

YCProductSDK revision history

Version	Content description	Revision date	Revised by
1.0.0	1. Swift initial version	2022-09-16	Mark
1.1.0	2.Support JL platform	2023-05-06	Mark
1.2.0	3. Merge codes from different platforms	2023-12-30	Mark

1 Overview

This document will explain the APIs and usage scenarios related to the functions used in the Bluetooth device.This document is only applicable to wearable devices such as bracelets or watches made by Yucheng.

1.1 Applicable readers

For engineers who use this document for APP development, they should have the following basic skills:

1. Have basic iOS development experience
2. Need to master the Swift language and have the knowledge reserve of mutual calling between Objective-C and Swift.
3. Understand the basic process of Bluetooth development in iOS

1.2 Related terms

App: This article refers to applications running on mobile phones or tablets

Device: This article refers to wearable hardware devices: such as bracelets, watches, etc.

Upload: Refers to the device sending data to the App

Delivery: Refers to the app sending data to the device

1.3 Description

1. All the APIs in the document will be demonstrated in the corresponding Demo. For the functions of the bracelet, you can refer to the SmartHealth application published in the AppStore for use. Combining the experience of using and reading this document will greatly improve efficiency.
2. The API in the document does not apply to all devices, that is, the device may only support some of the functions in the API, and it can be judged whether it is available through the return value or attribute of the API.
3. In the development and debugging stage, it is strongly recommended that you turn on the log switch to facilitate error information to help locate the problem.
4. This document only describes the Swift version. If you use Objective-C language to develop, you can combine the document and use Xcode's smart prompts to call the corresponding Method.
5. For the introduction of API, the principle is to explain according to the classification of instructions. If there are related functions, it may be put in a chapter or a mark that refers to the API will be introduced.

2. SDK integration instructions

2.1 SDK Description

2.1.1 Resource overview.

Some functions in the SDK, such as OTA long class, depend on some third-party library files, which are provided in the SDK resource package, and will be mentioned in the document when needed.

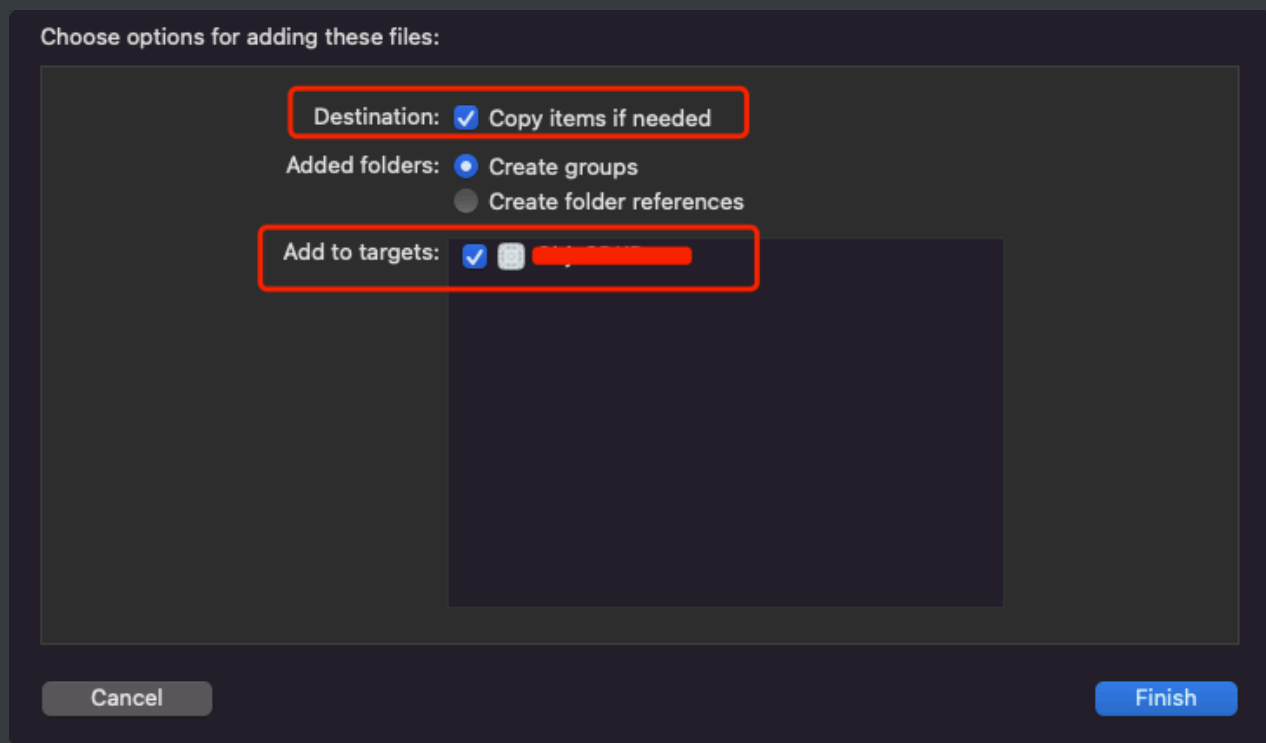
In addition, it should be noted that the SDK does not provide the simulator version, because BLE cannot be debugged on the simulator, and the third-party libraries we rely on do not support running in the simulator environment.

2.1.2 Instructions

1. There are a lot of type declarations in the API, which will only be explained when they are used.
2. If you find that some types are not given instructions when reading the document, you can use the global search Method, which may have been given in other places.
3. If the entire document does not give a definition, you can write this type directly in Xcode, and then use the Xcode jump function to jump to the internal definition of the framework.
4. In the process of using the SDK, if you encounter a problem, you can first try to use our application or Demo to determine whether the device itself is faulty, or there is a bug in the SDK, etc., and give us feedback in time.

2.2 Integrated SDK

1. Directly drag the library files in Lib into the project.



Frameworks, Libraries, and Embedded Content

Name	Embed
DFUnits.framework	Do Not Embed ↕
JL_AdvParse.framework	Do Not Embed ↕
JL_BLEKit.framework	Do Not Embed ↕
JL_HashPair.framework	Do Not Embed ↕
JL_OTALib.framework	Do Not Embed ↕
JLDialUnit.framework	Do Not Embed ↕
libc++.tbd	
libconv.tbd	
RTKLEFoundation.framework	Embed & Sign ↕
RTKOTASDK.framework	Embed & Sign ↕
YCProductSDK.framework	Do Not Embed ↕
ZipZap.framework	Do Not Embed ↕

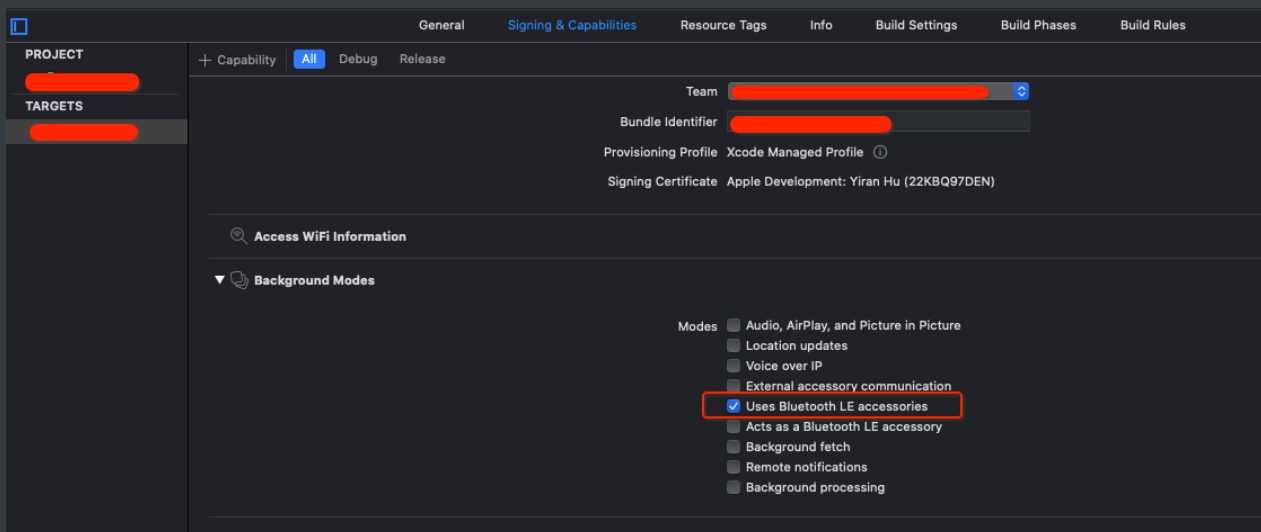
2. Configure the info.plist file

The use of Bluetooth needs to be explained in the info.plist, the keys used in the versions before and after iOS13 are different

NSBluetoothAlwaysUsageDescription (iOS 13+)

NSBluetoothPeripheralUsageDescription

3. Configure Bluetooth access



4. Project import

```
// Import of Swift project
import CoreBluetooth
import YCProductSDK
```

```
// Import of OC project
#import CoreBluetooth
#import YCProductSDK;
```

2.3 SDK log printing

Log printing and log saving can be independently set to different levels, and the SDK is disabled by default.

```
/// Log level
@objc public enum YCProductLogLevel : Int {
    case off        // off
    case normal     // normal
    case info
    case error      // error
}

/// Set the log level switch of the SDK (the default is off)
/// - Parameters:
///   - printLevel: console print log level
///   - saveLevel: save log level
public static func setLogLevel(
    _ printLevel: YCProductLogLevel = .off,
    saveLevel: YCProductLogLevel = .off
)

/// log manager
@objcMembers public class YCProductLogManager: NSObject {

    /// Read data from log file
    /// - Returns: log content
    public static func readLogFileData() -> String?

    /// Clear log content
    public static func clear()
}
```

2.4 Status code in SDK

- Each API callback will contain two parts, one is the status code, the other is the specific information, and the specific information is the Any type, mainly based on the basic data type and class.
- The specific information returned will be explained when it is used on the specific API, and all the states will be explained here.

```

@objc public enum YCProductState : Int {

    case unknow           // Bluetooth status is unknown
    case resetting        // Bluetooth reset
    case unsupported       // Does not support Bluetooth
    case unauthorized     // Bluetooth is not authorized
    case poweredOff       // Bluetooth off
    case poweredOn        // Bluetooth is on
    case disconnected      // Bluetooth disconnect
    case connected        // Bluetooth is connected
    case connectedFailed  // Bluetooth connection failed

    case succeed          // Success
    case failed           // Fail

    case unavailable      // API is not available, device does not
support
    case timeout          // time out
    case dataError        // data error
    case crcError         // crc error
    case dataTypeError    // Data type error
    case noRecord         // No record
    case parameterError   // Parameter error

    case alarmNotExist    // Alarm clock does not exist
    case alarmAlreadyExist // Alarm already exists
    case alarmCountLimit  // The number of alarms reaches the limit
    case alarmTypeNotSupport // Alarm clock type is not supported
}

```

2.5 SDK initialization

After integrating the SDK, you need to call the initialization Method (required). The SDK initialization Method will do some simple settings.

```

_ = YCProduct.shared

```

3. Device search and connection

3.1 Device status

- Method

```
/// Device status changes
public static let deviceStateNotification: Notification.Name

/// State key
public static let connecteStateKey: String
```

- Instruction
 - The SDK will monitor the connection status of the device and will send it in the form of Notification. The App can monitor this message globally.
 - The message in Notification is stored in the key of `connecteStateKey` , and the corresponding state can be obtained through the key. (When Objc is called, the key name is `connecteStateKeyObjc`)
- Examples of use

```
NotificationCenter.default.addObserver(
    self,
    selector: #selector(deviceStateChange(_:)),

    name: YCProduct.deviceStateNotification,
    object: nil
)

@objc private func deviceStateChange(_ ntf: Notification) {
    guard let info = ntf.userInfo as? [String: Any],
    let state = info[YCProduct.connecteStateKey] as? YCProductState else {
        return
    }
    print("=== stateChange \(state.rawValue)")
}
```

3.2 Search device

- Method

```
/// Start scanning for devices
/// - Parameters:
///   - delayTime: delay to stop searching, default 3 seconds
///   - completion: result
public static func scanningDevice(
    delayTime: TimeInterval = 3.0,
    completion: (([CBPeripheral], NSError?) -> ())?
)

/// Device Manufacturer ID
public static var filterProductID:[Int]
```

- Instruction

- After calling the method search device, it will stop automatically. The search time is determined by delayTime. The default time is 3 seconds. You can also set any time. It is recommended to use the default value.
- The searched device will be returned in the callback when it ends.
- If the filterProductID is not set, all models of Yucheng are supported by default. If the ID is specified, only devices of the specified model can be searched.

- Examples of use

```
YCProduct.scanningDevice(delayTime: 3.0) { devices, error in
    for device in devices {
        print(device.name ?? "", device.identifier.uuidString)
    }
}
```

3.3 Connect the device

- Method


```

/// Connect the device
/// - Parameter peripheral: the user selects the device that needs to be
connected
public static func connectDevice(
    _ peripheral: CBPeripheral,
    completion: ((YCPProductSDK.YCProductState, NSError?) -> ())?
)

```

- Instruction
 - You can select any device from the searched devices to connect.
 - After selecting the connected device, you need to wait for a while, and the connection result will be returned in the callback.
- Examples of use

```

YCPProduct.connectDevice(device) { state, error in
    if state == .connected {
        print("connected")
    }
}

```

3.4 Disconnect device

- Method

```

/// Disconnect device
/// - Parameter peripheral: currently connected device
public static func disconnectDevice(
    _ peripheral: CBPeripheral? = YCPProduct.shared.currentPeripheral,
    completion: ((_ state: YCProductState, _ error: NSError?) -> ())?
)

/// Reconnect flag
open var isReconnectEnable: Bool = true

```

- Instruction
 - The connected device, calling this method, will disconnect from the SDK. Note that it will not disconnect from the iOS system.
 - After disconnecting, the SDK will clear the back-connect mark, and the device will not be back-connected.

- Examples of use

```
YCProduct.disconnectDevice(devcie) { state, _ in  
  
}
```

3.5 Get the currently connected device

```
/// Current connected peripheral  
public var currentPeripheral: CBPeripheral? { get }  
  
/// All peripherals currently connected (reserved parameters, extended use)  
public var connectedPeripherals: [CBPeripheral] { get }
```

- Instruction
 - The SDK will save the connected devices to the array, and at the same time save the last connected device to the current device for easy use.
- Examples of use

```
let devcie = YCProduct.shared.currentPeripheral  
let lastDevice = YCProduct.shared.connectedPeripherals.last
```

3.6 Device back and long connection

1. After the SDK is successfully connected, it will save the parameters of the last successfully connected device. Once the device is disconnected, the SDK will actively reconnect the device.
2. If you call the method(3.3) of the disconnected device in the SDK, the SDK will not connect back to the device.
3. If the App wants to realize the function of keeping the connection all the time, it is realized by the App itself, and the SDK does not realize the function of keeping the connection in the background.

4. Get health data

- Obtaining the health data of the device refers to querying the heart rate, blood pressure, sleep, blood oxygen and other data of the device through active or automatic detection.
- The types of health data in the device are not the same, please call according to the return value of the device and the function support switch.
- Among the data types supported by the device, the first 5 data types (step, sleep, heartRate, bloodPressure, combinedData) are supported by most devices, and the rest are only supported by customized versions.
- Note: Do not use the heart rate, steps, sleep, blood pressure obtained through combinedData, that is to say, the data obtained through this type can only use blood oxygen, respiration rate, body temperature, body fat, etc. Heart rate, steps, sleep, and blood pressure can only be obtained through separate types.
- The data in the device will not be actively deleted, so after the App is obtained, it should be deleted actively, otherwise the same data will be obtained the next time it is obtained, and once the data in the device exceeds the storage size, it will be automatically deleted.

4.1 Retrieve data

- Method

```
/// Query the type definition of health data
@objc public enum YCQueryHealthDataType: UInt8 {

    case step                // Step data
    case sleep                // Sleep data
    case heartRate            // Heart rate data
    case bloodPressure        // Blood pressure data
    case combinedData         // Combined data (blood oxygen,
                             // respiration rate, temperature, body fat, hrv, cvrr)

    case sportModeHistoryData // Exercise history data
    case invasiveComprehensiveData // Comprehensive data of invasive
    measurement
}

/// Query health data
/// - Parameters:
///   - peripheral: current device
///   - dataType: YCQueryHealthDataType
```

```

/// - completion: result
public static func queryHealthData(
    _ peripheral: CBPeripheral? = YCProduct.shared.currentPeripheral,
    dataType: YCQueryHealthDataType,
    completion: ((_ state: YCProductState, _ response: Any?) -> ())?
)

```

- Instruction

- After the corresponding data is queried, the result will be saved in the response. The results returned by each type are different and need to be converted into corresponding objects. The specific types have been listed one by one, please refer to 4.3.

