CS575 Assignment 1 – Build and Describe an Architecture for an IoT device

1. Prerequisites and inbuilt features:

    a. The patient, caregiver and the clinical team should have the Smart Pill application in their smartphone.
    b. Pillbox hub and Smart Pillbox application from smartphone should be connected to the same Wi-Fi network.
    c. Pillbox comes with Type C port to charge the inbuilt battery in the pillbox (8 hours standby time).
    d. From the Smart Pill Box application, users can connect to more than one pillbox under one smart hub. Smart pillbox hub will be using Z-Wave network to connect to individual pillboxes.
    e. The hub should be charged via the inbuilt type C port or should be kept in charge so that the patient/clinical team person/caretaker can easily connect to the smart pillbox through the Smart Pillbox application. The user can search and add for the available pillboxes from the installed smartphone app and they can connect to it (only if the pillbox is turned on). In that same way, the user can add multiple pill vials under the same user account/application.
    f. From the Smart Pillbox application, the Caregiver or the clinical team can set up an individual weight of a single pill and the time duration/frequency of each medicine should be taken by the patient.
    g. Smart Pill Vial application in the smartphone should have access to the GPS and periodically stores the location of the vial being used with the mobile device.
    h. Pillbox has the inbuilt micro temperature sensor which periodically saves the temperature inside the vial into the Smart Vial application.
    i. Pillbox has the inbuilt installed LED light, small speaker and vibrator for alert purpose.
    j. Pillbox has the inbuilt Bluetooth transmitter and the receiver.
    k. Pillbox has an inbuilt integrated clock.

2. Five features of an IoT Smart Pill Vial

a) **Feature 1**
The pill vial will have an integrated clock that is updated automatically over the network so that if the time-sensitive medicines are on the list, integrated clock sensor will alert the user by turning on the LED light (blue), Vibration and beep noise from the vial. Also, it will trigger the alert to the Patient's and Caregiver's smartphone Smart Pill Vial application as a reminder.

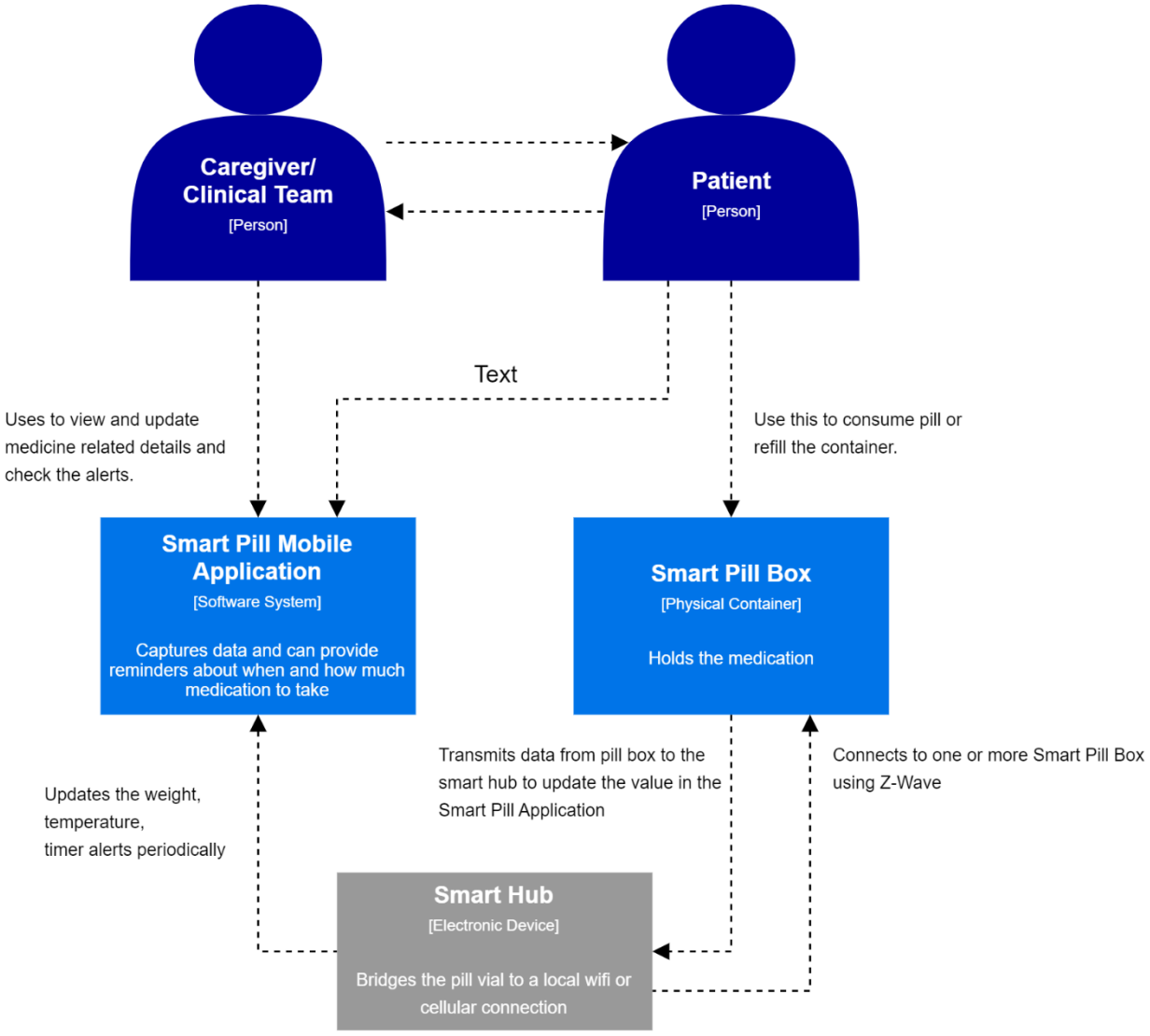
b) **Feature 2**
If the critical and time-sensitive medicines are not taken during the specified amount of time, alerts will be triggered from the pill vial to the smart vial app on the caregiver's and the clinical's team smart phone. The inbuilt weighing sensor in the vial will deduct the weight of the pills and if the weight does not get reduced from the previously saved weight it will trigger an alert to the caregiver's and the clinical person's smartphone application and also it will alert user from Pill box's LED (Red), vibration and beep noise from the Vial.

