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(57) Abstract :

A fail-safe smart switching system in the field of power control incorporates a microcontroller that processes real-time inputs from a manual two-way switch a local web interface, and cloud services via a Wi-Fi interface. The microcontroller employs hierarchical control logic to prioritize manual inputs, generating pulse width modulation signals to drive a servo motor connected by a threaded linkage for synchronizing the switch with its digital counterpart, while a relay module manages power delivery to an appliance load. Non-volatile flash memory stores operational states, ensuring consistency during transitions, and an integrated fault detection mechanism prompts the servo motor to actuate the manual switch upon anomalies, thereby providing robust cloud-local redundancy and fail-safe functionality.

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