- Examples of use

```

// Query sleep
YCProduct.queryHealthData(dataType: YCQueryHealthDataType.sleep) { state,
response in

    if state == .succeed, let datas = response as? [YCHealthDataSleep] {
        for info in datas {
            print(info.startTimeStamp,
                info.endTimeStamp,
                info.lightSleepCount,
                info.lightSleepMinutes,
                info.deepSleepCount,
                info.deepSleepMinutes,
                info.sleepDetailDatas
            )
        }
    } else {
        print("No data")
    }
}

// Query combined data
YCProduct.queryHealthData(dataType: YCQueryHealthDataType.combinedData) {
state, response in

    if state == .succeed, let datas = response as?
[YCHealthDataCombinedData] {
        for info in datas {
            print(info.startTimeStamp,
                info.bloodOxygen,

```

```

        info.respirationRate,
        info.temperature,
        info.fat
    )
}
} else {
    print("No data")
}
}

// For other types, please refer to Demo

```

4.2 Delete data

- Method

```

/// Delete the type definition of health data
@objc public enum YCDeleteHealthDataType: UInt8 {

    case step
    case sleep
    case heartRate
    case bloodPressure
    case combinedData

    case bloodOxygen
    case temperatureHumidity
    case bodyTemperature
    case ambientLight
    case wearState
    case healthMonitoringData
    case sportModeHistoryData
    case invasiveComprehensiveData
}

/// Delete health data
/// - Parameters:
///   - peripheral: currently connected device
///   - dataType: YCDeleteHealthDataType
///   - completion: result
public static func deleteHealthData(

```

```

    _ peripheral: CBPeripheral? = YCProduct.shared.currentPeripheral,
    dataType: YCDeleteHealthDataType,
    completion: ((_ state: YCProductState, _ response: Any?) -> ())?
)

```

- Instruction:
 - When calling method, just pass in the specific type to the dataType. If the deletion is successful, the state will return succeed, otherwise it means the operation failed.
- Examples of use

```

// Delete steps
YCProduct.deleteHealthData(dataType: YCDeleteHealthDataType.step) { state,
response in

    if state == .succeed {
        print("Delete succeed")
    } else {
        print("Delete failed")
    }
}

// Delete combined data
YCProduct.deleteHealthData(dataType: YCDeleteHealthDataType.combinedData)
{ state, response in

    if state == .succeed {
        print("Delete succeed")
    } else {
        print("Delete failed")
    }
}

// For other types, please refer to Demo

```

4.3 Health data type and corresponding return value type

4.3.1 Step

```
// YCQueryHealthDataType.step
/// Steps information
@objcMembers public class YCHealthDataStep : NSObject {

    /// Start timestamp (seconds)
    public var startTimeStamp: Int { get }

    /// End timestamp (seconds)
    public var endTimeStamp: Int { get }

    /// Steps (steps)
    public var step: Int { get }

    /// Distance (meter)
    public var distance: Int { get }

    /// Calories (kcal)
    public var calories: Int { get }
}
```

4.3.2 Sleep

```
// YCQueryHealthDataType.sleep

/// Sleep data
@objcMembers public class YCHealthDataSleep : NSObject {

    /// Start timestamp (seconds)
    public var startTimeStamp: Int { get }

    /// End timestamp (seconds)
    public var endTimeStamp: Int { get }

    /// Deep sleep times (If the value 0xFFFF is the new format)
    public var deepSleepCount: Int { get }

    /// Total time of deep sleep (unit: minute)
    public var deepSleepMinutes: Int { get }
```

```

    /// REM duration (unit: minute)
    public var remSleepMinutes: Int { get }

    /// Light sleep times
    public var lightSleepCount: Int { get }

    /// Total light sleep time (unit: minute)
    public var lightSleepMinutes: Int { get }

    /// Total time of deep sleep (unit: seconds) deepSleepCount == 0xFFFF
    effective
    public var deepSleepSeconds: Int { get }

    ///REM duration (unit: seconds) deepSleepCount == 0xFFFF effective
    public var remSleepSeconds: Int { get }

    /// Total light sleep time (unit: seconds) deepSleepCount == 0xFFFF
    effective
    public var lightSleepSeconds: Int { get }

    /// Sleep detailed data
    public var sleepDetailDatas: [YCProductSDK.YCHealthDataSleepDetail] {
    get }
    }

    /// Deep sleep and light sleep types
    @objc public enum YCHealthDataSleepType : Int {
        case unknow
        case deepSleep
        case lightSleep
        case rem
        case awake
    }

    /// Sleep detailed data
    @objcMembers public class YCHealthDataSleepDetail : NSObject {

        /// Deep sleep or light sleep mark
        public var sleepType: YCProductSDK.YCHealthDataSleepType { get }

        /// Sleep start timestamp (seconds)
        public var startTimeStamp: Int { get }
    }

```



```

    /// Sleep duration (unit: second)
    public var duration: Int { get }
}

```

- Note: If the deepSleepCount value is 0xFFFF, it indicates a new format and uses deepSleepSeconds, remSleepSeconds, and lightSleepSeconds. Otherwise, deepSleepMinutes, remSleepMinutes, and lightSleepMinutes are used.

4.3.3 Heart rate

```

// YCQueryHealthDataType.heartRate
/// Heart rate health data
@objcMembers public class YCHealthDataHeartRate : NSObject {

    /// Start timestamp (seconds)
    public var startTimeStamp: Int { get }

    /// Measurement method
    public var mode: YCProductSDK.YCHealthDataMeasureMode { get }

    /// Heart rate value
    public var heartRate: Int { get }
}

```

4.3.4 Blood pressure

```

// YCQueryHealthDataType.bloodPressure
/// Blood pressure health data
@objcMembers public class YCHealthDataBloodPressure : NSObject {

    /// Start timestamp (seconds)
    public var startTimeStamp: Int { get }

    /// Measurement method
    public var mode: YCProductSDK.YCHealthDataBloodPressureMode { get }

    /// Systolic blood pressure
    public var systolicBloodPressure: Int { get }
}

```

```

    /// Diastolic blood pressure
    public var diastolicBloodPressure: Int { get }
}

/// measurement method
@objc public enum YCHealthDataBloodPressureMode : UInt8 {
    case single          // Single measurement
    case monitor         // Automatic monitoring
    case inflated        // Accurate measurement
}

```

4.3.5 Combined data

```

// YCQueryHealthDataType.combinedData
/// Combined data
@objcMembers public class YCHealthDataCombinedData : NSObject {

    /// Start timestamp (seconds)
    public var startTimeStamp: Int { get }

    /// Steps (steps)
    public var step: Int { get }

    /// Heart rate value
    public var heartRate: Int { get }

    /// Systolic blood pressure
    public var systolicBloodPressure: Int { get }

    /// Diastolic blood pressure
    public var diastolicBloodPressure: Int { get }

    /// Blood oxygen value
    public var bloodOxygen: Int { get }

    /// Respiration rate value
    public var respirationRate: Int { get }

    /// HRV
    public var hrv: Int { get }

    /// CVRR

```

```

    public var cvrr: Int { get }

    /// Temperature
    public var temperature: Double { get }

    /// Is the temperature valid
    public var temperatureValid: Bool { get }

    /// Body fat
    public var fat: Double { get }

    /// Blood glucose
    public var bloodGlucose: Double {get}
}

```

4.3.6 Sports history data

```

// YCQueryHealthDataType.sportModeHistoryData

/// Sports history data
@objcMembers public class YCHealthDataSportModeHistory : NSObject {

    /// Start timestamp (seconds)
    public var startTimeStamp: Int { get }

    /// End timestamp (seconds)
    public var endTimeStamp: Int { get }

    /// Steps (steps)
    public var step: Int { get }

    /// Distance (meter)
    public var distance: Int { get }

    /// Calories (kcal)
    public var calories: Int { get }

    /// Sport mode
    public var sport: YCProductSDK.YCDeviceSportType { get }

    /// Sport start method
    public var flag: YCProductSDK.YCHealthDataSportModeStartMethod { get }
}

```

```

    /// Heart rate value
    public var heartRate: Int { get }

    /// Exercise time (effective exercise time)
    public var sportTime: Int { get }

    /// minimum heart rate
    public var minimumHeartRate: Int { get }

    /// maximum heart rate
    public var maximumHeartRate: Int { get }
}

/// Sport start method
@objc public enum YCHealthDataSportModeStartMethod : UInt8 {
    case app
    case device
}

```

4.3.7 Comprehensive data of invasive measurement

```

/// Comprehensive data of invasive measurement
@objcMembers public class YCHealthDataInvasiveComprehensiveData: NSObject {

    /// Start timestamp
    public var startTimeStamp: Int = 0

    /// blood glucose
    public var bloodGlucose: Double = 0

    /// uric acid
    public var uricAcid : UInt16 = 0

    /// blood ketone
    public var bloodKetone: Double = 0
}

```

5. Get device information

Note: In this chapter, starting from 5.8, only customized devices are supported.

5.1 Support function

- Method

```
extension CBPeripheral {  
    /// Support function list  
    public var supportItems: YCProductSDK.YCProductFunctionSupportItems  
}
```

- Instruction
 - For customized equipment, the function is already fixed, it is not necessary to use this parameter. This parameter is valid only after the device is successfully connected.
 - This parameter contains too many attributes, which are not listed in this document. Readers can jump to the definition through Xcode to view it carefully.
- Examples of use

```
guard let device = YCProduct.shared.currentPeripheral else {  
    return  
}  
  
if device.supportItems.isSupportStep {  
    print("step")  
}  
  
if device.supportItems.isSupportBloodPressure {  
    print("blood pressure")  
}
```

5.2 Basic device information

- Method

```
public static func queryDeviceInfo(
    _ peripheral: CBPeripheral? = YCProduct.shared.currentPeripheral,
    completion: ((YCProductSDK.YCProductState, Any?) -> ())?
)

/// Version Information
@objcMembers public class YCDeviceVersionInfo: NSObject {

    /// version
    public var version: String { get };

    /// major version
    public var majorVersion: UInt8 { get }

    /// subversion
    public var subVersion: UInt8 { get }
}

/// Basic Information
@objcMembers public class YCDeviceBasicInfo : NSObject {

    /// Device ID
    public var deviceID: UInt16 { get }

    /// Firmware version
    public var mcuFirmware: YCProductSDK.YCDeviceVersionInfo { get }

    /// Battery status
    public var batterystatus: YCProductSDK.YCDeviceBatterystate { get }

    /// battery power
    public var batteryPower: UInt8 { get }

    /// Whether to bind (reserved parameters)
    public var isBind: Bool { get }

    /// Do you need to synchronize (retain parameters)
    public var needSync: Bool { get }

    /// Communication protocol version (internal use)
```

```

        public var innerProtocol: YCProductSDK.YCDeviceVersionInfo { get }

        /// Inflatable Blood Pressure Firmware Information
        public var bloodPressureFirmware: YCProductSDK.YCDeviceVersionInfo {
get }

        /// TP firmware information
        public var touchPanelFirmware: YCProductSDK.YCDeviceVersionInfo { get
}
}

/// Battery charge status
@objc public enum YCDeviceBatterystate : UInt8 {
    case normal        // normal
    case low            // low power
    case charging       // charging
    case full           // be filled
}

```

- Instruction
 - Query basic information, you will get an object of type YCDeviceBasicInfo ,
- Examples of use

```

YCProduct.queryDeviceBasicInfo { state, response in
    if state == YCProductState.succeed,
        let info = response as? YCDeviceBasicInfo {
            print(info.batteryPower)
        }
}

```

5.3 Mac address

- Method

```

/// Get mac address
public static func queryDeviceMacAddress(
    _ peripheral: CBPeripheral? = YCProduct.shared.currentPeripheral,
    completion: ((YCProductSDK.YCProductState, Any?) -> ())?
)

/// mac address attribute
extension CBPeripheral {
    public var macAddress: String
}

```

- Instruction
 - To get the mac address, you can get it directly by accessing its attributes. If the value in the attribute is empty, you can get it by calling method.
- Examples of use

```

YCProduct.queryDeviceMacAddress { state, response in
    if state == YCProductState.succeed,
        let macaddress = response as? String {
            print(macaddress)
        }
}

```

5.4 Device model

- Method

```

/// Get model
public static func queryDeviceModel(
    _ peripheral: CBPeripheral? = YCProduct.shared.currentPeripheral,
    completion: ((YCProductSDK.YCProductState, Any?) -> ())?
)

```

- Instruction
 - this method is mainly used to obtain the type number of the device, and is used to distinguish the models of different products derived from the same series.
- Examples of use


```
YCProduct.queryDeviceModel { state, response in
    if state == YCProductState.succeed,
        let name = response as? String {
            print(name)
        }
}
```

5.5 Theme information

- Method

```
/// Get theme
public static func queryDeviceTheme(
    _ peripheral: CBPeripheral? = YCProduct.shared.currentPeripheral,
    completion: ((_ state: YCProductState, _ response: Any?) -> ()))?
)

/// Theme information
@objcMembers public class YCDeviceTheme : NSObject {

    /// Number of themes
    public var themeCount: Int { get }

    /// Current theme index
    public var themeIndex: Int { get }
}
```

- Instruction
 - Get the theme index and the total number of themes currently displayed on the device
- Examples of use

```
YCProduct.queryDeviceTheme { state, response in
    if state == YCProductState.succeed,
        let info = response as? YCDeviceTheme {
            print(info.themeCount, info.themeIndex)
        }
}
```

5.6 Get chip information

- Method

```
/// Get the chip model
public static func queryDeviceMCU(
    _ peripheral: CBPeripheral? = YCProduct.shared.currentPeripheral,
    completion: ((_ state: YCProductState, _ response: Any?) -> ())?
)

/// MCU
@objc public enum YCDeviceMCUType : UInt8 {
    case nrf52832
    case rtk8762c
    case rtk8762d
}
```

- Instruction
 - Obtaining chip information refers to the manufacturer brand and model of the MCU for obtaining the device
- Examples of use

```
YCProduct.queryDeviceMCU { state, response in
    if state == .succeed,
    let mcu = response as? YCDeviceMCUType{
        print(mcu)
    } else if state == .unavailable {
        print("nrf52832")
    }
}
```

5.7 Get user configuration information

- Method

```
/// Get user configuration information
public static func queryDeviceUserConfiguration(
    _ peripheral: CBPeripheral? = YCProduct.shared.currentPeripheral,
```



```

    /// Sedentary reminder
    public var startHour1: UInt8 { get }
    public var startMinute1: UInt8 { get }
    public var endHour1: UInt8 { get }
    public var endMinute1: UInt8 { get }
    public var startHour2: UInt8 { get }
    public var startMinute2: UInt8 { get }
    public var endHour2: UInt8 { get }
    public var endMinute2: UInt8 { get }
    public var sedentaryReminderInterval: UInt8 { get }
    public var sedentaryReminderRepeat: Set<YCProductSDK.YCDeviceWeekRepeat>
{ get }

    /// Anti-lost
    public var antiLostType: YCProductSDK.YCDeviceAntiLostType { get }
    public var rssi: Int8 { get }
    public var antiLostDelay: UInt8 { get }
    public var antiLostDisconnectDelay: Bool { get }
    public var antiLostRepeat: Bool { get }
    public var infomationPushEnable: Bool { get }
    public var infomationPushItems: Set<YCProductSDK.YCDeviceInfoPushType> {
get }

    /// Wearing position
    public var wearingPosition: YCProductSDK.YCDeviceWearingPositionType {
get }

    /// Heart rate alarm switch
    public var heartRateAlarmEnable: Bool { get }

    /// Heart rate alarm value
    public var heartRateAlarmValue: Int { get }

    /// Whether automatic monitoring is turned on
    public var heartMonitoringModeEnable: Bool { get }

    /// Monitoring interval
    public var monitoringInterval: Int { get }

    /// Language
    public var language: YCProductSDK.YCDeviceLanguageType { get }

    /// Raise your wrist to turn on the screen switch

```


- Instruction
 - The API returns all the fields, but the configuration information supported by the specific device may be different.
 - Some attributes in the return value do not have specific type analysis, and can be read in conjunction with the setting part.
- Examples of use

```
YCProduct.queryDeviceUserConfiguration { state, response in
    if state == .succeed,
        let info = response as? YCProductUserConfiguration {
            print(info.age)
        }
}
```

6. Set up the device

6.1 Time

- Method

```
/// time setting
/// - Parameters:
///   - peripheral: Connected device
///   - year: 2000+
///   - month: 1 ~ 12
///   - day: 1 ~ 31
///   - hour: 0 ~ 23
///   - minute: 0 ~ 59
///   - second: 0 ~ 59
///   - weekDay: week
///   - completion: Result
public static func setDeviceTime(
    _ peripheral: CBPeripheral? = YCProduct.shared.currentPeripheral,
    year: UInt16,
    month: UInt8,
    day: UInt8,
    hour: UInt8,
    minute: UInt8,
```

```

        second: UInt8,
        weekDay: YCWeekDay,
        completion: ((_ state: YCProductState, _ response: Any?) -> (()))?
    )

    /// Set the day of the week
    @objc public enum YCWeekDay : UInt8 {
        case monday
        case tuesday
        case wednesday
        case thursday
        case friday
        case saturday
        case sunday
    }

```

- Instruction
 - The device only supports Gregorian calendar time, and other time types such as Buddhist calendar cannot be set.
 - The time is automatically set internally in the SDK, and generally there is no need to call this API.
- Examples of use

```

// 2021/12/6 14:38:59 Monday
YCProduct.setDeviceTime(
    year: 2021,
    month: 12,
    day: 6,
    hour: 14,
    minute: 38,
    second: 59,
    weekDay: .monday) { state, response in
    if state == .succeed {
        print("success")
    } else {
        print("fail")
    }
}

```

6.2 Goal setting

- Method

```
/// Set step goal
/// - Parameters:
///   - peripheral: Connected device
///   - step: Step goal (steps)
///   - completion: Result
public static func setDeviceStepGoal(
    _ peripheral: CBPeripheral? = YCProduct.shared.currentPeripheral,
    step: UInt32,
    completion: ((_ state: YCProductState, _ response: Any?) -> ()))?
)

/// Set calorie goal
/// - Parameters:
///   - peripheral: Connected device
///   - calories: Calorie goal (kcal)
///   - completion: Result
public static func setDeviceCaloriesGoal(
    _ peripheral: CBPeripheral? = YCProduct.shared.currentPeripheral,
    calories: UInt32,
    completion: ((_ state: YCProductState, _ response: Any?) -> ()))?
)

/// Set distance goal
/// - Parameters:
///   - peripheral: Connected device
///   - calories: Distance target (m)
///   - completion: Result
public static func setDeviceDistanceGoal(
    _ peripheral: CBPeripheral? = YCProduct.shared.currentPeripheral,
    distance: UInt32,
    completion: ((_ state: YCProductState, _ response: Any?) -> ()))?
)

/// Set sleep goals
/// - Parameters:
///   - peripheral: Connected device
///   - hour: 0 ~ 23
///   - minute: 0 ~ 59
///   - completion: Result
public static func setDeviceSleepGoal(
```



```

    _ peripheral: CBPeripheral? = YCProduct.shared.currentPeripheral,
    hour: UInt8,
    minute: UInt8,
    completion: ((_ state: YCProductState, _ response: Any?) -> (()))?
)

/// Exercise time goal
/// - Parameters:
///   - peripheral: Connected device
///   - hour: 0 ~ 23
///   - minute: 0 ~ 59
///   - completion: Result
public static func setDeviceSportTimeGoal(
    _ peripheral: CBPeripheral? = YCProduct.shared.currentPeripheral,
    hour: UInt8,
    minute: UInt8,
    completion: ((_ state: YCProductState, _ response: Any?) -> (()))?
)

/// Effective step goal
/// - Parameters:
///   - peripheral: Connected device
///   - effectiveSteps: Effective step goal (steps)
///   - completion: Result
public static func setDeviceEffectiveStepsGoal(
    _ peripheral: CBPeripheral? = YCProduct.shared.currentPeripheral,
    effectiveSteps: UInt32,
    completion: ((_ state: YCProductState, _ response: Any?) -> (()))?
)

