help you safely test, validate, and demonstrate your EMS in real time – without the need for physical microgrid hardware, costly MATLAB licenses, or in-house HIL specialists.

Based on a verified Simulink-based digital twin and deployed on a certified real-time platform (Speedgoat, dSPACE), the setup emulates realistic PV, BESS, load, and grid conditions – enabling faster development, higher reliability, and confident EMS demonstrations in a fully controlled environment.

Challenges EMS Developers Face

- Physical **test benches are unavailable** or unsafe to use early in development
- Debugging control logic directly on hardware introduces **costly risks**
- **Onboarding and training** engineers is inefficient without simulation tools
- EMS logic is **hard to explain or showcase** without a visual, working setup
- **Pre-commissioning** is often skipped, leading to integration delays on site

Solution Highlights

- Closed-loop communication via **Modbus TCP/RTU**, **CAN** (e.g. for BMS), and optional **DNP3**
- Real-time HIL simulation of **microgrid components**: PV, BESS, load, energy meter and grid
- Precompiled Simulink-based **digital twin**, requiring **no MATLAB license on the client side**
- **Detailed BESS model** with type-specific battery curves, CC/CV control, SOC/voltage constraints
- Built-in **test scenarios**, including PV ramping, SOC cycling, islanding, and more
- **Integrated GUI** for interactive testing, live demonstrations, and scenario control

Use Cases

- **Algorithm validation** and safe debugging in a controlled real-time environment
- **Customer demonstrations** and pilot testing without access to physical hardware
- **Training** and onboarding of EMS developers and integrators
- **Pre-commissioning** and fault response testing before field deployment

What You Get

- **Save time and cost** - skip building your own models or HIL infrastructure
- **No MATLAB required on your side -** just connect your EMS to the precompiled setup
- **No need to hire an in-house HIL specialist** – we handle model design and integration
- **Custom test modes and protocol mapping** – tailored to your EMS architecture
- **Scalable foundation** – extend later with predictive control, optimization, and digital twins

Extensibility

- The HIL setup is not a fixed black box – it's a **modular, upgradeable platform** that evolves alongside your EMS.
- We offer long-term support and development services to help you **extend and adapt your system** as your project scales:
- **Custom hardware expansion**: extend I/O, protocols, and interfaces based on your EMS architecture
- **Functional upgrades to the digital twin:** add new assets, control logic, grid conditions, or operating modes
- **Custom test scenario design:** simulate utility-specific workflows, edge cases, and fault conditions
- **Automated EMS testing**

Note: Hardware can be delivered via MW-Engineering as part of a turnkey package, or integrated with your existing real-time platform. All software, digital twin models, and EMS integration are developed and supported by MW-Engineering.

Interested?

Let's set up a short call to see how it can support your EMS development, testing, or demonstration activities.

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