

B. Example of Requirements List made with ReqGPT for a Smart Light Bulb

Prompt: Make an Engineering Requirements Document for {a Smart Light bulb}
Product Design Specifications Document for a Smart Light Bulb

1. Main Function

Description	<ul style="list-style-type: none">- The smart light bulb is designed to provide illumination with enhanced functionality through connectivity and intelligent features.- The primary purpose is to serve as a traditional light source while integrating smart home automation capabilities.
Key Features	<ul style="list-style-type: none">- Wi-Fi/Bluetooth Connectivity: Enables the bulb to connect to a smart home network.- Voice Control: Compatibility with voice assistants like Amazon Alexa, Google Assistant, and Apple Siri.- Remote Control: App-based control through a smartphone or tablet.- Scheduling: Ability to schedule on/off times and light levels.- Motion Detection: Automatic lighting based on motion detection.- Color Temperature Control: Adjustable color temperature from warm to cool.- Dimming Capabilities: Smooth dimming functionality.- Energy Efficiency: Designed to use less energy than traditional bulbs.- Multi-User Support: Allows multiple users to control the bulb from different locations.

2. Functionally Determined Properties

Performance Requirements	<ul style="list-style-type: none">- Power Output: Maximum 1600 lumens.- Efficiency: Minimum 80% energy efficiency rated by ENERGY STAR.- Input Voltage: 110-240V AC.- Operating Frequency: 2.4 GHz for Wi-Fi, 2.4 GHz for Bluetooth.- Lighting Modes: Multiple modes including standard, dim, warm, cool, and color changing.- Color Temperature Range: 2700K (warm) to 6500K (cool).- Brightness Levels: 0% to 100%.- Response Time: Less than 1 second for command execution.- Operating Modes: Ambient, task lighting, and accent lighting.
Functionality	<ul style="list-style-type: none">- Smart Home Integration: Must integrate with popular smart home systems.- App Interface: User-friendly mobile app for iOS and Android.- Voice Commands: Support for basic commands like "on," "off," "brightness," and "color."- Scheduling: Ability to set schedules for different days of the week and times of the day.- Motion Detection: Adjustable sensitivity and delay settings.- Firmware Updates: Over-the-air (OTA) firmware updates for security and feature enhancements.- Multi-Device Support: Compatibility with multiple smart devices and assistants.

3. Operational Properties

Operating Conditions	<ul style="list-style-type: none">- Temperature Range: -20Â°C to 50Â°C (-4Â°F to 122Â°F).- Humidity: 10% to 90% non-condensing.- Indoor/Outdoor Use: Suitable for indoor use only.- EMI/RFI Shielding: Effective shielding to prevent interference with other devices.- Lighting Conditions: Operates under various lighting conditions including direct sunlight and low light environments.
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<i>User Interaction</i>	<ul style="list-style-type: none"> - <i>Mobile App: Intuitive app interface with easy-to-navigate menus.</i> - <i>Voice Interface: Clear voice prompts and feedback.</i> - <i>Mechanical Controls: Minimal physical buttons, perhaps just a power button.</i> - <i>LED Indicators: Visual indicators for power, connectivity, and operational status.</i> - <i>Feedback Systems: Immediate visual and auditory feedback for user actions.</i>
<i>Support Systems</i>	<ul style="list-style-type: none"> - <i>Network Requirements: Stable Wi-Fi connection with 2.4 GHz band support.</i> - <i>Software Requirements: Compatible with iOS 10+ and Android 5.0+.</i> - <i>External Devices: Compatibility with smart home hubs and routers.</i> - <i>Customer Support: 24/7 customer support hotline and online chat.</i> - <i>Firmware Updates: Regular firmware updates available through the mobile app.</i>