```

- Instruction
 - If the parameter assignment is wrong, or the device does not support the target setting, it will return failure.
- Examples of use

```

// step goal
YCProduct.setDeviceStepGoal(
    step: 10000) { state, _ in
    if state == .succeed {
        print("success")
    } else {
        print("fail")
    }
}

```

```

}

// calories goal
YCProduct.setDeviceCaloriesGoal(calories: 1000) { state, _ in
    if state == .succeed {
        print("success")
    } else {
        print("fail")
    }
}

// distance goal
YCProduct.setDeviceDistanceGoal(distance: 10000) { state, _ in

    if state == .succeed {
        print("success")
    } else {
        print("fail")
    }
}

// sleep goal
YCProduct.setDeviceSleepGoal(hour: 8, minute: 30) { state, response in
    if state == .succeed {
        print("success")
    } else {
        print("fail")
    }
}

// sport time goal
YCProduct.setDeviceSportTimeGoal(hour: 1, minute: 20) { state, response in

    if state == .succeed {
        print("success")
    } else {
        print("fail")
    }
}

// effective step goal
YCProduct.setDeviceEffectiveStepsGoal(effectiveSteps: 8000) { state,
response in
    if state == .succeed {

```

```

        print("success")
    } else {
        print("fail")
    }
}

```

6.3 User information

- Method

```

/// User information settings
/// - Parameters:
///   - peripheral: Connected device
///   - height: 100 ~ 250cm
///   - weight: 30 ~ 200 kg
///   - gender: YCDeviceGender
///   - age: 6 ~ 120
///   - completion: Result
public static func setDeviceInfo(
    _ peripheral: CBPeripheral? = YCProduct.shared.currentPeripheral,
    height: UInt8,
    weight: UInt8,
    gender: YCDeviceGender,
    age: UInt8,
    completion: ((_ state: YCProductState, _ response: Any?) -> ()))?
)

/// Gender
@objc public enum YCDeviceGender: UInt8 {
    case male
    case female
}

```

- Instruction
 - Set only for the user's body, weight, gender, and age. Pay attention to the value range of each parameter.
- Examples of use

```

YCProduct.setDeviceInfo(height: 180,
                        weight: 90,
                        gender: .male, age: 18) { state, response in

    if state == .succeed {
        print("success")
    } else {
        print("fail")
    }
}

```

6.4 Unit settings

- Method

```

/// Unit settings
/// - Parameters:
///   - peripheral: Connected device
///   - distance: Distance unit
///   - weight: Weight unit
///   - temperature: Temperature unit
///   - timeFormat: Time format: 12-hour clock/24-hour clock
///   - bloodGlucose: Blood glucose unit mmol/l mg/dl
///   - completion: Result
public static func setDeviceUnit(
    _ peripheral: CBPeripheral? = YCProduct.shared.currentPeripheral,
    distance: YCDeviceDistanceType = .km,
    weight: YCDeviceWeightType = .kg,
    temperature: YCDeviceTemperatureType = .celsius,
    timeFormat: YCDeviceTimeType = .hour24,
    bloodGlucose: YCDeviceBloodGlucoseType = .millimolePerLiter,
    completion: ((_ state: YCProductState, _ response: Any?) -> ())?
)

/// Distance unit
@objc public enum YCDeviceDistanceType: UInt8 {
    case km
    case mile
}

/// Weight unit
@objc public enum YCDeviceWeightType: UInt8 {
    case kg
    case lb
}

```

```

}

/// Temperature unit
@objc public enum YCDeviceTemperatureType: UInt8 {
    case celsius
    case fahrenheit
}

/// Time format
@objc public enum YCDeviceTimeType: UInt8 {
    case hour24
    case hour12
}

/// Blood glucose unit
@objc public enum YCDeviceBloodGlucoseType: UInt8 {
    case millimolePerLiter           // mmol/l
    case milligramsPerDeciliter      // mg/dl
}

```

- Instruction
 - The unit setting is used to display the display value format
- Examples of use

```

YCProduct.setDeviceUnit(distance: .km,
                        weight: .kg,
                        temperature: .celsius,
                        timeFormat: .hour24) { state, response in
    if state == .succeed {
        print("success")
    } else {
        print("fail")
    }
}

```

6.5 Sedentary reminder

- Method

```

/// Sedentary reminder
/// - Parameters:
///   - peripheral: Connected device

```

```

/// - startHour1: 0 ~ 23
/// - startMinute1: 0 ~ 59
/// - endHour1: 0 ~ 23
/// - endMinute1: 0 ~ 59
/// - startHour2: 0 ~ 23
/// - startMinute2: 0 ~ 59
/// - endHour2: 0 ~ 23
/// - endMinute2: 0 ~ 59
/// - interval: 15 ~ 45 minutes
/// - repeat: YCDeviceWeekRepeat
/// - completion: Result
public static func setDeviceSedentary(
    _ peripheral: CBPeripheral? = YCProduct.shared.currentPeripheral,
    startHour1: UInt8,
    startMinute1: UInt8,
    endHour1: UInt8,
    endMinute1: UInt8,
    startHour2: UInt8,
    startMinute2: UInt8,
    endHour2: UInt8,
    endMinute2: UInt8,
    interval: UInt8,
    repeat: Set<YCDeviceWeekRepeat>,
    completion: ((_ state: YCProductState, _ response: Any?) -> ())?
)

/// Repeat time of the week
@objc public enum YCDeviceWeekRepeat: UInt8 {
    case monday
    case tuesday
    case wednesday
    case thursday
    case friday
    case saturday
    case sunday
    case enable
}

```

- Instruction

- Sedentary reminder can only be set for two time periods
- Pay attention to the value range of interval time, and the value of time is in 24-hour format.
- The last value of YCDeviceWeekRepeat is the time enable switch. If

YCDeviceWeekRepeat.enable is included, this parameter is valid, otherwise it is invalid.

- Examples of use

```
YCProduct.setDeviceSedentary(startHour1: 9,
    startMinute1: 0,
    endHour1: 12,
    endMinute1: 30,
    startHour2: 13,
    startMinute2: 30,
    endHour2: 18,
    endMinute2: 00,
    interval: 15,
    repeat: [
        .monday,
        .tuesday,
        .wednesday,
        .thursday,
        .friday,
        .enable
    ]
) { state, response in
    if state == .succeed {
        print("success")
    } else {
        print("fail")
    }
}
```

6.6 Anti-lost

- Method

```
/// Anti-lost settings
/// - Parameters:
///   - peripheral: Connected device
///   - antiLostType: Anti-lost type
///   - completion: Result
public static func setDeviceAntiLost(
    _ peripheral: CBPeripheral? = YCProduct.shared.currentPeripheral,
    antiLostType: YCDeviceAntiLostType = .middleDistance,
    completion: ((_ state: YCProductState, _ response: Any?) -> ())?
)
```

```

/// Anti-lost type
@objc public enum YCDeviceAntiLostType: UInt8 {
    case off          // closure
    case closeRange   // Close range
    case middleDistance // Middle distance
    case longDistance  // Long distance
}

```

- Instruction
 - Anti-lost means that the bracelet will vibrate when the connection signal between the device and the mobile phone becomes weak or disconnected. The last three values in the anti-lost type have the same effect.
- Examples of use

```

YCProduct.setDeviceAntiLost(antiLostType: .middleDistance) { state,
response in
    if state == .succeed {
        print("success")
    } else {
        print("fail")
    }
}

```

6.7 Notification reminder switch

- Method

```

/// Set the message reminder type
/// - Parameters:
///   - peripheral: Connected device
///   - isEnabled: Whether to open
///   - infoPushType: Notification reminder type
///   - completion: Result
public static func setDeviceInfoPush(
    _ peripheral: CBPeripheral? = YCProduct.shared.currentPeripheral,
    isEnabled: Bool, infoPushType: Set<YCDeviceInfoPushType>,
    completion: ((_ state: YCProductState, _ response: Any?) -> ()))?
)

/// Notification reminder type
@objc public enum YCDeviceInfoPushType: UInt16 {

```



```

    case call
    case sms
    case email
    case wechat
    case qq
    case weibo
    case facebook
    case twitter

    case messenger
    case whatsapp
    case linkedIn
    case instagram
    case skype
    case line
    case snapchat
    case telegram

    case other
    case viber
    case zoom
    case tiktok
    case kakaoTalk
}

```

- Instruction
 - The notification reminder in the device is implemented based on the ANCS service of iOS, and the API can only set whether to display the corresponding type of message.
 - When the device is connected to the phone for the first time, iOS will pop up two interfaces, which are whether to allow pairing and whether to allow notifications to be displayed. All of them must be agreed, otherwise the notification reminder will not be available.
- Examples of use

```

// on
YCProduct.setDeviceInfoPush(isEnable: true,
                             infoPushType: [.call, .qq, .weChat] ) { state,
response in
    if state == .succeed {
        print("success")
    } else {

```

```

        print("fail")
    }
}

// off
YCPProduct.setDeviceInfoPush(isEnable: false,
                             infoPushType: [.call, .qq, .weChat ] ) { state,
response in
    if state == .succeed {
        print("success")
    } else {
        print("fail")
    }
}
}

```

6.8 Health monitoring

- Health monitoring means that the device will measure and save the corresponding data at a fixed time.
- In health monitoring, heart rate monitoring and temperature monitoring are common functions and can also meet most of the scenarios. The SDK provides an independent API for setting (6.8.1, the effect is equivalent to calling 6.8.2 and 6.8.3 at the same time), for general equipment, only need to use this API, other such as blood oxygen monitoring API (since 6.8 .4 API) is only possible for individual devices.

6.8.1 Health monitoring

- Method

```

/// Health monitoring
/// - Parameters:
///   - peripheral: Connected device
///   - isEnabled: Whether to enable
///   - interval: Monitoring interval 1 ~ 60 minutes
///   - completion: Result
public static func setDeviceHealthMonitoringMode(
    _ peripheral: CBPeripheral? = YCProduct.shared.currentPeripheral,
    isEnabled: Bool, interval: UInt8,
    completion: ((_ state: YCProductState, _ response: Any?) -> ()))?
)

```

- Instruction
 - The device will measure heart rate, blood pressure, blood oxygen, respiration rate, body temperature according to the automatic time. The shorter the time, the greater the power consumption.
 - Calling this method has the same effect as calling both 6.8.2 and 6.8.3.
- Examples of use

```

YCProduct.setDeviceHealthMonitoringMode(isEnabled: true, interval: 60) {
    state, response in

    if state == .succeed {
        print("success")
    } else {
        print("fail")
    }
}

```

6.8.2 Heart rate monitoring (discarded)

- Method

```

/// Heart rate monitoring
/// - Parameters:
///   - peripheral: Connected device
///   - isEnabled: Whether to enable
///   - interval: Monitoring interval 1 ~ 60 minutes
///   - completion: Result
public static func setDeviceHeartRateMonitoringMode(
    _ peripheral: CBPeripheral? = YCProduct.shared.currentPeripheral,
    isEnabled: Bool, interval: UInt8,
    completion: ((_ state: YCProductState, _ response: Any?) -> ())?
)

```

- Instruction
 - After the heart rate monitoring is turned on, the device will automatically measure the heart rate, blood pressure, blood oxygen, and respiration rate according to the automatic time. The shorter the time, the greater the power consumption.
- Examples of use

```

YCProduct.setDeviceHeartRateMonitoringMode(isEnabled: true, interval: 60) {
    state, response in
        if state == .succeed {
            print("success")
        } else {
            print("fail")
        }
    }
}

```

6.8.3 Temperature monitoring (discarded)

- Method

```

/// Temperature monitoring
/// - Parameters:
///   - peripheral: Connected device
///   - isEnabled: Whether to open
///   - interval: Monitoring interval 1 ~ 60 minutes
///   - completion: Result
public static func setDeviceTemperatureMonitoringMode(
    _ peripheral: CBPeripheral? = YCProduct.shared.currentPeripheral,
    isEnabled: Bool,
    interval: UInt8,
    completion: ((_ state: YCProductState, _ response: Any?) -> ()))?
)

```

- Instruction
 - After the temperature monitoring is turned on, the device will automatically measure and record the temperature according to the set time.
 - It is recommended to keep the time interval consistent with the heart rate monitoring interval.
- Examples of use

```

YCProduct.setDeviceTemperatureMonitoringMode(isEnabled: true, interval: 60)
{ state, response in
    if state == .succeed {
        print("success")
    } else {
        print("fail")
    }
}

```

6.8.4 Blood pressure monitoring (discarded)

- Method

```

/// Blood pressure monitoring mode setting
/// - Parameters:
///   - peripheral: Connected device
///   - isEnabled: Whether to enable
///   - interval: Monitoring interval 1 ~ 60 minutes
///   - completion: Result
public static func setDeviceBloodPressureMonitoringMode(
    _ peripheral: CBPeripheral? = YCProduct.shared.currentPeripheral,
    isEnabled: Bool,
    interval: UInt8,
    completion: ((_ state: YCProductState, _ response: Any?) -> ()))?
)

```

- Instruction
 - After the heart rate monitor is turned on, the device will monitor blood pressure at the same time. Only a few older versions of the device need to use this method, and in general, there is no need to call this method.
 - The monitoring time is best to be consistent with the heart rate monitoring
- Examples of use

```

YCProduct.setDeviceBloodPressureMonitoringMode(isEnabled: true, interval:
60) { state, response in
    if state == .succeed {
        print("success")
    } else {
        print("fail")
    }
}

```

6.8.5 Blood oxygen monitoring

- Method

```

/// Blood oxygen monitoring
/// - Parameters:
///   - peripheral: Connected device
///   - isEnabled: Whether to open
///   - interval: Monitoring interval 1 ~ 60 minutes
///   - completion: Result
public static func setDeviceBloodOxygenMonitoringMode(
    _ peripheral: CBPeripheral? = YCProduct.shared.currentPeripheral,
    isEnabled: Bool,
    interval: UInt8,
    completion: ((_ state: YCProductState, _ response: Any?) -> ()))?
)

```

- Instruction
 - None
- Examples of use

```

YCProduct.setDeviceBloodOxygenMonitoringMode(isEnabled: true, interval: 60)
{ state, response in
    if state == .succeed {
        print("success")
    } else {
        print("fail")
    }
}
}

```

6.8.6 Ambient light monitoring

- Method

```

/// Ambient light monitoring
/// - Parameters:
///   - peripheral: Connected device
///   - isEnabled: Whether to open
///   - interval: Monitoring interval 1 ~ 60 minutes
///   - completion: Result
public static func setDeviceAmbientLightMonitoringMode(
    _ peripheral: CBPeripheral? = YCProduct.shared.currentPeripheral,
    isEnabled: Bool,
    interval: UInt8,
    completion: ((_ state: YCProductState, _ response: Any?) -> ()))?
)

```

- Instruction
 - Individual customized bracelets are supported, which are the same as other monitoring modes, and will be automatically measured and saved after being turned on.
- Examples of use

```

YCProduct.setDeviceAmbientLightMonitoringMode(isEnabled: true, interval: 60)
{ state, response in
    if state == .succeed {
        print("success")
    } else {
        print("fail")
    }
}

```

6.8.7 Environmental temperature and humidity monitoring

- Method


```

/// Environmental temperature and humidity monitoring
/// - Parameters:
///   - peripheral: Connected device
///   - isEnabled: Whether to open
///   - interval: Monitoring interval 1 ~ 60 minutes
///   - completion: Result
public static func setDeviceTemperatureHumidityMonitoringMode(
    _ peripheral: CBPeripheral? = YCProduct.shared.currentPeripheral,
    isEnabled: Bool,
    interval: UInt8,
    completion: ((_ state: YCProductState, _ response: Any?) -> ()))?
)

```

- Instruction
 - None
- Examples of use

```

YCProduct.setDeviceTemperatureHumidityMonitoringMode(isEnabled: true,
interval: 60) { state, response in
    if state == .succeed {
        print("success")
    } else {
        print("fail")
    }
}
}

```

6.9 Health warning

6.9.1 Heart rate alarm

- Method

```

/// Heart rate alarm
/// - Parameters:
///   - peripheral: Connected device
///   - isEnabled: Whether to open
///   - maxHeartRate: Heart rate warning upper limit 100 ~ 240
///   - minHeartRate: Heart rate lower limit 30 ~ 60
///   - completion: Result
public static func setDeviceHeartRateAlarm(

```

```

        _ peripheral: CBPeripheral? = YCProduct.shared.currentPeripheral,
        isEnabled: Bool,
        maxHeartRate: UInt8,
        minHeartRate: UInt8 ,
        completion: ((_ state: YCProductState, _ response: Any?) -> ())?
    )

```

- Instruction
 - Heart rate alarm means that the device detects that the heart rate value is higher than the upper limit or lower than the lower limit will be turned on, pay attention to the parameter value range.
- Examples of use

```

YCProduct.setDeviceHeartRateAlarm(isEnable: true,
                                   maxHeartRate: 100,
                                   minHeartRate: 50) { state, response in

    if state == .succeed {
        print("success")
    } else {
        print("fail")
    }
}