c) **Feature 3**
Smart pill vial application will periodically save the location of the pillbox when it paired to the pillbox via Z-Wave. If the patient lost the pill vial medicine or misplaced it somewhere else inside the home. Patients can find the vial from the smartphone application, specific feature from that application will allow the user to track the vial based on the latest data from integrated GPS tracker from the vial and if the vial has battery power, they will be able to vibrate, enable beeping tone and blink green LED light on the vial through the application anytime.

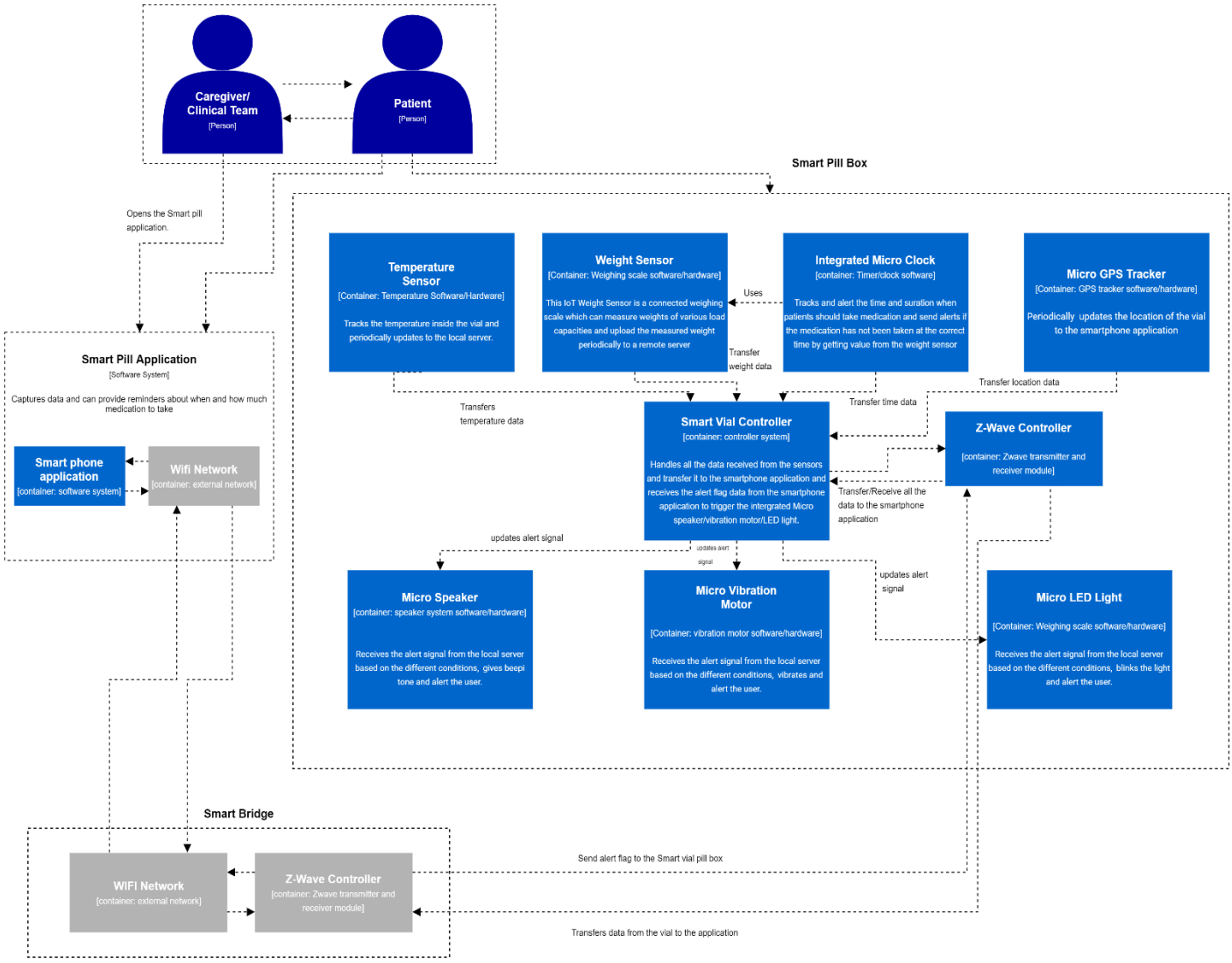
d) **Feature 4**
For all the connected pillboxes. If the weight of each vial about to reach zero, weighing sensor from the pillbox will trigger an alert to the application and the smartphone application will automatically alert the clinical team and the caregiver. So that, they can re-stock the medicines. Also, alert to the patient from the pillbox in the form of LED blink (yellow), vibrate and beeping noise.

e) **Feature 5**
If the temperature inside the pillbox goes below or above the standard value, then the alert will get triggered to the smartphone application to indicate the user that it should be kept in a dry and cool place. Alert is in the form of notification to the phone from the application and red blinking alert, beep noise and vibration on the pillbox.

3. System Context diagram for the Smart Pill Vial application



4. System Container diagram for the Smart Pill Vial application



Please click this to see the diagram in full view → IOT_Container.png