FUNCTIONAL REQUIREMENTS

**1.HACS AUTHENTICATION SYSTEM**

* Function Name: User Authentication (Login/Signup)
* Trigger: User opens the app and attempts to log in or sign up.
* Preconditions:
* User has installed the application.
* Internet/DB connection available.
* For signup: User must provide valid details (username, password, email/phone).
* Postconditions:
* Valid login → User redirected to Home Page.
* Invalid login → User receives error message.
* Business Rules:
* Password must meet security requirements.
* Duplicate usernames not allowed.
* Only registered users can access appliances.
* Data Manipulated:
* User credentials stored in database.
* Session tokens generated for active login.
* Normal Processing Procedure:

1. User enters credentials.  
2. System checks database for matching record.  
3. If found → establish session and go to Home Page.  
4. If not found → show error.

* Variations:  
  Login via Google/Gmail authentication.  
  Login via Biometric authentication.
* Exceptions:  
  Invalid password → “Try again” message.  
  Account not found → Suggest signup.  
  Forgotten password → Redirect to “Forgot Password” flow.
* Hacks (Optional Features):  
  Quick OTP login via mobile number.

**2.APPLIANCE CONTROLLER – GENERAL**

* Function Name: Appliance Control (On/Off/Mode/Schedule)
* Trigger: User selects an appliance from Home Page.
* Preconditions:
* User must be logged in.
* Device must be connected to controller.
* Postconditions:
* Appliance state updated (ON/OFF or Mode Changed).
* System logs the action in history.
* Business Rules:
* One user action at a time for each appliance.
* Scheduling cannot overlap with manual ON/OFF.
* Data Manipulated:
* Appliance status (ON/OFF, Mode, Timer).
* Energy consumption logs.
* Normal Processing Procedure:

1.User selects appliance (e.g., Light, AC, Microwave).  
2. System fetches current status.  
3. User chooses operation (ON, OFF, Mode, Timer).  
4. Controller sends command to appliance.  
5. Appliance status updated in database.

* Variations:
* Group control (turn off all appliances in a room).
* Voice command execution (future enhancement).
* Exceptions:
* Appliance not connected → “Device Offline” message.
* Wrong command format → Reject and prompt again.
* Hacks: Auto cut-off for devices left ON beyond a certain time.

**3. Energy Consumption Monitoring**

* Function Name: Energy Usage Report
* Trigger: User opens energy report from Home Page.
* Preconditions: At least one appliance has logged usage data.
* Postconditions: Report displayed with time and units consumed.
* Business Rules: Data stored for last 30 days by default. Reports can be exported.
* Data Manipulated: Appliance usage logs. User’s energy history.
* Normal Processing Procedure:

1.User selects “Energy Report” option.  
2. System fetches consumption data from DB.  
3. Display usage chart (daily/weekly/monthly).

* Variations:
* Compare usage between rooms.
* Suggest energy saving tips.
* Exceptions: No data → Display “No usage yet.”

**4. Appliance Controller List**

*Here’s the room-wise appliance mapping from your draft:*

* Living Room: Lights, Fan, AC, TV, Automatic Curtains
* Kitchen: Chimney, Refrigerator, Stove/Oven, Purifier, Dishwasher
* Bedroom: Lights, Fan, AC, TV, Automatic Bed
* Bathroom: Lights, Fan, Heater, Shower
* Dining Room: Fan, Lights
* Storeroom: Fan, Lights
* Laundry Room: Washing Machine, Dryer
* Playroom/Gym: Fan, Lights
* Outdoor/Garden: Sprinkler, Grass Cutter, Motor, Garden Lights
* Garage: Door, Smart Lock
* Swimming Pool: Pump, Cleaner, Heater
* Security: CCTV Surveillance, Alarm System