```

6.9.2 Temperature alarm

- Method

```

/// Temperature alarm
/// - Parameters:
///   - peripheral: Connected device
///   - isEnabled: Whether to open
///   - highTemperatureIntegerValue: 36 ~ 100 Celsius
///   - highTemperatureDecimalValue: 0 ~ 9 Celsius
///   - lowTemperatureIntegerValue: -127 ~ 36 Celsius
///   - lowTemperatureDecimalValue: 0 ~ 9 Celsius
///   - completion: Result
public static func setDeviceTemperatureAlarm(
    _ peripheral: CBPeripheral? = YCProduct.shared.currentPeripheral,
    isEnabled: Bool,
    highTemperatureIntegerValue: UInt8,

```

```

highTemperatureDecimalValue: UInt8,
lowTemperatureIntegerValue: Int8,
lowTemperatureDecimalValue: UInt8,
completion: ((_ state: YCProductState, _ response: Any?) -> (()))?
)

```

- Instruction
 - Like the heart rate alarm value, there are two values. Separate the integer and the decimal part. The value of the decimal part is 0-9. Like other methods, the temperature in the document is in degrees Celsius.
- Examples of use

```

YCProduct.setDeviceTemperatureAlarm(isEnable: true,
                                     highTemperatureIntegerValue: 37,
                                     highTemperatureDecimalValue: 3,
                                     lowTemperatureIntegerValue: 35,
                                     lowTemperatureDecimalValue: 5) { state,
response in
    if state == .succeed {
        print("success")
    } else {
        print("fail")
    }
}
}

```

6.9.3 Blood pressure alarm

- Method

```

/// Blood pressure alarm setting
/// - Parameters:
///   - peripheral: Connected device
///   - isEnable: Whether to open
///   - maximumSystolicBloodPressure: Maximum systolic blood pressure
///   - maximumDiastolicBloodPressure: Maximum diastolic blood pressure
///   - minimumSystolicBloodPressure: Minimum systolic blood pressure
///   - minimumDiastolicBloodPressure: Minimum diastolic blood pressure
///   - completion: Result
public static func setDeviceBloodPressureAlarm(
    _ peripheral: CBPeripheral? = YCProduct.shared.currentPeripheral,

```

```

    isEnabled: Bool,
    maximumSystolicBloodPressure: UInt8,
    maximumDiastolicBloodPressure: UInt8,
    minimumSystolicBloodPressure: UInt8,
    minimumDiastolicBloodPressure: UInt8,
    completion: ((_ state: YCProductState, _ response: Any?) -> ())?
)

```

- Instruction
 - When the device detects that the blood pressure is not within the set range, it will alarm and report the detection value at the same time. For the content of the detection value, please refer to Chapter 8.
- Examples of use

```

YCProduct.setDeviceBloodPressureAlarm(isEnable: true,
                                     maximumSystolicBloodPressure: 250,
                                     maximumDiastolicBloodPressure: 140,
                                     minimumSystolicBloodPressure: 160,
                                     minimumDiastolicBloodPressure: 90) {
state, response in
    if state == .succeed {
        print("success")
    } else {
        print("fail")
    }
}

```

6.9.4 Blood oxygen warning

- Method

```

/// Set blood oxygen alarm
/// - Parameters:
///   - peripheral: Connected device
///   - isEnabled: Whether to open
///   - minimum: Minimum blood oxygen level
///   - completion: Result
public static func setDeviceBloodOxygenAlarm(
    _ peripheral: CBPeripheral? = YCProduct.shared.currentPeripheral,
    isEnabled: Bool, minimum: UInt8,
    completion: ((_ state: YCProductState, _ response: Any?) -> ())?
)

```

- Instruction
 - When the device detects that the blood oxygen is lower than the set value, the device will alarm and report the detected value. For the content of the detection value, please refer to Chapter 8.
- Examples of use

```
YCProduct.setDeviceBloodOxygenAlarm(isEnable: true, minimum: 88) { state,
response in
    if state == .succeed {
        print("success")
    } else {
        print("fail")
    }
}
```

6.9.5 Respiration rate alarm

- Method

```
/// Set respiration rate alarm
/// - Parameters:
///   - peripheral: Connect peripherals
///   - isEnable: Whether to open
///   - maximum: Upper limit of alarm value
///   - minimum: Lower limit of alarm value
///   - completion: Result
public static func setDeviceRespirationRateAlarm(
    _ peripheral: CBPeripheral? = YCProduct.shared.currentPeripheral,
    isEnable: Bool,
    maximum: UInt8,
    minimum: UInt8,
    completion: ((_ state: YCProductState, _ response: Any?) -> ()))?
)
```

- Instruction
 - The respiration rate alarm has two values, the upper limit and the lower limit. If the measured value is within the range, the device will not alarm, otherwise the device will alarm.
 - Whether this function is valid can be judged by whether the `isSupportRespirationRateAlarm` flag is `true`.

- Examples of use

```
// Set respiration rate alarm value
YCProduct.setDeviceRespirationRateAlarm(
    isEnabled: true,
    maximum: 30,
    minimum: 6
) { state, response in
    if state == .succeed, let datas = response as? [YCDeviceEventInfo] {
        print("success")
    } else {
        print("fail")
    }
}
```

6.10 Do not disturb settings

- Method

```
/// Do not disturb settings
/// - Parameters:
///   - peripheral: Connected device
///   - isEable: Whether to enable
///   - startHour: 0 ~ 23
///   - startMinute: 0 ~ 59
///   - endHour: 0 ~ 23
///   - endMinute: 0 ~ 59
///   - completion: Result
public static func setDeviceNotDisturb(
    _ peripheral: CBPeripheral? = YCProduct.shared.currentPeripheral,
    isEable: Bool,
    startHour: UInt8,
    startMinute: UInt8,
    endHour: UInt8,
    endMinute: UInt8,
    completion: ((_ state: YCProductState, _ response: Any?) -> ())?
)
```

- Instruction

- After the bracelet enters the Do Not Disturb mode, all the reminder functions do not

work.

- Examples of use

```
// 9:30 ~ 12:00
YCProduct.setDeviceNotDisturb(isEable: true,
                               startHour: 9,
                               startMinute: 30,
                               endHour: 12,
                               endMinute: 0) { state, response in

    if state == .succeed {
        print("success")
    } else {
        print("fail")
    }
}
```

6.11 Reset

- Method

```
/// reset
/// - Parameters:
///   - peripheral: Connected device
///   - completion: Result
public static func setDeviceReset(
    _ peripheral: CBPeripheral? = YCProduct.shared.currentPeripheral,
    completion: ((_ state: YCProductState, _ response: Any?) -> ()))?
)
```

- Instruction
 - After the device performs a factory reset, all data will be erased and the bracelet will be disconnected.
- Examples of use

```
YCProduct.setDeviceReset { state, response in
    if state == .succeed {
        print("success")
    } else {
        print("fail")
    }
}
```

6.12 Language setting

- Method

```
/// Language setting
/// - Parameters:
///   - peripheral: Connected device
///   - language: 语言
///   - completion: Result
public static func setDeviceLanguage(
    _ peripheral: CBPeripheral? = YCProduct.shared.currentPeripheral,
    language: YCDeviceLanguageType,
    completion: ((_ state: YCProductState, _ response: Any?) -> ())?
)

/// language
@objc public enum YCDeviceLanguageType: UInt8 {

    case english
    case chineseSimplified
    case russian
    case german
    case french
    case japanese
    case spanish
    case italian
    case portuguese
    case korean
    case poland
    case malay
    case chineseTradition
    case thai

    case vietnamese
    case hungarian
    case arabic
    case greek
    case malaysian
    case hebrew
    case finnish
    case czech
    case croatian

    case persian
```



```

        case ukrainian
        case turkish

        case danish
        case swedish
        case norwegian
        case romanian
    }

```

- Instruction
 - The languages supported by each device are different, and the languages that are not supported may be displayed as English.
- Examples of use

```

YCProduct.setDeviceLanguage(language: .persian) { state, response in
    if state == .succeed {
        print("success")
    } else {
        print("fail")
    }
}

```

6.13 Raise your wrist to turn on the screen switch

- Method

```

/// Raise your wrist to turn on the screen switch
/// - Parameters:
///   - peripheral: Connected device
///   - isEnabled: Whether to enable
///   - completion: Result
public static func setDeviceWristBrightScreen(
    _ peripheral: CBPeripheral? = YCProduct.shared.currentPeripheral,
    isEnabled: Bool,
    completion: ((_ state: YCProductState, _ response: Any?) -> ()))?
)

```

- Instruction
 - None
- Examples of use

```

YCProduct.setDeviceWristBrightScreen(isEnable: true) { state, response in
    if state == .succeed {
        print("success")
    } else {
        print("fail")
    }
}
}

```

6.14 Screen settings

6.14.1 Screen brightness

- Method

```

/// Screen brightness
/// - Parameters:
///   - peripheral: Connected device
///   - level: Brightness level
///   - completion: Result
public static func setDeviceDisplayBrightness(
    _ peripheral: CBPeripheral? = YCProduct.shared.currentPeripheral,
    level: YCDeviceDisplayBrightnessLevel,
    completion: ((_ state: YCProductState, _ response: Any?) -> ())?
)

/// Brightness level
@objc public enum YCDeviceDisplayBrightnessLevel : UInt8 {
    case low
    case middle
    case high
    case automatic
    case lower
    case higher
}

```

- Instruction
 - The first 3 values of brightness level are universal, and the last three values are only supported by some customized devices.
- Examples of use

```

YCProduct.setDeviceDisplayBrightness(level: .middle) { state, response in
    if state == .succeed {
        print("success")
    } else {
        print("fail")
    }
}
}

```

6.14.2 Resting time

- Method

```

/// Rest screen time setting
/// - Parameters:
///   - peripheral: Connected device
///   - interval: YCDeviceBreathScreenInterval
///   - completion: Result
public static func setDeviceBreathScreen(
    _ peripheral: CBPeripheral? = YCProduct.shared.currentPeripheral,
    interval: YCDeviceBreathScreenInterval,
    completion: ((_ state: YCProductState, _ response: Any?) -> ()))?
)

/// Interval
@objc public enum YCDeviceBreathScreenInterval: UInt8 {
    case five           // 5s
    case ten            // 10s
    case fifteen        // 15s
    case thirty         // 30s
}

```

- Instruction
 - Note that the time interval is not a specific value, but `YCDeviceBreathScreenInterval` .
- Method

```

YCProduct.setDeviceBreathScreen(interval: .fifteen) { state, response in
    if state == .succeed {
        print("success")
    } else {
        print("fail")
    }
}
}

```

6.15 Skin tone settings

- Method

```

/// 肤色设置
/// - Parameters:
///   - peripheral: Connected device
///   - level: color
///   - completion: Result
public static func setDeviceSkinColor(
    _ peripheral: CBPeripheral? = YCProduct.shared.currentPeripheral,
    level: YCDeviceSkinColorLevel,
    completion: ((_ state: YCProductState, _ response: Any?) -> ()))?
)

@objc public enum YCDeviceSkinColorLevel: UInt8 {
    case white
    case whiteYellow
    case yellow
    case brown
    case darkBrown
    case black
    case other
}

```

- Instruction
 - The skin color setting will affect the health data of the device and the ECG test. Generally, the darker the skin and the more hair users, the larger the value.
- Examples of use

```

YCProduct.setDeviceSkinColor(level: .yellow) { state, response in
    if state == .succeed {
        print("success")
    } else {
        print("fail")
    }
}
}

```

6.16 Blood pressure level setting

- Method

```

/// Blood pressure range setting
/// - Parameters:
///   - peripheral: Connected device
///   - level: Blood pressure range
///   - completion: Result
public static func setDeviceBloodPressureRange(
    _ peripheral: CBPeripheral? = YCProduct.shared.currentPeripheral,
    level: YCDeviceBloodPressureLevel,
    completion: ((_ state: YCProductState, _ response: Any?) -> ()))?
)

/// Blood pressure level
@objc public enum YCDeviceBloodPressureLevel: UInt8 {
    case low // sbp < 90
    case normal // sbp < 140
    case slightlyHigh // spb < 160
    case moderatelyHigh // spb < 180
    case severeHigh
}

```

- Instruction

- When the measured photoelectric blood pressure has a large deviation from the actual blood pressure, the blood pressure level value of the device can be set for correction.
- Note: If the device has a blood pressure calibration function, you do not need to use this function, and directly call blood pressure calibration (refer to 7.2).

- Examples of use

```

YCPProduct.setDeviceBloodPressureRange(level: .normal) { state, response in
    if state == .succeed {
        print("success")
    } else {
        print("fail")
    }
}

```

6.17 Bluetooth name setting

- Method

```

/// Set Bluetooth name
/// - Parameters:
///   - peripheral: Connected device
///   - name: New name
///   - completion: Result
public static func setDeviceBloodPressureRange(
    _ peripheral: CBPeripheral? = YCPProduct.shared.currentPeripheral,
    name: String,
    completion: ((_ state: YCPProductState, _ response: Any?) -> ()))?
)

```

- Instruction

- The setting name is not allowed to exceed 12 bytes, and it is not recommended to use special characters.
- This method is used for factory production, and it is not necessary to develop ordinary applications.

- Examples of use

```

YCPProduct.setDeviceName(name: "YC2021") { state, response in
    if state == .succeed {
        print("success")
    } else {
        print("fail")
    }
}

```

6.18 Set the sensor sampling rate

- Method

```
/// Set the sensor sampling rate
/// - Parameters:
///   - peripheral: Connected device
///   - ppg: PPG sampling rate HZ
///   - ecg: ECG sampling rate HZ
///   - gSensor: G-Sensor sampling rate HZ
///   - tempeatureSensor: Temperature sensor sampling rate HZ
///   - completion: Result
public static func setDeviceSensorSamplingRate(
    _ peripheral: CBPeripheral? = YCProduct.shared.currentPeripheral,
    ppg: UInt16,
    ecg: UInt16,
    gSensor: UInt16,
    tempeatureSensor: UInt16,
    completion: ((_ state: YCProductState, _ response: Any?) -> ()))?
)
```

- Instruction
 - The sensor sampling rate is best to use the default, and do not modify it easily.
- Examples of use

```
YCProduct.setDeviceSensorSamplingRate(ppg: 250,
                                       ecg: 100,
                                       gSensor: 25,
                                       tempeatureSensor: 10) { state,
response in
    if state == .succeed {
        print("success")
    } else {
        print("fail")
    }
}
```

6.19 Theme settings

- Method

```
/// Theme settings
/// - Parameters:
///   - peripheral: Connected device
///   - index: Theme Index
///   - completion: Result
public static func setDeviceTheme(
    _ peripheral: CBPeripheral? = YCProduct.shared.currentPeripheral,
    index: UInt8,
    completion: ((_ state: YCProductState, _ response: Any?) -> ())?
)
```

- Instruction
 - The theme index starts from 0 and reaches the total number of themes-1.
- Examples of use

```
YCProduct.setDeviceTheme(index: 0) { state, response in
    if state == .succeed {
        print("success")
    } else {
        print("fail")
    }
}
```

6.20 Reminder settings

6.20.1 Sleep reminder time

- Method


```

/// Sleep reminder time
/// - Parameters:
///   - peripheral: Connected device
///   - hour: 0 ~ 23
///   - minute: 0 ~ 59
///   - repeat: YCDeviceWeekRepeat
///   - completion: Result
public static func setDeviceSleepReminder(
    _ peripheral: CBPeripheral? = YCProduct.shared.currentPeripheral,
    hour: UInt8, minute: UInt8, repeat: Set<YCDeviceWeekRepeat>,
    completion: ((_ state: YCProductState, _ response: Any?) -> ())?
)

```

- Instruction
 - After the setting is successful, when the current time enters the reminder time, the device will vibrate and display the sleep reminder screen.
- Examples of use

```

YCProduct.setDeviceSleepReminder(hour: 22,
                                  minute: 30,
                                  repeat: [.monday, .thursday, .wednesday,
.enable]) { state, response in
    if state == .succeed {
        print("success")
    } else {
        print("fail")
    }
}

```

6.20.2 Disconnect or exercise standard reminder settings

- Method

```

/// Device reminder type setting
/// - Parameters:
///   - peripheral: Connected device
///   - isEnabled: Whether to enable
///   - remindType: YCDeviceRemindType
///   - completion: Result
public static func setDeviceReminderType(
    _ peripheral: CBPeripheral? = YCProduct.shared.currentPeripheral,

    isEnabled: Bool,
    remindType: YCDeviceRemindType,
    completion: ((_ state: YCProductState, _ response: Any?) -> (()))?
)

```

- Instruction
 - When the device reaches the set reminder conditions, it will vibrate.
- Examples of use

```

YCProduct.setDeviceReminderType(isEnable: true,
                                remindType: .deviceDisconnected) {
state, response in
    if state == .succeed {
        print("success")
    } else {
        print("fail")
    }
}

```

6.20.3 Upload reminder

- Method

```

/// Upload reminder
/// - Parameters:
///   - peripheral: Connected device
///   - isEnabled: Whether to open
///   - threshold: Reminder value
///   - completion: Result
public static func setDeviceUploadReminder(
    _ peripheral: CBPeripheral? = YCProduct.shared.currentPeripheral,
    isEnabled: Bool,
    threshold: UInt8,
    completion: ((_ state: YCProductState, _ response: Any?) -> ()))?
)

```

- Instruction
 - It is used to indicate that when the storage data of the device reaches a specified ratio, an upload reminder is generated.
- Examples of use

```

YCProduct.setDeviceUploadReminder(isEnabled: true, threshold: 50) { state,
response in
    if state == .succeed {
        print("success")
    } else {
        print("fail")
    }
}

```

6.30 Alarm clock

6.30.1 Query alarm clock

- Method

```

/// Query alarm clock
/// - Parameters:
///   - peripheral: Connected device

```

```

/// - completion: Alarm information
public static func queryDeviceAlarmInfo(
    _ peripheral: CBPeripheral? = YCProduct.shared.currentPeripheral,
    completion: ((_ state: YCProductState, _ response: Any?) -> ())?
)

/// Alarm information
@objc public class YCDeviceAlarmInfo : NSObject {

    /// Maximum number of alarms allowed by the device
    public var limitCount: UInt8 { get }

    /// Alarm type
    public var alarmType: YCProductSDK.YCDeviceAlarmType { get }

    /// Hour 0 ~ 23
    public var hour: UInt8 { get }

    /// Minute 0 ~ 59
    public var minute: UInt8 { get }

    /// Repeat
    public var `repeat`: Set<YCProductSDK.YCDeviceWeekRepeat> { get }

    /// Snooze time (minute)
    public var snoozeTime: UInt8 { get }
}

/// Alarm type
@objc public enum YCDeviceAlarmType : UInt8 {
    case wakeUp
    case sleep
    case exercise
    case medicine
    case appointment
    case party
    case meeting
    case custom
}

```

- Instruction

- After executing the query alarm, all the alarm information will be returned in the form of YCDeviceAlarmInfo .

