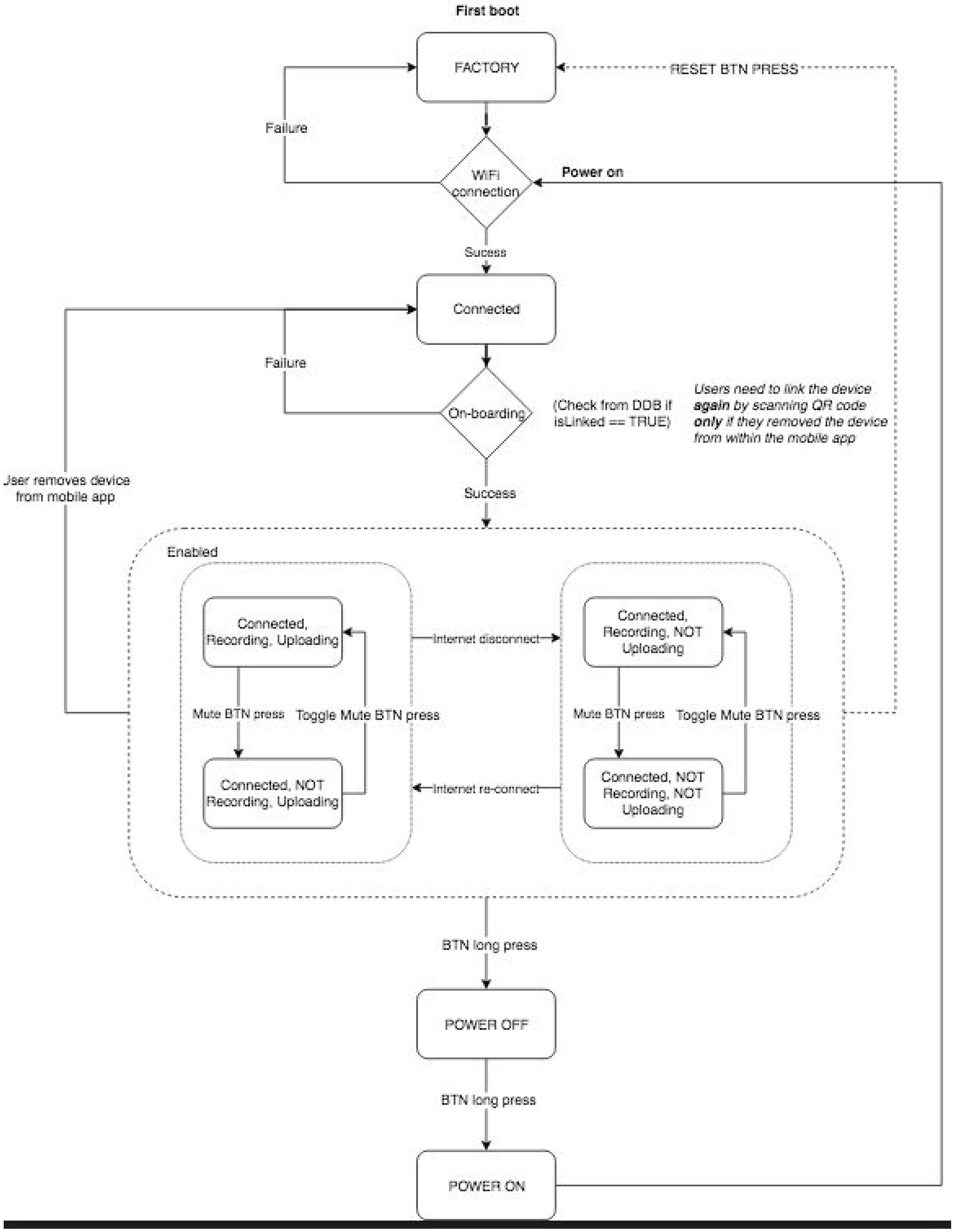
Notes:

- AI7688H runs on Linux platform (Openwrt)
- Openwrt is used across multiple chipsets that are used in WiFi routers.
- Firmware for Oya was developed on top of LinkIt's feeds for Openwrt which has driver for WM8960 audio codec. Headphones and microphones (not speaker)
- The Schematic design is borrowed largely off of Seeed's ReSpeaker Core V0.

Design:


First boot
FACTORY
RESET BTN PRESS
Failure
WiFi connection
Power on
Sucess
Connected
Failure
On-boarding
(Check from DDB if isLinked == TRUE)
Users need to link the device again by scanning QR code only if they removed the device from within the mobile app
Jser removes device from mobile app
Success
Enabled
Connected, Recording, Uploading
Internet disconnect
Connected, Recording, NOT Uploading
Mute BTN press
Toggle Mute BTN press
Mute BTN press
Toggle Mute BTN press
Connected, NOT Recording, Uploading
Internet re-connect
Connected, NOT Recording, NOT Uploading
BTN long press
POWER OFF
BTN long press
POWER ON

The firmware design is roughly based on the above flow chart. The actual implementation, however, differs in some aspects.

Components:
The functional parts of the firmware was divided into processes that run independently of each other but restarts based on changes in states (such as WiFi connection status, internet connection status, Button press to mute the microphone etc.)

1. Flask server: for user on-boarding.
2. Internet status: regularly checks if the device is connected to the internet
3. MQTT: Starts the MQTT process and subscribes to the relevant topic for publishing device states and subscribe to relevant topics for receiving remote commands (subscription incomplete)
4. Recording: To record
5. Uploading: To upload
6. UART: To communicate with the TI MCU for controlling LEDs and receiving interrupts from buttons etc., (incomplete)
7. IsLinked: to check if the device is linked to a particular user (i.e, if the device ID is mapped to a UserID on the backend)
8. *Oya: used it for testing purposes only*

Files and processes:
All functions are written as Linux process
(https://oldwiki.archive.openwrt.org/doc/techref/initscripts)

Files under /*oya_package/files/etc:*

/oya_package/files/etc/init.d

1. Files under the above directory define start(), stop() and boot() functions. See code for reference and comments.

/oya_package/files/etc/uci-default

1. *Z_oya_01_init* - Grant permissions to newly written Linux processes.
2. *Z_oya_02_config* - Set up host name as Oya and set WiFi SSID and password

Files under */oya_package/usr/bin:*

Custom linux commands for getting/setting states, pid and other relevant functions that needs to be called within processes by reading state files.

For example: Internet connection status is stored in ***/Oya/internet_status/connected*** as 0 or 1. To get the connection status, the file in **/usr/bin/internet_status** defines a command `internet_status connected get` would return 0 or 1.

Functions:
All functions are stored under **/Oya.** Refer to the individual files and comments for notes on the actual implementation of the functions.

State changes:
Any change in states such as internet disconnection or change in recording duration, etc. changes the state file first, calls a commit which restarts all related functions and sends the LED command via UART. Please check the commit command under */usr/bin/internet_status* for reference.