4. Service Life and Maintainability

<i>Expected Lifespan</i>	<ul style="list-style-type: none"> - <i>Operational Lifespan: 15,000 hours (equivalent to 10 years of operation at 3 hours per day).</i> - <i>Maintenance Intervals: Minimal maintenance required; check connections every 6 months.</i> - <i>MTBF (Mean Time Between Failures): 50,000 hours.</i>
<i>Common Pitfalls and Important Product Parts</i>	<p><i>Core Modules:</i></p> <ul style="list-style-type: none"> - <i>LED Module: High-efficiency LED array.</i> - <i>Control Board: Microcontroller unit for smart functionality.</i> - <i>Power Supply: Adjustable AC/DC power supply.</i> - <i>Connectivity Module: Wi-Fi and Bluetooth chips.</i> - <i>Sensors: Motion and light sensors.</i> <p><i>Fault Tolerance:</i></p> <ul style="list-style-type: none"> - <i>LED Failure Rate: Less than 1% per 10,000 hours.</i> - <i>Connectivity Loss Rate: Less than 0.1% per 10,000 hours.</i> <p><i>Redundancy Systems:</i></p> <ul style="list-style-type: none"> - <i>Backup Power: Battery backup for up to 2 hours of operation during power outages.</i> - <i>Dual-Band Connectivity: Fallback to Bluetooth if Wi-Fi connection is lost.</i>
<i>End-of-Life Handling</i>	<ul style="list-style-type: none"> - <i>Recycling: LED components and circuit boards should be recyclable.</i> - <i>Refurbishing: Options for refurbishing bulbs with minor wear and tear.</i> - <i>Disposal: Environmentally friendly disposal procedures for non-recyclable parts.</i> - <i>Environmental Impact: Minimize use of hazardous materials like lead and mercury.</i>
<i>Service Manuals</i>	<p><i>Maintenance Procedures:</i></p> <ul style="list-style-type: none"> - <i>Bulb Replacement: Step-by-step guide for replacing the LED bulb.</i> - <i>Firmware Updates: Instructions for updating firmware via the mobile app.</i> - <i>Troubleshooting: Common issues and solutions for connectivity, power, and performance problems.</i> <p><i>Schematic Diagrams: Detailed diagrams of the internal circuitry and component layout.</i></p> <p><i>Parts List: Comprehensive list of all parts with part numbers and suppliers.</i></p>
<i>Standardized Parts</i>	<ul style="list-style-type: none"> - <i>LED Module: Standardized across all models.</i> - <i>Control Board: Modular design with interchangeable components.</i> - <i>Power Supply: Standardized AC/DC adapter.</i> - <i>Sensors: Standard motion and light sensors.</i> - <i>Connectivity Modules: Universal Wi-Fi and Bluetooth chips.</i>

5. Safety

<i>Fail-Safe Mechanisms</i>	<p><i>Auto-Shutoff Features:</i></p> <ul style="list-style-type: none"> - <i>Overheat Protection: The bulb should automatically shut off when internal temperature exceeds 120Â°C (248Â°F).</i>
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	<ul style="list-style-type: none"> - <i>Power Surge Protection:</i> Built-in surge protector to cut off power during voltage spikes. - <i>Timer-Based Shutoff:</i> Automatically turn off after a predefined period (e.g., 8 hours) if no command is received.
Protective Features	<p><i>Guards and Shields:</i></p> <ul style="list-style-type: none"> - <i>Glass Cover:</i> Tempered glass to prevent breakage. - <i>Electrical Insulation:</i> Double-layered insulation to prevent electrical leakage. <p><i>Testing Methods:</i></p> <ul style="list-style-type: none"> - <i>Drop Test:</i> Must withstand being dropped from a height of 1.5 meters without functional damage. - <i>Moisture Resistance Test:</i> Pass IP65 water and dust resistance test. <p><i>Warnings:</i></p> <ul style="list-style-type: none"> - <i>On-Device Labels:</i> Clear warnings about high temperatures and the risk of electrical injury. - <i>User Manual:</i> Detailed safety instructions included in the product manual.

6. Ergonomic Properties

User Interface	<p><i>Control Types:</i></p> <ul style="list-style-type: none"> - <i>Touch Controls:</i> Capacitive touch sensors on the bulb for basic functions. - <i>Mobile App:</i> Advanced settings and customization via the mobile app. - <i>Voice Control:</i> Integration with voice assistants for hands-free operation.
Accessibility	<p><i>Maintenance Access:</i></p> <ul style="list-style-type: none"> - <i>Removable Cover:</i> Easy-to-remove cover for accessing internal components. - <i>Tool-Free Design:</i> No need for specialized tools for maintenance. <p><i>Modular Design:</i></p> <ul style="list-style-type: none"> - <i>Replaceable Components:</i> LED module, control board, and power supply can be replaced independently. - <i>Standard Connections:</i> Use of standardized connectors for easy replacement and upgrades.
Physical Comfort	<p><i>Ergonomic Shape:</i></p> <ul style="list-style-type: none"> - <i>Bulb Design:</i> Slightly asymmetrical design to avoid glare. - <i>Interaction Points:</i> Smooth edges and rounded surfaces for user comfort. <p><i>Height Adjustability:</i></p> <ul style="list-style-type: none"> - <i>Mounting Options:</i> Optional mounting bracket with adjustable height.
Visual and Auditory Feedback	<p><i>Visual Signals:</i></p> <ul style="list-style-type: none"> - <i>LED Indicators:</i> Multi-color LEDs to indicate power, connectivity, and operational status. - <i>Status Display:</i> On-screen notifications in the mobile app. <p><i>Auditory Signals:</i></p> <ul style="list-style-type: none"> - <i>Sound Alerts:</i> Audible tones for successful commands and errors. - <i>Voice Announcements:</i> Voice prompts for operational status and user actions.
Dimensions	<p><i>Exact Dimensions:</i></p> <ul style="list-style-type: none"> - <i>Height:</i> 120 mm - <i>Diameter:</i> 50 mm <p><i>Space Requirements:</i></p> <ul style="list-style-type: none"> - <i>Ventilation:</i> Minimum 10 mm clearance for airflow. - <i>Connections:</i> Additional 20 mm clearance for power and data cables.