- Examples of use

```
YCProduct.queryDeviceAlarmInfo { state, response in
    if state == .succeed,
        let datas = response as? [YCDeviceAlarmInfo] {

            for item in datas {
                print(item.hour, item.minute)
            }
        }
    }
}
```

6.30.2 Add alarm clock

- Method

```
/// Add alarm clock
/// - Parameters:
///   - peripheral: Connected device
///   - alarmType: Alarm type
///   - hour: 0 ~ 23
///   - minute: 0 ~ 59
///   - repeat: Repeat time
///   - snoozeTime: Snooze time 0~59minutes
///   - completion: Result
public static func addDeviceAlarm(
    _ peripheral: CBPeripheral? = YCProduct.shared.currentPeripheral,

    alarmType: YCDeviceAlarmType,
    hour: UInt8,
    minute: UInt8,
    repeat: Set<YCDeviceWeekRepeat>,
    snoozeTime: UInt8,
    completion: ((_ state: YCProductState, _ response: Any?) -> ())?
)
```

- Instruction
 - Only one alarm clock is allowed at the same time. Increase the number of alarm clocks that cannot exceed the device limit, generally 10.
- Examples of use

```

YCProduct.addDeviceAlarm(alarmType: .wakeUp,
                        hour: 6,
                        minute: 30,
                        repeat: [.enable, .sunday, .saturday],
                        snoozeTime: 0) { state, response in
    if state == .succeed {
        print("success")
    } else {
        print("fail \(String(describing: response) ?? "")")
    }
}

```

6.30.3 Modify alarm

- Method

```

/// Modify alarm
/// - Parameters:
///   - peripheral: Connected device
///   - oldHour: The original hour of the alarm clock
///   - oldMinute: The original minute of the alarm
///   - hour: Alarm clock new hour
///   - minute: Alarm new minute
///   - alarmType: Alarm type
///   - repeat: Repeat time
///   - snoozeTime: Snooze time
///   - completion: Result
public static func modifyDeviceAlarm(
    _ peripheral: CBPeripheral? = YCProduct.shared.currentPeripheral,
    oldHour: UInt8,
    oldMinute: UInt8,
    hour: UInt8,
    minute: UInt8,
    alarmType: YCDeviceAlarmType,
    repeat: Set<YCDeviceWeekRepeat>,
    snoozeTime: UInt8,
    completion: ((_ state: YCProductState, _ response: Any?) -> ())?
)

```

- Instruction

- The alarm information can be modified according to the old time of the alarm clock
- Examples of use

```
YCProduct.modifyDeviceAlarm(oldHour: 6,
                             oldMinute: 30,
                             hour: 11,
                             minute: 0,
                             alarmType: .meeting,
                             repeat: [.enable, .monday],
                             snoozeTime: 0) { state, response in

    if state == .succeed {
        print("success")
    } else {
        print("fail")
    }
}
```

6.30.4 Delete alarm

- Method

```
/// Delete alarm
/// - Parameters:
///   - peripheral: Connected device
///   - hour: 0 ~ 23
///   - minute: 0 ~ 59
///   - completion: Result
public static func deleteDeviceAlarm(
    _ peripheral: CBPeripheral? = YCProduct.shared.currentPeripheral,
    hour: UInt8,
    minute: UInt8,
    completion: ((_ state: YCProductState, _ response: Any?) -> ())?
)
```

- Instruction
 - The specified alarm can be deleted according to the time of the alarm
- Examples of use

```

YCProduct.deleteDeviceAlarm(hour: 6, minute: 30) { state, response in
    if state == .succeed {
        print("success")
    } else {
        print("fail")
    }
}
}

```

6.34 Business card information

- Method

```

/// Send business card to device
/// - Parameters:
///   - peripheral: Connect peripherals
///   - businessCardType: Business card type
///   - content: Business card content
///   - completion: Result
public static func sendBusinessCard(
    _ peripheral: CBPeripheral? = YCProduct.shared.currentPeripheral,
    businessCardType: YCBusinessCardType,
    content: String,
    completion: ((_ state: YCProductState, _ response: Any?) -> ()))?
)

/// Query business card information
/// - Parameters:
///   - peripheral: Connect peripherals
///   - businessCardType: Business card type
///   - completion: Result
public static func queryBusinessCardContent(
    _ peripheral: CBPeripheral? = YCProduct.shared.currentPeripheral,
    businessCardType: YCBusinessCardType,
    completion: ((_ state: YCProductState, _ response: Any?) -> ()))?
)

/// Business card type
@objc public enum YCBusinessCardType: UInt8 {
    case wechat
    case qq
    case facebook
}

```



```

    case twitter
    case whatsapp
    case instagram

    /* ----- */
    case snCode
    case staticCode
    case dynamicCode
}

```

- Instruction
 - Business cards can be set and queried.
 - If you use the parameters starting from snCode, the state change operation will also be used. Please refer to Chapter 8.6.
- Examples of use

```

// Set business card information
YCProduct.sendBusinessCard(businessCardType: .wechat, content:
"https://u.wechat.com/xxxxxxx") { state, _ in

    if state == .succeed {
        print("succeed")
    } else {
        print("failed")
    }
}

// Query business card information
YCProduct.queryBusinessCardContent(businessCardType: .wechat) { state,
response in

    guard state == .succeed,
        let content = response as? String else {
        return
    }

    print(content)
}

```

7. Controll device

7.1 Find device

- Method

```
/// Find device
/// - Parameters:
///   - peripheral: Connected device
///   - remindCount: 1 ~ 10
///   - remindInterval: 1 ~ 3
///   - completion: Result
public static func findDevice(_ peripheral: CBPeripheral? =
YCPProduct.shared.currentPeripheral,
                             remindCount: UInt8 = 5,
                             remindInterval: UInt8 = 1,
                             completion: ((_ state: YCPProductState, _
response: Any?) -> ()))?
)
```

- Instruction

- After calling Method, the bracelet will vibrate. Although the method provides reminder parameter settings, it is recommended to use the default values provided by the SDK.

- Examples of use

```
YCPProduct.findDevice { state, response in
    if state == .succeed {
        print("success")
    } else {
        print("fail")
    }
}
```

7.2 Blood pressure calibration

- Method

```
/// Blood pressure calibration
/// - Parameters:
///   - peripheral: Connected device
///   - systolicBloodPressure: Systolic blood pressure
///   - diastolicBloodPressure: Diastolic blood pressure
///   - completion: Result
public static func deviceBloodPressureCalibration(
    _ peripheral: CBPeripheral? = YCProduct.shared.currentPeripheral,
    systolicBloodPressure: UInt8,
    diastolicBloodPressure: UInt8,
    completion: ((_ state: YCProductState, _ response: Any?) -> ())?
)
```

- Instruction

- Blood pressure calibration refers to the calibration of photoelectric blood pressure. After blood pressure calibration is performed, blood pressure level setting is not required, that is, only one of the two is used, and the priority of blood pressure calibration is high.

- Examples of use

```
YCProduct.deviceBloodPressureCalibration(
    systolicBloodPressure: 110,
    diastolicBloodPressure: 72) { state, response in
    if state == .succeed {
        print("success")
    } else {
        print("fail")
    }
}
```

7.3 Temperature calibration

- Method

```

/// Temperature calibration
/// - Parameters:
///   - peripheral: Connected device
///   - completion: Result
public static func deviceTemperatureCalibration(
    _ peripheral: CBPeripheral? = YCProduct.shared.currentPeripheral,
    completion: ((_ state: YCProductState, _ response: Any?) -> ())?
)

```

- Instruction
 - Temperature calibration is used to calibrate temperature sensors in production equipment to make temperature measurement more accurate. Generally, this method is not required to develop applications.
- Examples of use

```

YCProduct.deviceTemperatureCalibration { state, _ in
    if state == .succeed {
        print("success")
    } else {
        print("fail")
    }
}

```

7.6 Weather data

- Method

```

/// Send weather
/// - Parameters:
///   - peripheral: Connected device
///   - isTomorrow: Today's weather or tomorrow's weather
///   - lowestTemperature: Minimum temperature Celsius
///   - highestTemperature: Maximum temperature Celsius
///   - realTimeTemperature: Current weather temperature Celsius
///   - weatherType: YCWeatherCodeType
///   - windDirection: Wind direction
///   - windPower: Wind force
///   - location: City

```

```

/// - moonType: Moon phase
/// - completion: Result
public static func sendWeatherData(
    _ peripheral: CBPeripheral? = YCProduct.shared.currentPeripheral,
    isTomorrow: Bool = false,
    lowestTemperature: Int8,
    highestTemperature: Int8,
    realTimeTemperature: Int8,
    weatherType: YCWeatherCodeType,
    windDirection: String?,
    windPower: String?,
    location: String?,
    moonType: YCWeatherMoonType?,
    completion: ((_ state: YCProductState, _ response: Any?) -> (()))?
)

```

```

/// Weather code type

```

```

@objc public enum YCWeatherCodeType: UInt8 {

```

```

    case unknow
    case sunny
    case cloudy
    case wind
    case rain
    case snow
    case foggy

```

```

    // ===== Individual equipment customization type

```

```

    case sunnyCustom
    case cloudyCustom
    case thunderShower
    case lightRain
    case moderateRain
    case heavyRain
    case rainSnow
    case lightSnow
    case moderateSnow
    case heavySnow
    case floatingDust
    case fog
    case haze
    case windCustom

```

```

}

```

```

/// Moon phase information
@objc public enum YCWeatherMoonType: UInt8 {

    case newMoon
    case waningMoon
    case theLastQuarterMoon
    case lowerConvexMoon
    case fullMoon
    case upperConvexMoon
    case firstQuarterMoon
    case crescentMoon
    case unknown
}

```

- Instruction
 - isTomorrow is used to determine whether to send today's weather or tomorrow's weather. Whether the bracelet supports tomorrow's weather setting can be judged based on function attributes or return values.
 - The temperature in the weather is all Celsius
 - Weather type YCWeatherCodeType Only the first 6 values are common, and the values listed later can only be used by some special customized equipment.
 - The remaining optional parameters can only be used on customized devices, and all other devices use nil.
- Examples of use

```

YCPProduct.sendWeatherData(lowestTemperature: -20,
                           highestTemperature: 36,
                           realTimeTemperature: 25,
                           weatherType: .sunny,
                           windDirection: nil,
                           windPower: nil,
                           location: nil,
                           moonType: nil) { state, _ in

    if state == .succeed {
        print("success")
    } else {
        print("fail")
    }
}

```

7.7 Shutdown reset restart

- Method

```
/// System operation
/// - Parameters:
///   - peripheral: Connected device
///   - mode: Shutdown reset restart
///   - completion: Result
public static func deviceSystemOperator(
    _ peripheral: CBPeripheral? = YCProduct.shared.currentPeripheral,
    mode: YCDeviceSystemOperator,
    completion: ((_ state: YCProductState, _ response: Any?) -> ())?
)

/// device mode
@objc public enum YCDeviceSystemOperator: UInt8 {
    case shutDown          = 1
    case transportation
    case resetRestart
}
```

- Instruction
 - Using different modes, the device will enter different states. Note that if it is set to transport mode, you must use charging to exit.
- Examples of use

```
YCProduct.deviceSystemOperator(mode: .shutDown) { state, _ in
    if state == .succeed {
        print("success")
    } else {
        print("fail")
    }
}
```

7.8 Get real-time data

Obtaining the real-time data of the device is quite special. There are two methods for opening and receiving. In order to distinguish, the returned data type and the control type setting are not exactly the same. The Demo will list the process and steps of obtaining the data. For the content that is not listed, it may be It will appear in other usage scenarios. If the entire document does not appear, this function may not be supported or needed.

7.8.1 Enable real-time data acquisition

- Method

```
/// Real-time data upload
/// - Parameters:
///   - peripheral: Connected device
///   - isEnabled: Whether to open or close
///   - dataType: YCRealTimeDataType
///   - interval: 1 ~ 240 seconds, it is recommended to use the default
value of 2 seconds
///   - completion: Result
public static func realTimeDataUplod(
    _ peripheral: CBPeripheral? = YCProduct.shared.currentPeripheral,

    isEnabled: Bool,
    dataType: YCRealTimeDataType,
    interval: UInt8 = 2,
    completion: ((_ state: YCProductState, _ response: Any?) -> ()))?
)

/// type of data
@objc public enum YCRealTimeDataType: UInt8 {
    case step
}
```

- Instruction

- This method is used in fewer scenarios, mainly used internally by the SDK, and Method needs to be used in individual cases.
- After using this method, you must actively receive data from the device, refer to 7.8.2.
- After the whole process is used, it is recommended to close the method to avoid some inexplicable problems.

- Examples of use


```

YCProduct.realTimeDataUplod(isEnable: true,
                             dataType: YCRealTimeDataType.step) { state,
response in
    if state == .succeed {
        print("success")
    } else {
        print("fail")
    }
}
}

```

7.8.2 Real-time data reported by the receiving device

- Method

```

/// Receive notifications of real-time data
public static let receivedRealTimeNotification: Notification.Name

/// Real-time data type received
@objc public enum YCReceivedRealTimeDataType: UInt8 {
    case step
}

/// Response to received real-time data
@objcMembers public class YCReceivedDeviceInfo: NSObject {

    /// Responding device received
    public var device: CBPeripheral? { get }

    /// Result
    public var data: Any? { get }
}

/// Real-time steps
@objcMembers public class YCReceivedRealTimeStepInfo: NSObject {

    /// Steps (unit: step)
    public var step: UInt16 { get }

    /// Distance (unit: meter)
    public var distance: UInt16 { get }
}

```

```

    /// Calories (unit: kcal)
    public var calories: UInt16 { get }
}

```

- Instruction

- The notification of `receivedRealTimeNotification` needs to be monitored by the application and parsed according to different types. All the parsing processes are given here, and some of them may be used elsewhere in the document.
- If there is no corresponding data playback, it means there is no corresponding data or the current scene cannot be obtained.
- Note: If you finish using this Method, you must take the initiative to perform a shutdown operation, otherwise it may cause some inexplicable problems.
- All type data will be returned in the `YCReceivedDeviceInfo` type, and be retrieved with the `YCReceivedRealTimeDataType` type as the key.

- Examples of use

```

NotificationCenter.default.addObserver(
    self,
    selector: #selector(receiveRealTimeData(_:)),
    name: YCProduct.receivedRealTimeNotification,
    object: nil
)

@objc private func receiveRealTimeData(_ notification: Notification) {

    guard let info = notification.userInfo else {
        return
    }

    if let response = info[YCReceivedRealTimeDataType.step.string] as?
YCReceivedDeviceInfo,
        let device = response.device,
        let sportInfo = response.data as? YCReceivedRealTimeStepInfo {

        print(device.name ?? "",
            sportInfo.step,
            sportInfo.calories,
            sportInfo.distance
        )
    }
}

```

7.10 ECG measurement

ECG detection includes starting and stopping ECG, and obtaining the results of ECG. For drawing ECG waveforms, please refer to the demo case. The document will give examples of related Methods. The ECG detection is turned on and off by the App, and the recommended measurement time is 60 to 90 seconds. The measured data will be acquired during the test. Similarly, the device itself can also start ECG measurement, and the App can obtain relevant information.

7.10.1 Get electrode position

- Method

```
/// Get the position of the ECG potential
public static func queryDeviceElectrodePosition(
    _ peripheral: CBPeripheral? = YCProduct.shared.currentPeripheral,
    completion: ((YCProductSDK.YCProductState, Any?) -> (()))?
)

/// ECG electrode position
@objc public enum YCDeviceElectrodePosition : UInt8 {
    case right           // Right
    case bottom          // Directly below the screen
    case bothSides       // Left side and right side
    case fullEncirclement // all
}
```

- Instruction
 - Obtaining the electrode position of the device can prompt the user where to place the finger when measuring ECG.
- Examples of use

```
YCProduct.queryDeviceElectrodePosition { state, response in
    if state == .succeed,
    let info = response as? YCDeviceElectrodePosition {
        print(info.rawValue)
    }
}
```

7.10.2 Set wearing position

- Method

```
/// Set wearing position
/// - Parameters:
///   - peripheral: Connected device
///   - wearingPosition: Wearing position
///   - completion: Result
public static func setDeviceWearingPosition(
    _ peripheral: CBPeripheral? = YCProduct.shared.currentPeripheral,
    wearingPosition: YCProductSDK.YCDeviceWearingPositionType = .left,
    completion: ((YCProductSDK.YCProductState, Any?) -> ())?
)

/// Wearing position
@objc public enum YCDeviceWearingPositionType : UInt8 {
    case left    // Left hand
    case right   // Right hand
}
```

- Instruction
 - When the wearing position of the device does not match the setting position, the generated waveform is opposite.
- Examples of use

```
// left hand
YCProduct.setDeviceWearingPosition(wearingPosition: .left) { state,
response in
    if state == .succeed {

    }
}
```

7.10.3 Start and end ECG measurement

- Method

```
/// Start ECG measurement
/// - Parameters:
///   - peripheral: Connected device
///   - completion: Result
public static func startECGMeasurement(
    _ peripheral: CBPeripheral? = YCProduct.shared.currentPeripheral,
    completion: ((YCProductSDK.YCProductState, Any?) -> ())?
)

/// Stop ECG measurement
/// - Parameters:
///   - peripheral: Connected device
///   - completion: Result
public static func stopECGMeasurement(
    _ peripheral: CBPeripheral? = YCProduct.shared.currentPeripheral,
    completion: ((YCProductSDK.YCProductState, Any?) -> ())?
)
```

- Instruction

- After starting to measure ECG, you need to place the finger of the other hand where it is with the electrode to make contact. After the measurement starts, the device will report the measured data.

