AWG\_controller Class – Final Design Plan

# 1. Connection & Device Control Methods (Used in Settings Tab)

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| Method | Description |
| connect(ip\_address: str) | Connects to AWG over LAN using the provided IP. |
| disconnect() | Closes the current connection with the AWG. |
| status() | Queries the current connection status (used to control GUI freezing/unfreezing). |
| power\_on() | Sends SCPI command to power ON the AWG. |
| power\_off() | Sends SCPI command to power OFF the AWG. |
| output\_on() | Sends command to enable output signal from AWG. |
| output\_off() | Sends command to disable output signal. |

# 2. Waveform Control & Monitoring (Used in AWG Tab)

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| Method | Description |
| start\_waveform() | Sends command to start waveform generation when user clicks RUN. |
| stop\_waveform() | Sends command to stop waveform generation when user clicks ABORT. |
| get\_active\_channels() | Queries the currently active output channels (CH1–CH4) to toggle LED indicators in GUI. |
| generate\_sine(frequency: float) | Sends SCPI command to generate sine wave; simulates and returns waveform data for plotting. |
| generate\_lfm(chirp\_rate: float, pulse\_width: float, pulse\_repeat: float) | Sends command to generate LFM signal; simulates and returns waveform data. |
| generate\_ofdm(center\_freq: float, bandwidth: float) | Sends command to generate OFDM waveform; simulates and returns waveform data. |
| upload\_waveform(file\_path: str) | Loads waveform definition from .csv or .mat and sends it to AWG; also returns data for visualization. |

# 3. Voltage & Power Handling (Dynamic form updates in AWG Tab)

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| Method | Description |
| set\_voltage(voltage: float) | Sends voltage setting to device and calculates corresponding power. |
| set\_power(power: float) | Sends power setting to device and calculates corresponding voltage. |
| calculate\_power\_from\_voltage(voltage: float) | Internal method to compute power from voltage (based on system impedance). |
| calculate\_voltage\_from\_power(power: float) | Internal method to compute voltage from power. |

# 4. Logging & Command Tracking

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| Feature | Description |
| log\_command(command\_str: str) | Appends each executed SCPI command to device-specific log file (awg\_<ddmmyyyyHHMM>.log). |
| live\_command\_display(command\_str: str) | Sends current SCPI command to GUI (specific tab) for real-time display. |