7. Appearance and Design

Aesthetic Design	<p><i>Visual Appeal:</i></p> <ul style="list-style-type: none"> - <i>Color Options:</i> Available in white, black, and metallic finishes. - <i>Shape:</i> Sleek, cylindrical design with a smooth finish. <p><i>Trend Alignment:</i></p> <ul style="list-style-type: none"> - <i>Minimalist Design:</i> In line with current home automation trends.
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	- Customizability: Optional custom color options for bulk orders.
Finish and Materials	<p><i>Durable Finishes:</i></p> <ul style="list-style-type: none"> - Electroplating: For metallic finishes to prevent corrosion. - Powder Coating: For non-metallic parts to ensure durability. <p><i>Material Choices:</i></p> <ul style="list-style-type: none"> - Glass: Tempered glass for the outer casing. - Plastic: High-impact ABS plastic for non-glass parts.
Branding	<p><i>Logo Placement:</i></p> <ul style="list-style-type: none"> - Front Panel: Small, illuminated logo near the base. - Color Scheme: Align with the brand's color palette. <p><i>User Experience:</i></p> <ul style="list-style-type: none"> - Branded App: Custom app with branding elements and intuitive UX. - Packaging: Attractive, eco-friendly packaging reflecting the brand image.

8. Law and Standards

Regulatory Compliance	<p><i>Local Regulations:</i></p> <ul style="list-style-type: none"> - Safety Standards: Comply with local electrical safety regulations. - Environmental Laws: Adhere to regulations for disposal and recycling. <p><i>National Regulations:</i></p> <ul style="list-style-type: none"> - ENERGY STAR: Must meet ENERGY STAR requirements for energy efficiency. - FCC: Compliance with Federal Communications Commission regulations for wireless devices. <p><i>International Regulations:</i></p> <ul style="list-style-type: none"> - RoHS: Restriction of Hazardous Substances Directive compliance. - WEEE: Waste Electrical and Electronic Equipment Directive compliance for recycling.
Certifications	<p><i>Required Certifications:</i></p> <ul style="list-style-type: none"> - CE Mark: Conformity with European health, safety, and environmental protection standards. - FCC Certification: Compliance with U.S. Federal Communications Commission regulations. - ISO 9001: Quality management system certification. <p><i>Certification Plan:</i></p> <ul style="list-style-type: none"> - Testing Phases: Pre-production testing for compliance. - Responsible Parties: Assign an internal compliance officer and external certification agency.
Relevant Patents	<p><i>Existing Patents:</i></p> <ul style="list-style-type: none"> - Patent 1234567: Covers wireless control of lighting fixtures. - Patent 8765432: Relates to dimmable LED bulbs with color temperature control. <p><i>Affected Aspects:</i></p> <ul style="list-style-type: none"> - Connectivity: Must use proprietary or licensed wireless technology. - Color Temperature Adjustment: Must innovate around existing mechanisms or obtain licensing.

9. Economics

Pricing Strategy	<p><i>Budget Pricing:</i></p> <ul style="list-style-type: none"> - Price Range: \$20 - \$40 - Features: Basic Wi-Fi connectivity, limited color options, no app integration. <p><i>Middle of the Market:</i></p> <ul style="list-style-type: none"> - Price Range: \$50 - \$80 - Features: Full smart home integration, multiple color options, app control, voice assistance.
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	<p><i>Premium:</i></p> <ul style="list-style-type: none"> - <i>Price Range: \$100 - \$150</i> - <i>Features: Advanced features like customizable scenes, enhanced security, superior build quality.</i>
Alternative Revenue Strategies	<p><i>Subscription Model:</i></p> <ul style="list-style-type: none"> - <i>Service: Monthly subscription for advanced features like remote diagnostics and extended warranty.</i> - <i>Content: Access to exclusive lighting scenes and patterns.</i> <p><i>Consumables:</i></p> <ul style="list-style-type: none"> - <i>Bulbs: Sell replacement bulbs at a lower cost with higher margins on the main product.</i> - <i>Accessories: Additional sensors and control units.</i> <p><i>Freemium Model:</i></p> <ul style="list-style-type: none"> - <i>Base Product: Offer the basic product for free with in-app purchases for additional features.</i> - <i>Advertising: Incorporate non-intrusive ads in the mobile app for revenue.</i>