- Examples of use

```
// Start ECG measurement
YCProduct.startECGMeasurement { state, _ in
    if state == .succeed {
    }
}

// Stop ECG measurement
YCProduct.stopECGMeasurement { state, _ in
    if state == .succeed {
    }
}
```

7.10.4 Receive measurement process data

- Method

```
/// Receive notifications of real-time data
public static let receivedRealTimeNotification: Notification.Name

/// Real-time blood pressure data
@objcMembers public class YCReceivedRealTimeBloodPressureInfo : NSObject {

    /// Heart rate value
    public var heartRate: Int { get }

    /// Systolic blood pressure
    public var systolicBloodPressure: Int { get }

    /// Diastolic blood pressure
    public var diastolicBloodPressure: Int { get }

    /// Blood oxygen level
    public var bloodOxygen: Int { get }

    /// HRV
    public var hrv: Int { get }

    /// Temperature
    public var temperature: Double { get }
}
```

- Instruction

- When the device starts to measure ECG, it will report heart rate, blood pressure and ECG data, and some customized devices will return PPG data.
- By monitoring the same notification, corresponding data can be obtained according to different data types. For specific data processing, refer to Demo.

- Examples of use

```
NotificationCenter.default.addObserver(
    self,
    selector: #selector(receiveRealTimeData(_:)),
    name: YCProduct.receivedRealTimeNotification,
    object: nil
)
```

```

@objc private func receiveRealTimeData(_ notification: Notification) {

    guard let info = notification.userInfo else {
        return
    }

    // Blood pressure data
    if let healthData =
        (info[YCReceivedRealTimeDataType.bloodPressure.toString] as?
        YCReceivedDeviceReportInfo)?.data as? YCReceivedRealTimeBloodPressureInfo
    {
        heartRate = healthData.heartRate
        systolicBloodPressure =
            healthData.systolicBloodPressure
        diastolicBloodPressure =
            healthData.diastolicBloodPressure
        if healthData.hrv > 0 {

        }

    }

    // ECG data
    if let ecgData = (info[YCReceivedRealTimeDataType.ecg.toString] as?
        YCReceivedDeviceReportInfo)?.data as? [Int32] {
        print(ecgData)
    }

    // ppg data
    if let ppgData = (info[YCReceivedRealTimeDataType.ppg.toString] as?
        YCReceivedDeviceReportInfo)?.data as? [Int32] {
        print(ppgData)
    }

}

```

7.10.5 Get ECG results

SDK provides a `YCECGManager` tool class to process the ECG measurement results and the parameters calculated in the measurement process.

7.10.5.1 initialization

- Method

```
/// Global object
public static let shared: YCProductSDK.YCECGManager

/// Algorithm calculation process callback
public func setupManagerInfo(
    rr:((_ rr: Float, _ heartRate: Int) -> ())?,
    hrv: ((_ hrv: Int) -> ())?
)
```

- Instruction
 - Some data will be generated during data processing, which will be reflected in the callback of `setupManagerInfo` method.
- Examples of use

```
let ecgManager = YCECGManager()

ecgManager.setupManagerInfo { rr, heartRate in
    // Check the RR interval and calculate the heart rate
    print("=== Play sound")
} hrv: { [weak self] hrv in
    // HRV
}
```

7.10.5.2 Receive ECG data

- Method

```
/// Process ECG data
public func processECGData(_ data: Int) -> Float
```

- Instruction
 - To pass the obtained ECG data into the `YCECGManager` tool class one by one.
- Examples of use


```

for data in datas {
    var ecgValue: Float = 0
    ecgValue = ecgManager.processECGData(Int(data))
    // ... other processing
}

```

7.10.5.3 Get ECG results

- Method

```

/// Get ECG results
/// - Parameters:
///   - peripheral: Connected device
///   - deviceHeartRate: Heart rate measured by the device
///   - deviceHRV: HRV measured by the device
/// - completion: Result
public func getECGMeasurementResult(
    _ peripheral: CBPeripheral? = YCProduct.shared.currentPeripheral,
    deviceHeartRate: Int?,
    deviceHRV: Int?,
    completion: @escaping (_ result: YCECGMeasurementResult) -> ()
)

/// ECG measurement results
@objcMembers public class YCECGMeasurementResult : NSObject {

    /// Heart rate
    public var heartRate: Int { get }

    /// ECG result
    public var ecgMeasurementType: YCProductSDK.YCECGResultType { get }

    /// HRV
    public var hrv: Int { get }
}

/// ECG type
@objc public enum YCECGResultType : UInt {
    case failed // Measurement failed
    case atrialFibrillation // Atrial fibrillation
    case earlyHeartbeat // Premature sexual intercourse
}

```

```
case supraventricularHeartbeat // Ventricular premature bleeding
case atrialBradycardia         // Slow heart rate
case atrialTachycardia         // Fast heart rate
case atrialArrhythmia          // Sinus arrhythmia
case normal                    // Normal ECG
}
```

- Instruction

- There are two parameters of heart rate and HRV in the Method in the obtained result. If nil is used, the final heart rate and HRV value will use the value calculated by the algorithm. If the specified value is passed in, the final result will use the passed in value.
- It is recommended to use the value measured by the device, if not, use the value of the algorithm.
- Regarding the presentation of ECG measurement results, the reference text has been given in the table.

ECG Result (YCECGResultType)	textual representation
failed	This measurement signal is not good, which may caused by dry-skin. Please clean or moisten the skin and retest. Keep quiet during the test.
atrialFibrillation	QRS waveform was normal, normal P wave disappeared, F wave appeared, R-R interval was irregular.
earlyHeartbeat	QRS waveform was normal, variant P wave appeared ahead of time, P-R > 0.12 s, compensation interval was incomplete.
supraventricularHeartbeat	The qrs-t waveform was wide and deformed. There was no related P wave before the QRS waveform. The QRS duration was > 0.12 seconds. The direction of T wave was opposite to that of the main wave.
atrialBradycardia	The QRS waveform was normal and the R-R interval was too long.
atrialTachycardia	The QRS waveform was normal and the R-R interval was short.
atrialArrhythmi	The QRS waveform was normal, and the R-R interval changed too much.
normal	The amplitude of QRS waveform was normal, P-R interval was normal, ST-T was not changed, and Q-T interval was normal.

■ Examples of use

```
ecgManager.getECGMeasurementResult(
    deviceHeartRate: heartRate > 0 ? heartRate : nil,
    deviceHRV: hrvValue > 0 ? hrvValue : nil) { result in
    print(result.hearRate,
          result.hrv,
          result.ecgMeasurementType == .normal
    )
}
```

7.10.5.4 Get body and other emotional index (reserved)

- Method

```
/// Get body index
public func getPhysicalIndexParameters() -> YCBodyIndexResult

/// Physical outcome parameters
@objcMembers public class YCBodyIndexResult: NSObject {

    /// Available or not
    public var isAvailable: Bool = false

    /// Load index
    public var heavyLoad: Float = 0

    /// Stress index
    public var pressure: Float = 0

    /// HRV index
    public var hrvNorm: Float = 0

    /// Body index
    public var body: Float = 0
}
```

- Instruction
 - This method may be able to determine whether it is available through the attribute isAvailable in the return value.
- Examples of use

```
let bodyInfo = ecgManager.getPhysicalIndexParameters()
if bodyInfo.isAvailable {
    print("heavyLoad = \(bodyInfo.heavyLoad), pressure = \(bodyInfo.pressure), hrvNorm = \(bodyInfo.hrvNorm), body = \(bodyInfo.body)")
}
```

7.10.6 About drawing ECG waveforms

1. During ECG measurement, if you need to draw graphics, you still need to read the code in the Demo first, and you need to understand the basic drawing knowledge in iOS.
2. The waveform given in the Demo is a normal and standardized drawing method. If it is of other types, you need to zoom in or out on this basis.

7.10.7 Acquire ECG and PPG data for device startup measurement

1. If it is the ECG measurement initiated by the device, only the measured ECG or PPG data can be obtained, but no other data.
2. For related operations to obtain data, please refer to Chapter 10 Historical Data Collection.

7.12 Sport

```
/// Sport type definition
@objc public enum YCDeviceSportType: UInt8 {

    case none
    case run
    case swimming
    case riding
    case fitness

    case ropeskiing
    case playball
    case walk
    case badminton

    case football
    case mountaineering
    case pingPang

    case indoorRunning
    case outdoorRunning
    case outdoorWalking
    case indoorWalking

    case indoorRiding
    case stepper
```

```

        case rowingMachine
        case realTimeMonitoring
        case situps
        case jumping
        case weightTraining
        case yoga
    }

    /// Sport state
    @objc public enum YCDeviceSportState: UInt8 {
        case stop
        case start
    }

```

7.3.1 Sport control

- Method

```

    /// Control the device to enter the sport mode
    /// - Parameters:
    ///   - peripheral: Connected device
    ///   - state: YCDeviceSportState
    ///   - sportType: YCDeviceSportType
    ///   - completion: Result
    public static func controlSport(
        _ peripheral: CBPeripheral? = YCProduct.shared.currentPeripheral,
        state: YCDeviceSportState,
        sportType: YCDeviceSportType,
        completion: ((_ state: YCProductState, _ response: Any?) -> ()))?
    )

```

- Instruction
 - Currently, all devices only support opening and closing.
- Examples of use

```

// Start running
YCProduct.controlSport(state: .start, sportType: .run) { state, response in
    if state == .succeed {
        print("success")
    } else {

```

```

        print("fail")
    }
}

// End running
YCProduct.controlSport(state: .stop, sportType: .run) { state, response in
    if state == .succeed {
        print("success")
    } else {
        print("fail")
    }
}
}

```

7.3.2 Receipt of exercise data

As the device motion data reporting method has been optimized, the method of receiving data has also changed accordingly. Subsequent products gradually migrate to the new method. The new method requires two sets of data to be received, and the old method only has one.

7.3.2.1 Determine the movement mode of the device to transmit data

- Method

```

// Refer to section 5.1
public var isSupportSyncRealSportData: Bool = false

```

- Instruction
 - Judge whether it is the new way or the old way through the attributes of the device.
- Examples of use

```

if peripheral?.supportItems.isSupportSyncRealSportData {
    // New way
} else {
    // Old way
}

```

7.3.2.2 Old way

- Method

```
/// Receive notifications of real-time data
public static let receivedRealTimeNotification: Notification.Name
```

- Instruction
 - The device will return heart rate, steps, distance, calories, but not time.
 - Note that the number of steps, distance, and calories are returned to the cumulative result, so each time you get these three values, you should subtract the initial value obtained for the first time after entering the exercise.
 - In this way, it is impossible to obtain whether the device has exited the sports mode.
- Examples of use

```
NotificationCenter.default.addObserver(
    self,
    selector: #selector(receiveRealTimeData(_:)),
    name: YCProduct.receivedRealTimeNotification,
    object: nil
)

@objc private func receiveRealTimeData(_ notification: Notification) {
    guard let info = notification.userInfo else {
        return
    }
    if let response = info[YCReceivedRealTimeDataType.step.string] as?
YCReceivedDeviceInfo,
        let device = response.device,
        let sportInfo = response.data as? YCReceivedRealTimeStepInfo {
        print(device.name ?? "",
              sportInfo.step,
              sportInfo.calories,
              sportInfo.distance
        )
    }
    else if let response =
info[YCReceivedRealTimeDataType.heartRate.string] as?
YCReceivedDeviceInfo,
        let device = response.device,
        let heartRate = response.data as? UInt8 {
        print(device.name ?? "",
```



```

        heartRate)
    }
}

```

7.3.2.3 New way

- Method

```

/// Receive notifications of real-time data
public static let receivedRealTimeNotification: Notification.Name

/// Sports status change notification
public let deviceControlNotification: Notification.Name

/// Sports status information
@objcMembers public class YCDeviceControlSportModeControlInfo: NSObject {
    public var state: YCDeviceSportState {get}
    public var sportType: YCDeviceSportType {get}
}

```

- Instruction
 - In addition to obtaining the exercise data of the device, the new method may also obtain the status of whether the exercise is exited or not.
- Examples of use

```

NotificationCenter.default.addObserver(
    self,
    selector: #selector(deviceDataStateChanged(_:)),
    name: YCProduct.deviceControlNotification,
    object: nil
)

```

```

NotificationCenter.default.addObserver(
    self,
    selector: #selector(receiveRealTimeData(_:)),
    name: YCProduct.receivedRealTimeNotification,
    object: nil
)

```

```

@objc private func receiveRealTimeData(_ notification: Notification) {

```

```

        guard let info = notification.userInfo else {
            return
        }

        if let response =
info[YCReceivedRealTimeDataType.realTimeMonitoringMode.string] as?
YCReceivedDeviceReportInfo,
            let device = response.device,
            let data = response.data as? YCReceivedMonitoringModeInfo {
                print(device.name ?? "",
                    data.startTimeStamp,
                    data.modeStep,
                    data.modeCalories,
                    data.modeCalories
                )
            }
        }

@objc private func deviceDataStateChanged(_ ntf: Notification) {

    guard let info = ntf.userInfo else {
        return
    }

    if let response = info[YCDeviceControlType.sportModeControl.string] as?
YCReceivedDeviceReportInfo,
        let device = response.device,
        let data = response.data as? YCDeviceControlSportModeControlInfo {
            print(device.name ?? "",
                data.state,
                data.sportType
            )
        }
    }
}

```

7.3.3 Sports history data

- Most devices will not record motion-related data after starting up and running, and need to be processed by the App itself.
- For some customized devices, exercise data will be saved. If you want to obtain this part of information, please refer to 4.3.12.

7.13 Photograph

There are two ways to start taking pictures. One is to start the device and enter the camera mode, and the other is to start the App to enter the camera mode. After entering the photo mode, there are two ways to perform the photo action, one is to tap the App to take a photo, and the other is to tap the device to take a photo. The real photo is done on the mobile phone. If the device clicks to take the photo, you need to reply to the device after the photo is completed to see if the photo is successful.

7.13.1 App to turn on and off the camera mode

- Method

```
/// Mobile phone control to enter and exit photo mode
/// - Parameters:
///   - peripheral: Connected device
///   - isEnabled: Activate or deactivate photo mode
///   - completion: Result
public static func takephotoByPhone(
    _ peripheral: CBPeripheral? = YCProduct.shared.currentPeripheral,
    isEnabled: Bool,
    completion: ((_ state: YCProductState, _ response: Any?) -> ())?
)
```

- Instruction

- In this method, the mobile phone controls the device to enter or exit the camera mode, and all operations are performed on the mobile phone.

7.13.2 The device starts and exits to take pictures

- Method

```
/// Device control notification
public static let deviceControlNotification: Notification.Name

/// Photo mode status
@objc public enum YCDeviceControlPhotoState: UInt8 {
    case exit      // Exit photo
    case enter     // Enter to take a photo
    case photo     // Photograph
}
```

- Instruction
 - When the received status is a photo, the photo is still operated on the mobile phone, and the device is only responsible for reporting the current status.
- Examples of use

```
NotificationCenter.default.addObserver(
    self,
    selector: #selector(deviceDataStateChanged(_:)),
    name: YCProduct.deviceControlNotification,
    object: nil
)

@objc private func deviceDataStateChanged(_ ntf: Notification) {

    guard let info = ntf.userInfo else {
        return
    }

    if let response = info[YCDeviceControlType.photo.string] as?
    YCReceivedDeviceReportInfo,
        let device = response.device,
        let state = response.data as? YCDeviceControlPhotoState {
        print(device.name ?? "",
              state
        )
    }
}
```

7.13.3 Cross operation

Once the interaction logic of taking pictures crosses, for example, the mobile phone starts and the device exits, or the device starts and the mobile phone exits. Pay attention to the change of state, and then call the corresponding interface.

7.22 Address book

The address book function only sends the user name and number to the device for storage and storage. The maximum number that the device can store is 30. During the entire process of transmitting the address book, opening and exiting synchronization only need to be executed once, while sending communication data requires repeated execution, because only one record can be sent at a time.

7.22.1 Enter sync address book

- Method

```
/// Turn on address book synchronization
/// - Parameters:
///   - peripheral: Connected device
///   - completion: Result
public static func startSendAddressBook(
    _ peripheral: CBPeripheral? = YCProduct.shared.currentPeripheral,
    completion: ((_ state: YCProductState, _ response: Any?) -> ()))?
)
```

- Instruction
 - Only after the device is set to start synchronization, can it enter the real synchronization data. It only needs to be executed once.
- Examples of use

```

YCPProduct.startSendAddressBook { state, response in
    if state == .succeed {
        print("success")
    } else {
        print("fail")
    }
}

```

7.22.2 Send address book data

- Method

```

/// Synchronize address book details data
/// - Parameters:
///   - peripheral: Connected device
///   - phone: Phone number, no more than 20 characters
///   - name: Username, no more than 8 Chinese
///   - completion: Result
public static func sendAddressBook(
    _ peripheral: CBPeripheral? = YCPProduct.shared.currentPeripheral,
    phone: String,
    name: String,
    completion: ((_ state: YCPProductState, _ response: Any?) -> ())?
)

```

- Instruction
 - Send specific address book information to the device, pay attention to the length of the value.
- Examples of use

```

YCPProduct.sendAddressBook(phone: "13800138000", name: "jack") { state,
response in
    if state == .succeed {
        print("success")
    } else {
        print("fail")
    }
}

```

7.22.3 Exit sync address book

- Method

```
/// Exit sync address book
/// - Parameters:
///   - peripheral: Connected device
///   - completion: Result
public static func stopSendAddressBook(
    _ peripheral: CBPeripheral? = YCProduct.shared.currentPeripheral,
    completion: ((_ state: YCProductState, _ response: Any?) -> ())?
)
```

- Instruction
 - To end the synchronization of address book information, it only needs to be executed once.
- Examples of use

```
YCProduct.stopSendAddressBook { state, response in
    if state == .succeed {
        print("success")
    } else {
        print("fail")
    }
}
```

7.22.4 JL Platform Address Book

JL Platform Address Book The address book information of Jerry Platform is sent using the platform's own API, which is an independent API.

