**Assumption**

* A1 : No concurrent user accesses. e.g.
  1. Access through a control panel and access through a web page are exclusive; both cannot happen at the same time.
  2. Only one control panel is installed in a house
* A2 : Internet connection between a homeowner (i.e., homeowner’s smartphone or notebook) and the SafeHome system is always available.
* A3 : All devices including cameras, sensors, and the SafeHome main system communicate using IEEE 802.11x protocol.

**Functional Requirements**

1. SafeHome bootup/shutdown service
   1. Self-diagnosis – check whether connected sensors and cameras are ok.
   2. Initialize/finish sensors
   3. Initialize/finish cameras
2. Configuration service
   1. Password
      1. Type of password
         1. Control panel - digits
         2. Web access – alphabets and digits
      2. Length of password
         1. Control panel – 4 digits
         2. Web access – at least 8 characters
   2. Floor plan
      1. Floor structure
         1. Distance scale
         2. Wall
         3. Door
      2. Registering new devices
      3. Relocating devices
   3. Security zone – a set of devices (e.g., sensors and cameras) which are manipulated as a group
   4. Backup plan for power off – Which devices could be turned off? Which devices should be turned on?
   5. Session timeout – See [5.A Athentication.session](#_Hlk418156511).
3. Real-time security service
   1. Arming the entire SafeHome system
   2. Disarming the entire SafeHome system
   3. Arming device(s)
   4. Disarming device(s)
   5. Alarming methods – Sound alarm, SMS, smartphone push alarm, and so on.
   6. Enabling travel mode – Turning lights on/off
   7. Sensor
      1. Types
         1. Motion detector
         2. Window sensor
         3. CO2 sensor
         4. Fire sensor
         5. Doggie angst sensor
      2. Output data format – binary, real number, or complex data?
   8. Camera
      1. Recording
         1. Format of movie – H264, MPEG, and so on
         2. Quality of movie – minimum required FPS issue
      2. Viewing
         1. A single camera
         2. All cameras through thumbnail view
      3. Controlling
         1. Zooming
         2. Panning
      4. Movie storage
4. User-requested information retrieval service
   1. Finding ID/Password
   2. Reporting system usage pattern
   3. Reporting web page access history
   4. Replaying recorded movie
5. Authentication
   1. Session
      1. Closing a session after certain timeout; See [2.E Session timeout](#_Hlk418156781).
   2. Control panel
      1. Input control panel password e.g. 4-digits password
      2. Access permission is granted to only one session. See [Assumption A1](#_Hlk418156474)
   3. Webpage
      1. Input ID and password(s) e.g. ID and two passwords
      2. Access permission is granted to only one session. See [Assumption A1](#_Hlk418156474)
6. User interface
   1. Control panel
      1. Input device – Keypad (12 keys)
      2. Output device
         1. LED notification (arm on/off and power on/off status)
         2. LCD display description
   2. Web page
      1. Configuration features. See [2. Configuration service](#_Hlk418157040).
      2. Real-time security features; See [3. Real-time security service](#_Hlk418157017).
      3. Reporting service features; See [4. User-requested reporting service](#_Hlk418156992).
      4. Web page should be designed mobile-friendly.

**Nonfunctional Requirements**

* SafeHome system should respond to sensor events in real-time.