Block Diagram Description & Requirements

User Communication: The user communication block is used to communicate with the user.

1. **LED** - Shows the current status of the plug. If it is currently in use or idle. Input comes from the MCU. The LED turns red when the plug is idle, turns green when it is in use.

2. **Wifi Module** - The user sends commands to the plug (on/off) using the wifi module. Input comes from the user or the microcontroller and is communicated to the MCU or the user. The power is drawn from the MCU. Need to support WPA2-AES/TKIP encryption.

AC->DC Converter: Takes input from the power supply main from the wall socket and gives a 7 V-10 V DC output to power the MCU. Also has a built-in regulator which protects the MCU from any AC power spikes. The

Power Source: Simple AC wall outlet. (110V - 130V AC)

MCU: This is the heart of the design with all communications occurring through here. Gets input from the Wifi module, and controls the transformer by turning it on or off and hence controlling the power supply to any connected appliances. Takes in power input from the AC->DC converter. Is able to toggle the transformer.

Transformer: Takes in power input directly from the main supply. Is controlled by the MCU which turns it on/off according to the user requirements. Gives the main output to the appliance that is attached to the plug. Can step up 130V AC to 230 V AC, and can also pass 130 V AC without any change.

Communication System:

1. **Phone App** - Consists of an user interface and an authentication system. Since our application include security device or health devices and security devices, the access and data connection needs to be secure. Requires SHA256 hashing to securely store password.

2. **Wireless Router** - Acts as a secure access point for connection to outlet. Need to support WPA2-AES/TKIP encryption.

3. Wifi module - The module found on the outlet, as described above.

Risk Analysis:
The transformer is the riskiest component of our design. This is because the transformer is handling very high AC voltages as compared to the rest of the circuit, therefore any minor glitches can lead to voltage leaks and which might result in the plug malfunctioning/blowing up.