- Method

```
/// Send contact information to the device
/// - Parameters:
///   - datas:Contact information list
///   - completion: Send status isSuccess or failure, progress 0~1
public static func syncJLContactInfoToDevice(
```

```

        _ datas: [YCDeviceContactItem],
        completion: @escaping (_ isSuccess: Bool, _ progress: Float) -> ()
    )

    /// Querying device contact information
    /// - Parameter completion: Address book existing in the device
    public static func queryJLDeviceContactData(
        _ completion: @escaping (_ datas: [YCDeviceContactItem])-> ()
    )

    /// Address book information
    @objcMembers open class YCDeviceContactItem: NSObject {

        /// full name
        open var name: String

        /// Telephone
        open var phone: String

        /// Whether it exists in the device
        open var isExistDevice: Bool

        public init(name: String = "",
                    phone: String = "",
                    isExist: Bool = false)
    }
}

```

- Instruction

- The address book of Jerry platform supports query and synchronization. The address book information is 'YCDeviceContactItem ', and the name and phone must be less than 20 bytes.

- Examples of use

```

// Querying the intermediate hand communication information of the device
YCPProduct.queryJLDeviceContactData { deviceItems in
    for item in deviceItems {
        print("\(item.name) - \(item.phone)")
    }
}

// Set up address book
YCPProduct.syncJLContactInfoToDevice([
    YCDeviceContactItem(name: "zhangsan", phone: "18812345678"),

```



```

        YCDeviceContactItem(name: "lisi", phone: "13685369726"),
    ]) { [weak self] isSuccess, progress in
        if isSuccess {
            print("success")
        } else {
            print("failed")
        }
    }
}

```

7.23 Blood glucose calibration

- Method

```

/// blood glucose calibration
/// - Parameters:
///   - peripheral: connected device
///   - bloodGlucoseInteger: blood Glucose integer
///   - bloodGlucoseDecimal: blood Glucose decimal
///   - mode: Blood glucose calibration mode
///   - completion: result
public static func bloodGlucoseCalibration(
    _ peripheral: CBPeripheral? = YCProduct.shared.currentPeripheral,
    bloodGlucoseInteger: Int8,
    bloodGlucoseDecimal: Int8,
    mode: YCBloodGlucoseCalibrationaMode = .fasting,
    completion: ((_ state: YCProductState, _ response: Any?) -> ()))?
)

/// Blood glucose calibration mode
@objc public enum YCBloodGlucoseCalibrationaMode: UInt8 {
    case fasting
    case afterBreakfast
}

```

- Instruction
 - Blood glucose calibration is the data used to calibrate blood glucose measurement. After this method is performed, the test blood glucose results will be more accurate.
- Examples of use

```
// 4.6 for fasting
YCProduct.bloodGlucoseCalibration(
    bloodGlucoseInteger: 4,
    bloodGlucoseDecimal: 6) { state, response in

    if state == .succeed {
        print("success")
    } else {
        print("fail")
    }
}
```

7.26 Uric acid calibration

- Method

```
/// Uric acid calibration
/// - Parameters:
///   - peripheral: Connected device
///   - value: uric acid (umol/L) 90 ~ 1000
///   - completion: result
public static func uricAcidCalibration(
    _ peripheral: CBPeripheral? = YCProduct.shared.currentPeripheral,
    value: UInt16,
    completion: ((_ state: YCProductState, _ response: Any?) -> ())?
)
```

- Instruction
 - Used to calibrate uric acid measurement. Note that the unit is umol/L. If it is other units, you need to convert it yourself. Calibration range is 90~1000 umol/L
 - After calling the interface, you need to wait for the watch measurement to end.
- Examples of use

```

YCProduct.uricAcidCalibration(value: 300 ) { [weak self] state, response in

    if state == .succeed {

    } else {

    }

}

```

7.27 Blood fat calibration

- Method

```

/// Blood fat calibration
/// - Parameters:
///   - peripheral: Connected device
///   - cholesterol: (mmol/L) 1.0 ~ 9.5
///   - completion: result
public static func bloodFatCalibration(
    _ peripheral: CBPeripheral? = YCProduct.shared.currentPeripheral,
    cholesterol: Double,
    completion: ((_ state: YCProductState, _ response: Any?) -> ()))?
)

```

- Instruction

- Used to calibrate blood lipid measurement. Note that the unit is mmol/L. If it is another unit, you need to convert it yourself. Calibration range is 1.0~9.5 mmol/L
- After calling the interface, you need to wait for the watch measurement to end.

- Examples of use

```

YCProduct.bloodFatCalibration(cholesterol: 5.1 ) { state, response in

    if state == .succeed {

        } else {

        }

    }

}

```

8. Receive device response

This part refers to that the user operates the device or the device monitors some kind of information, and the device will report the operation information at the same time. The SDK will uniformly monitor the response of the device and process it according to different types. The SDK will send the operating status of the device in the form of a notification. The application needs to monitor and parse according to different types. In addition, some content has already been listed by other parties and will no longer appear here. If the corresponding data is not received, it may be that the device does not support this function.

```

// Response type
@objc public enum YCDeviceControlType: UInt8 {

    case findPhone           // Find cellphone
    case photo               // Photograph
    case sos                 // SOS
    case allowConnection     // Whether to allow connection
    case sportMode           // Switch sport
    case reset               // Reset
    case stopRealTimeECGMeasurement // Stop ECG measurement
    case sportModeControl    // Switch sport mode
    case switchWatchFace     // Switch watch face
    case healthDataMeasurementResult // Start device test
    case reportWarningValue  // Warning value
    case ppi                 // peak to peak interval (unit:
microseconds)
    case invasiveMeasurementState // Invasive measurement results
    case alipayActivationState // Alipay activation status

```

```

        case dynamicCodeState // Dynamic code status
    }

    /// Device control notification
    public static let deviceControlNotification: Notification.Name

```

Since this part is relatively uniform, the case demonstrations are all written in one demonstration.

```

NotificationCenter.default.addObserver(
    self,
    selector: #selector(deviceDataStateChanged(_:)),
    name: YCProduct.deviceControlNotification,
    object: nil
)

@objc private func deviceDataStateChanged(_ ntf: Notification) {
    guard let info = ntf.userInfo else {
        return
    }

    // Find cellphone
    if let response = info[YCDeviceControlType.findPhone.toString] as?
    YCReceivedDeviceInfo,
        let device = response.device,
        let state = response.data as? YCDeviceControlState {
        print(device.name ?? "",
            state == .stop
        )
    }

    // sos
    if let response = info[YCDeviceControlType.sos.toString] as?
    YCReceivedDeviceInfo,
        let device = response.device {
        print(device.name ?? "",
            "sos"
        )
    }

    // Whether to allow connection
    if let response = info[YCDeviceControlType.allowConnection.string] as?
    YCReceivedDeviceInfo,
        let device = response.device,

```

```

        let state = response.data as? YCDeviceControlAllowConnectionState {
            print(device.name ?? "",
                state == .agree
            )
        }
    }

    // reset
    if let response = info[YCDeviceControlType.reset.toString] as?
YCReceivedDeviceReportInfo,
        let device = response.device {
            print(device.name ?? "",
                "reset"
            )
        }

    // Warning value
    if let response = info[YCDeviceControlType.reportWarningValue.toString]
as? YCReceivedDeviceReportInfo,
        let device = response.device,
        let value = response.data as? YCDeviceControlReportWarningValueInfo {
            print(device.name ?? "",
                value
            )
        }
    }
}

```

8.1 Find cellphone

The device will report the status when it starts searching for the mobile phone or stops searching for the mobile phone.

```

// Find the status of the phone
@objc public enum YCDeviceControlState: UInt8 {
    case stop
    case start
}

```

9. Watch face download

Watch face download includes querying the watch face information in the device, App switching watch faces, deleting watch faces, device operation watch faces, and App custom watch faces.

9.1 Query device dial information

- Method

```
/// Query device dial information
/// - Parameters:
///   - peripheral: Connected device
///   - completion: Result
public static func queryWatchFaceInfo(
    _ peripheral: CBPeripheral? = YCProduct.shared.currentPeripheral,
    completion: ((YCProductSDK.YCProductState, Any?) -> ())?
)

/// Breakpoint information of the watch face
@objcMembers public class YCWatchFaceBreakCountInfo : NSObject {

    /// Dial data
    public var dials: [YCProductSDK.YCWatchFaceInfo] { get }

    /// Maximum number supported
    public var limitCount: Int { get }

    /// Locally stored quantity
    public var localCount: Int { get }
}

/// Dial information
@objcMembers public class YCWatchFaceInfo : NSObject {

    /// Dial id
    public var dialID: UInt32

    /// Dial breakpoint value
    public var blockCount: UInt16
```

```

    /// Support delete
    public var isSupportDelete: Bool { get }

    /// Dial version
    public var version: UInt16 { get }

    /// Whether it is a custom watch face
    public var isCustomDial: Bool { get }

    /// Whether it is the current display dial
    public var isShowing: Bool { get }
}

```

- Instruction
 - If the query is successful, the returned result is `[YCWatchFaceBreakCountInfo]` type
- Examples of use

```

YCProduct.queryWatchFaceInfo { state, response in
    if state == YCProductState.succeed,
    let info = response as? YCWatchFaceBreakCountInfo {
        if info.localCount > 0 {
            for item in info.dials {
                print(item.dialID)
            }
        }
    }
}

```

9.2 App delete watch face

- Method


```

/// Remove watch face
/// - Parameters:
///   - peripheral: Connected device
///   - dialID: Dial ID
///   - completion: Result
public static func deleteWatchFace(
    _ peripheral: CBPeripheral? = YCProduct.shared.currentPeripheral,
    dialID: UInt32,
    completion: ((YCProductSDK.YCProductState, Any?) -> ())?
)

```

- Instruction
 - You can delete the watch face as long as you specify the watch face ID to be deleted.
- Examples of use

```

let dialID: UInt32 = 2147483539
YCProduct.deleteWatchFace(dialID: dialID) { state, _ in
    if state == .succeed {
        print("delete success")
    }
}

```

9.3 App switch watch face

- Method

```

/// App switch watch face
/// - Parameters:
///   - peripheral: Connected device
///   - dialID: Dial ID
///   - completion: Result
public static func changeWatchFace(
    _ peripheral: CBPeripheral? = YCProduct.shared.currentPeripheral,
    dialID: UInt32,
    completion: ((YCProductSDK.YCProductState, Any?) -> ())?
)

```

- Instruction

- The parameters for switching the dial and deleting the dial are the same
- Examples of use

```
let dialID: UInt32 = 2147483539
YCProduct.changeWatchFace(dialID: dialID) { state, _ in
    if state == .succeed {
        print("change success")
    }
}
```

9.4 Device switch or delete watch face

- Method

```
/// Device control notification
public static let deviceControlNotification: Notification.Name
```

- Instruction
 - If the device deletes or switches the watch face, it will take the initiative to report the finally displayed watch face ID, and the complete watch face information can be found by matching the watch face information that is queried.
 - The information reported by the device can be retrieved by type
- Examples of use

```
NotificationCenter.default.addObserver(
    self,
    selector: #selector(watchFaceChanged(_:)),
    name: YCProduct.deviceControlNotification,
    object: nil
)

@objc private func watchFaceChanged(_ ntf: Notification) {
    guard let info = ntf.userInfo,
          let dialID = ((info[YCDeviceControlType.switchWatchFace.string])
as? YCReceivedDeviceReportInfo)?.data as? UInt32 else {
        return
    }
    print("dialID: \(dialID)")
}
```

9.5 Download watch face

- Method

```
/// Download watch face
/// - Parameters:
///   - peripheral: Connected device
///   - isEnabled: On or off
///   - data: Dial data
///   - dialID: Dial ID
///   - blockCount: Dial breakpoint
///   - dialVersion: Dial version
///   - completion: Download progress
public static func downloadWatchFace(
    _ peripheral: CBPeripheral? = YCProduct.shared.currentPeripheral,
    isEnabled: Bool,
    data: NSData,
    dialID: UInt32,
    blockCount: UInt16,
    dialVersion: UInt16,
    completion: ((YCProductSDK.YCProductState, Any?) -> ())?
)

/// Download data progress information
@objcMembers public class YCDownloadProgressInfo : NSObject {

    /// Progress (0 ~ 1.0)
    public var progress: Float { get }

    /// Downloaded data size
    public var downloaded: Int

    /// The size of the total downloaded data
    public var total: Int { get }
}
```

- Instruction

- The parameters in the download dial will indicate whether the download is normal and the download progress through the return value.

- Examples of use

```

guard let path = Bundle.main.path(forResource: "customE80.bin", ofType:
nil),
    let dialData = NSData(contentsOfFile: path) else {
        return
    }

let dialID: UInt32 = 2147483539

// Remove watch face
YCProduct.deleteWatchFace(dialID: dialID) { state, response in

    // Download
    YCProduct.downloadWatchFace(
        isEnabled: true,
        data: customDialData,
        dialID: dialID,
        blockCount: 0,
        dialVersion: 1) { state, response in
            if state == .succeed,
                let info = response as? YCDownloadProgressInfo {
                    print(info.downloaded, info.progress)
                } else {

            }
        }
    }
}

```

9.6 Custom watch face

- Method

```

/// Generate custom watch face data
/// - Parameters:
///   - dialData: Original dial data
///   - backgroundImage: Background picture
///   - thumbnail: Thumbnail
///   - timePosition: Time display position coordinates
///   - redColor: 0 ~ 255
///   - greenColor: 0 ~ 255

```

```

/// - blueColor: 0 ~ 255
/// - isFlipColor: whether to flip the colors
/// - Returns: Dial data
public static func generateCustomDialData(
    _ dialData: Data,
    backgroundImage: UIImage?,
    thumbnail: UIImage?,
    timePosition: CGPoint,
    redColor: UInt8,
    greenColor: UInt8,
    blueColor: UInt8,
    isFlipColor: Bool
) -> Data

/// Query the BMP information in the dial file
public static func queryDeviceBmpInfo(_ dialData: Data) ->
YCProductSDK.YCWatchFaceDataBmpInfo

/// Picture information in the watch face
@objcMembers public class YCWatchFaceDataBmpInfo : NSObject {

    /// The width of the background image
    public var width: Int { get }

    /// The height of the background image
    public var height: Int { get }

    /// The size of the background image (bytes)
    public var size: Int { get }

    /// The radius of the background image
    public var radius: Int { get }

    /// The width of the thumbnail
    public var thumbnailWidth: Int { get }

    /// The height of the thumbnail
    public var thumbnailHeight: Int { get }

    /// Thumbnail size (bytes)
    public var thumbnailSize: Int { get }

    /// The radius of the thumbnail
    public var thumbnailRadius: Int { get }
}

```

```
}
```

- Instruction
 - The custom dial is based on the custom dial source file provided by the manufacturer, the picture and text color are modified, and a new dial file is generated and downloaded to the device.
 - If you don't modify the picture, you can pass in nil, and the SDK will keep the original background picture and thumbnail.
 - A new dial file is generated, directly call the method downloaded by the dial, and download it to the device.
 - The document gives a method for querying information of the dial BMP, which may be used in the App development interface or when generating thumbnails.
- Examples of use

```
let customDialData =  
    YCProduct.generateCustomDialData(  
        dialData as Data,  
        backgroundImage: UIImage(named: "test"),  
        thumbnail: UIImage(named: "test"),  
        timePosition: CGPoint(x: 120, y: 120),  
        redColor: 255,  
        greenColor: 0,  
        blueColor: 0,  
        isFlipColor:  
        YCProduct.shared.currentPeripheral?.supportItems.isFlipCustomDialColor ??  
        false  
    ) as NSData
```

9.7 JL dial API

JL Dial API Jerry Platform uses the API provided by the platform itself, so most of the dial APIs listed in the previous chapter are unavailable.

9.7.1 Query dial information

- Method

```
/// Query JL's current display dial  
/// - Parameter completion: Dial name
```

```

public static func queryJLDeviceCurrentWatchFace(_ completion: ((_ name:
String) -> ()))?)

/// Query all the information of Jerry's dials
/// - Parameter completion: isSuccess: whether the query is successful,
dials: dial name, customDials: custom dial name
public static func queryJLDeviceLocalWatchFaceInfo(
    _ completion: (
        ( _ isSuccess: Bool, _ dials: [String], _ customDials: [String]) ->
        ()))?
)

/// Querying the version information of a dial
/// - Parameters:
///   - dials: Local dial
///   - completion: Dial version and ID information
public static func queryJLDeviceWatchVersionInfo(
    _ dials: [String],
    completion: ((_ info: [YCJLDeviceWatchFaceVersionInfo]) -> ()))?
)

/// Dial version information
@objcMembers public class YCJLDeviceWatchFaceVersionInfo: NSObject {

    /// Dial name
    public var name: String = ""

    /// ID of dial
    public var dialID: String = ""

    /// Version of dial
    public var version: String = ""

    init(name: String, dialID: String, version: String)
}

```

- Instruction
 - Dial queries support the API in 9.1. In addition, this chapter lists three, which query the corresponding version and ID of the device's dial information and the dial. The queried dial names start with 'WATCH', and the user-defined dials start with 'BGP'.
- Examples of use

```

// Query the current dial
YCProduct.queryJLDeviceCurrentWatchFace { name in
    print("\(name)")
}

// Querying all dial information in the device
YCProduct.queryJLDeviceLocalWatchFaceInfo { isSuccess, dialCaches,
customDialCaches in

    guard isSuccess else {
        return
    }

    print("\(dialCaches), \(customDialCaches)")
// FIXME: - No need to read the ID information of Jerry dial temporarily
//          YCProduct.queryJLDeviceWatchVersionInfo(dialCaches) { infos
in
//
//
//          }
}

```

9.7.2 Set dial

- Method

```

/// Set JL dial
/// - Parameters:
///   - watchFaceName: Dial name
///   - isCustomWatchFace: is cusotom dial
///   - completion: Whether the setting is successful
public static func settingJLDeviceWatchFace(
    _ watchFaceName: String,
    isCustomWatchFace: Bool = false,
    completion: ((_ isSuccess: Bool) -> ())?
)

```

- Instruction

- Setting dials is also distinguished by name, including setting common dials and user-defined dials. Setting user-defined dials will be described separately in user-defined dials.

