**Solution**

**Hardware Setup**

* *IoT Devices*: Acquire IoT-compatible light bulbs or smart switches capable of wireless network control.
* *Motion Sensors*: Procure motion sensors with the capability to detect human presence or movement.
* *IoT Gateway*: Select an appropriate IoT gateway or hub for seamless connectivity and management of IoT devices.

**IoT Communication**

* *Select IoT Protocol*: Choose a communication protocol (e.g., MQTT, HTTP, CoAP) for efficient data transmission among IoT devices.
* *Connect IoT Devices*: Configure and establish connections between IoT devices and the designated IoT gateway.

**Cloud Platform Setup**

* *Choose Cloud Service*: Opt for a reputable cloud service provider (e.g., AWS, Azure, Google Cloud) to host the IoT backend infrastructure.
* *Set Up Cloud Database*: Establish a database to store critical information related to device states, user preferences, and activity logs.
* *Implement Server Functions*: Develop server-side functions responsible for managing device states and addressing user requests.

**Web Application Development**

* *Choose Web Framework*: Select a web development framework (e.g., React, Angular, Vue.js) for building the web application component.
* *Create Web Interface*: Craft a user-friendly interface enabling control of the smart lighting system via web browsers.
* *Connect to IoT Backend*: Develop code for interaction with the cloud platform, facilitating command transmission to IoT devices.
* *Implement User Authentication*: Ensure secure access to the web application through proper authentication methods.

**IoT Device Integration**

* *Configure IoT Devices*: Establish connections between IoT devices and the cloud platform using the selected communication protocol.
* *Handle Device States*: Develop logic to manage the operational states of IoT devices based on user input and sensor data.

**Implement Automation Rules**

* *Define Rules*: Establish rules based on sensor data to automate lighting adjustments, such as activating lights when motion is detected.
* *Integrate Rules Engine*: Implement a rules engine that evaluates conditions and triggers corresponding actions.

**Testing**

* *Unit Testing*: Conduct comprehensive testing of individual components (mobile app, web app, server functions) to ensure proper functionality.
* *Integration Testing*: Verify seamless communication between different parts of the system.
* *User Acceptance Testing (UAT)*: Engage users to test the system, gather feedback, and identify potential areas for improvement.

**Deployment**

* *Deploy Cloud Services*: Launch the cloud backend and database on the chosen cloud service provider's platform.
* *Publish Mobile App*: Release the mobile app on relevant app stores (e.g., Apple App Store, Google Play Store).
* *Host Web Application*: Deploy the web application on a web server accessible via a URL.

**Maintenance and Updates**

* *Monitoring and Analytics*: Implement monitoring solutions to track system performance and user activity.
* *Regular Updates*: Continuously enhance the system by incorporating new features and addressing any identified issues.