- Examples of use

```
// Set WATCH2 as the current dial
YCProduct.settingJLDeviceWatchFace("WATCH2") { [weak self] isSuccess in

    if isSuccess {
        print("success")
    } else {
        print("failed")
    }
}
```

9.7.3 Delete dial

- Method

```
/// Delete dial
/// - Parameters:
///   - watchFaceName: Dial name
///   - completion: Whether the deletion is successful
public static func deleteJLDeviceWatchFace(
    _ watchFaceName: String,
    completion: ((_ isSuccess: Bool) -> ())?
)
```

- Instruction
 - Just like setting a dial, you can directly use the dial name as a parameter.
- Examples of use

```
// Delete WATCH2
YCProduct.deleteJLDeviceWatchFace("WATCH2") { isSuccess in
    if isSuccess {
        print("success")
    } else {
        print("failed")
    }
}
```

9.7.4 Download dial

- Method

```
/// Installing the JL dial
/// - Parameters:
///   - watchFaceName: Dial name
///   - dialData: Dial data
///   - completion: Installation progress 0~1.0 and result - state
public static func installJLDeviceWatchFace(
    _ watchFaceName: String,
    dialData: Data,
    completion: @escaping ((_ state: JLDeviceWatchFaceState, _ progress:
Float) -> ()))
)

/// Installation status of dial
@objc public enum JLDeviceWatchFaceState: Int {
    case noSpace                = 0
    case installing
    case success
    case failed
}
```

- Instruction

- To install a dial, you need the dial name and the dial file data as parameters.
- After successful installation, you need to actively set the installation dial to display it.

- Examples of use

```
// Installing WATCH2
guard let dialData = NSData(contentsOfFile: "表盘文件路径") else {
    return
}

YCProduct.installJLDeviceWatchFace(
    "WATCH2",
    dialData: dialData as Data) { state, progress in
    if state == .success {
        YCProduct.settingJLDeviceWatchFace("WATCH2") { [weak self]
isSuccess in
        }
    }
}
}
```

9.7.5 Device dial switch

- Method

```
/// JL dial switch notification
public static let jlDeviceWachFaceChangeNotification: Notification.Name

/// JL dial switch has a key
public static let jlDeviceWatcFaceChangeKey: String
```

- Instruction
 - When the watch switches or deletes the dial, the name of the dial displayed in the current interface will be sent. The app just needs to listen to the notification.
- Examples of use

```
NotificationCenter.default.addObserver(
    self,
    selector: #selector(receiveJLWatchFaceChange(_:)),
    name: YCProduct.jlDeviceWachFaceChangeNotification,
    object: nil
)

@objc private func receiveJLWatchFaceChange(_ ntf: Notification) {

    guard let info = ntf.object as? [String: Any],
```

```

        let name = info[YCProduct.jlDeviceWatchFaceChangeKey] as? String
    else {
        return
    }
    print("\(name)")
}

```

9.7.6 Custom dial

- Method

```

/// Convert custom dials
/// - Parameters:
///   - watchName: Dial name
///   - backgroundImage: Background picture
///   - completion: customWatchName - User defined dial name, dialData -
dial data
public static func convertJLCustomWatchFaceInfo(
    _ watchName: String,
    backgroundImage: UIImage,
    completion: @escaping (_ customWatchName: String, _ dialData : Data?) -
>()
)

```

- Instruction

- Customized dials transform the background image based on the dials file, that is, they only change the bound background image.
- After the dial conversion is successful, download it to the watch. The download dial API is the same as that of a common dial, except that the dial name changes to a user-defined dial name.
- After the download is completed, the dial needs to be set before it will be displayed. The interface of the set dial is the same as that of the common dial, but the parameters change.
- Note: Jerry's custom dial settings are based on the premise that the dial already exists in the watch, otherwise the picture cannot be changed**

- Examples of use

```

// Download custom dials

```

```

YCProduct.convertJLCustomWatchFaceInfo(
    "WATCH100",
    backgroundImage: UIImage(named: "test")) { [weak self] customWatchName,
    dialData in

    YCProduct.installJLDeviceWatchFace(
        customWatchName,
        dialData: dialData ?? Data()) { state, progress in

        if state == .success {

            YCProduct.settingJLDeviceWatchFace(customWatchName,
            isCustomWatchFace: true) { isSuccess in
                printLog("\(isSuccess)")
            }
        }
    }
}

```

10. Historical data collection

Note: This part is mainly to obtain ECG and PPG data, other types are not supported temporarily.

```

/// Type of collected data
@objc public enum YCCollectDataType : UInt8 {
    case ecg                // ECG data
    case ppg                // PPG data
}

```

10.1 Query information record

- Method

```

/// Query basic information of local historical collected data
/// - Parameters:
///   - peripheral: Connected device

```

```

/// - dataType: YCCollectDataType
/// - completion: information record
public static func queryCollectDataBasicInfo(
    _ peripheral: CBPeripheral? = YCProduct.shared.currentPeripheral,
    dataType: YCCollectDataType,
    completion: ((_ state: YCProductState, _ response: Any?) -> (()))?
)

/// Basic information of historical collected data
@objcMembers public class YCCollectDataBasicInfo : NSObject {

    /// Collection type
    public var dataType: YCProductSDK.YCCollectDataType { get }

    /// Serial number
    public var index: UInt16 { get }

    /// Timestamp (seconds)
    public var timeStamp: UInt32 { get }

    /// Sampling Rate
    public var sampleRate: UInt16 { get }

    /// Number of samples
    public var samplesCount: UInt8 { get }

    /// Total bytes
    public var totalBytes: UInt32 { get }

    /// Total number of packages
    public var packages: UInt16 { get }
}

```

- Instruction
 - By calling this method, you can obtain several records of the current device and the basic information of each record.
- Examples of use

```

YCProduct.queryCollectDataBasicInfo(dataType: .ecg) { state, response in
    guard state == .succeed,
        let datas = response as? [YCCollectDataBasicInfo] else {
            return
        }
    print(datas)
}

```

10.2 Get specific data

- Method

```

/// Get data through index
/// - Parameters:
///   - peripheral: Connected device
///   - dataType: Data collection type
///   - index: Serial number
///   - uploadEnable: Whether to report data
///   - completion: Result
public static func queryCollectDataInfo(
    _ peripheral: CBPeripheral? = YCProduct.shared.currentPeripheral,
    dataType: YCCollectDataType,
    index: UInt16 = 0,
    uploadEnable: Bool = true,
    completion: ((_ state: YCProductState, _ response: Any?) -> ())?
)

/// Historical collection data information
@objcMembers public class YCCollectDataInfo: NSObject {

    /// Basic information
    public var basicInfo: YCCollectDataBasicInfo { get }

    /// Sync progress
    public var progress: Float { get }

    /// Whether the transfer is complete
    public var isFinished: Bool { get }

    /// Response data
    public var data: [Int32] { get }

```

```
}
```

- Instruction
 - The return value of this method is of type YCCollectDataInfo, which contains information such as data and progress.
- Examples of use

```
YCProduct.queryCollectDataInfo( dataType: .ecg,  
                                index: 0,  
                                uploadEnable: true) { state, response in  
    if state == .succeed,  
    let info = response as? YCCollectDataInfo,  
        info.isFinished {  
            print(info.data, info.progress)  
        }  
}
```

10.3 Delete data

- Method

```
/// Delete by index  
/// - Parameters:  
///   - peripheral: Connected device  
///   - dataType: Data collection type  
///   - index: Serial number  
///   - completion: Result  
public static func deleteCollectData(  
    _ peripheral: CBPeripheral? = YCProduct.shared.currentPeripheral,  
    dataType: YCCollectDataType,  
    index: UInt16,  
    completion: ((_ state: YCProductState, _ response: Any?) -> ())?  
)
```

- Instruction
 - If you do not actively delete the data, this data will always exist, and once the storage limit of the device is reached, it will be deleted by the device.
- Examples of use


```
YCProduct.deleteCollectData(dataType: .ecg,  
                             index: 0) { state, response in  
  
}
```

11. Firmware upgrade

11.1 Get information about device upgrades

11.1.1 Main control chip model

Before firmware upgrade, you need to confirm the hardware platform used by the device. You can obtain the main control chip model used by the device through section 5.6 to call different upgrade library files. nrf52832 uses Nordic's upgrade library, rtk8762c or rtk8762d uses Realtek's upgrade library.

11.1.2 Firmware version

You can use section 5.2 to obtain the firmware version information used by the device, including the major version and the sub-version. When judging the size of the version number, pay attention to it. If the major version is not the same, the larger the major version value, the higher the version. If the main version is the same, compare the sub-versions. The larger the number of the sub-version, the higher the version. For example, the firmware version 1.10 is higher than version 1.1, which cannot be judged from mathematical values.

11.2 Nordic firmware upgrade

11.2.1 Import library file

The Nordic firmware upgrade library can be obtained directly from github. The address is <https://github.com/NordicSemiconductor/IOS-DFU-Library>.

It is recommended to use Pod to install

```
target 'YourAppTargetName' do
  use_frameworks!
  pod 'iOSSDFULibrary'
end
```

11.2.2 Realize firmware upgrade

The API parameters in the method are explained in detail in the Nordic upgrade library

```

        guard let dfuFirmware = DFUFirmware(urlToZipFile: filePath) else {
            printLog("Firmware does not exist")
            return
        }

        let initiator =
            DFUServiceInitiator(queue: DispatchQueue.main,
                                delegateQueue: DispatchQueue.main,
                                progressQueue: DispatchQueue.main,
                                loggerQueue: DispatchQueue.main
                                )
        initiator.delegate = self
        initiator.progressDelegate = self
        initiator.forceDfu = false
        initiator.alternativeAdvertisingNameEnabled = false
        initiator.enableUnsafeExperimentalButtonlessServiceInSecureDfu =
true

        _ = initiator.with(firmware: dfuFirmware)
        dfuController = initiator.start(target: device)
    }

    /// State change
    func dfuStateDidChange(to state: DFUState) {
        switch state {

        case .disconnecting:
            break

        case .connecting:
            break

        case .starting:
            break

        case .enablingDfuMode: // Enter the upgrade state
            break

        case .completed: // End of upgrade
            break

        case .aborted:
            break

```

```

        default:
            break
    }

    /// Upgrade error
    func dfuError(_ error: DFUError, didOccurWithMessage message: String) {

    }

    /// Upgrade progress
    func dfuProgressDidChange(for part: Int, outOf totalParts: Int, to
progress: Int, currentSpeedBytesPerSecond: Double, avgSpeedBytesPerSecond:
Double) {

    }
}

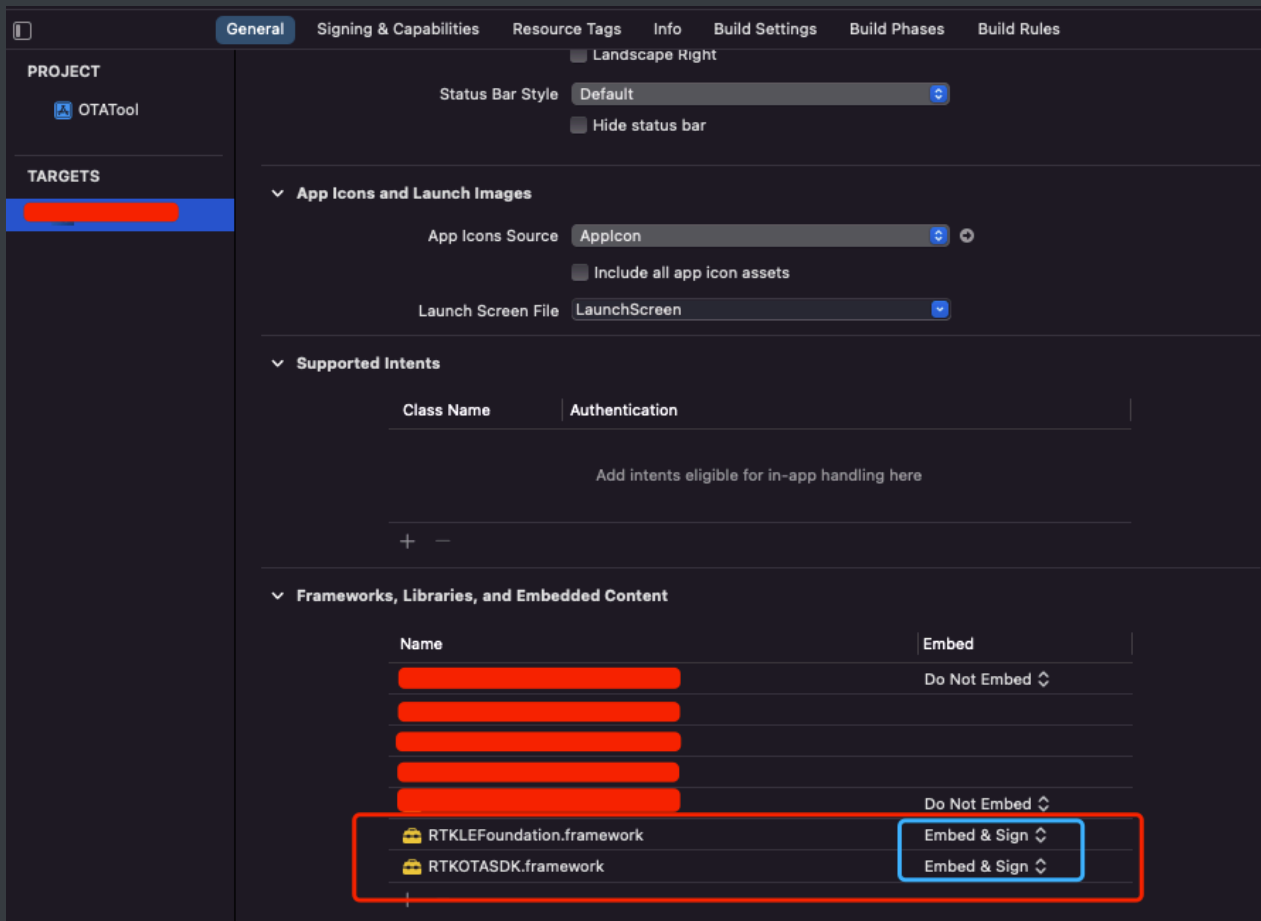
```

11.3 Realtek firmware upgrade

Realtek's upgrade operation is more complicated than Nordic

11.3.1 Import library file

Two Realtek library files `RTK0TASDK.framework` and `RTKLEFoundation.framework` are provided in the SDK file directory, and these two libraries are imported into the project. Ignore if it has been imported.



11.3.2 Realize firmware upgrade

```
import UIKit
import RTKOTASDK

class YCFirmwareUpgradeViewController: UIViewController {

    /// RTK uses management objects required for any operation
    private var rtkDFUUpgrade: RTKDFUUpgrade?

    /// RTK upgraded firmware image
    private var rtkImages: [RTKOTAUpgradeBin]?
}

// MARK: -Firmware upgrade
extension YCFirmwareUpgradeViewController {

    /// Upgrade RTK
    /// - Parameters:
    ///   - device: rtkDevice
    ///   - filePath: Firmware file address
```

```

        private func startRTKFirmwareUpgrade(_ device: CBPeripheral, filePath:
String) {

            #if DEBUG
            RTKLog.setLogLevel(.warning)
            #else
            RTKLog.setLogLevel(.off)
            #endif

            rtkDFUUpgrade = RTKDFUUpgrade(peripheral: device)
            rtkDFUUpgrade?.delegate = self

            rtkDFUUpgrade?.usingStrictImageCheckMechanism = true
            rtkDFUUpgrade?.batteryLevelLimit = RTKDFUBatteryLevel.zero

            guard let zipFile = try?
RTKOTAUpgradeBin.imagesExtracted(fromMPPackFilePath: filePath),
                zipFile.count == 1,
                zipFile.last?.icDetermined == false else {

                return
            }

            rtkImages = zipFile
            rtkDFUUpgrade?.prepareForUpgrade()

        }
    }

    // MARK: - Upgrade related agents
    extension YCFirmwareUpgradeViewController: RTKDFUUpgradeDelegate {

        /// Ready to upgrade
        func dfuUpgradeDidReady(for task: RTKDFUUpgrade) {

            guard let deviceInfo = task.deviceInfo,
                let upgradeBins = rtkImages else {
                print("升级失败")
                return
            }
            upgradeBins.last?.assertAvailable(forPeripheralInfo: deviceInfo)
            rtkDFUUpgrade?.upgrade(withImages: upgradeBins)
        }
    }

```

```

    /// Upgrade progress
    func dfuUpgrade(_ task: RTKDFUUpgrade, withDevice connection:
RTKProfileConnection, didSendBytesCount length: UInt, ofImage image:
RTKOTAUpgradeBin) {
        print(task.progress.fractionCompleted)
    }

    /// Upgrade progress End
    func dfuUpgrade(_ task: RTKDFUUpgrade, withDevice connection:
RTKProfileConnection, didCompleteSendImage image: RTKOTAUpgradeBin) {
        print(task.progress.fractionCompleted)
    }

    /// End of upgrade
    func dfuUpgrade(_ task: RTKDFUUpgrade, didFinishUpgradeWithError error:
Error?) {
        if err == nil {
            print("update succeeded")
        } else {
            print("Upgrade failed")
        }
    }

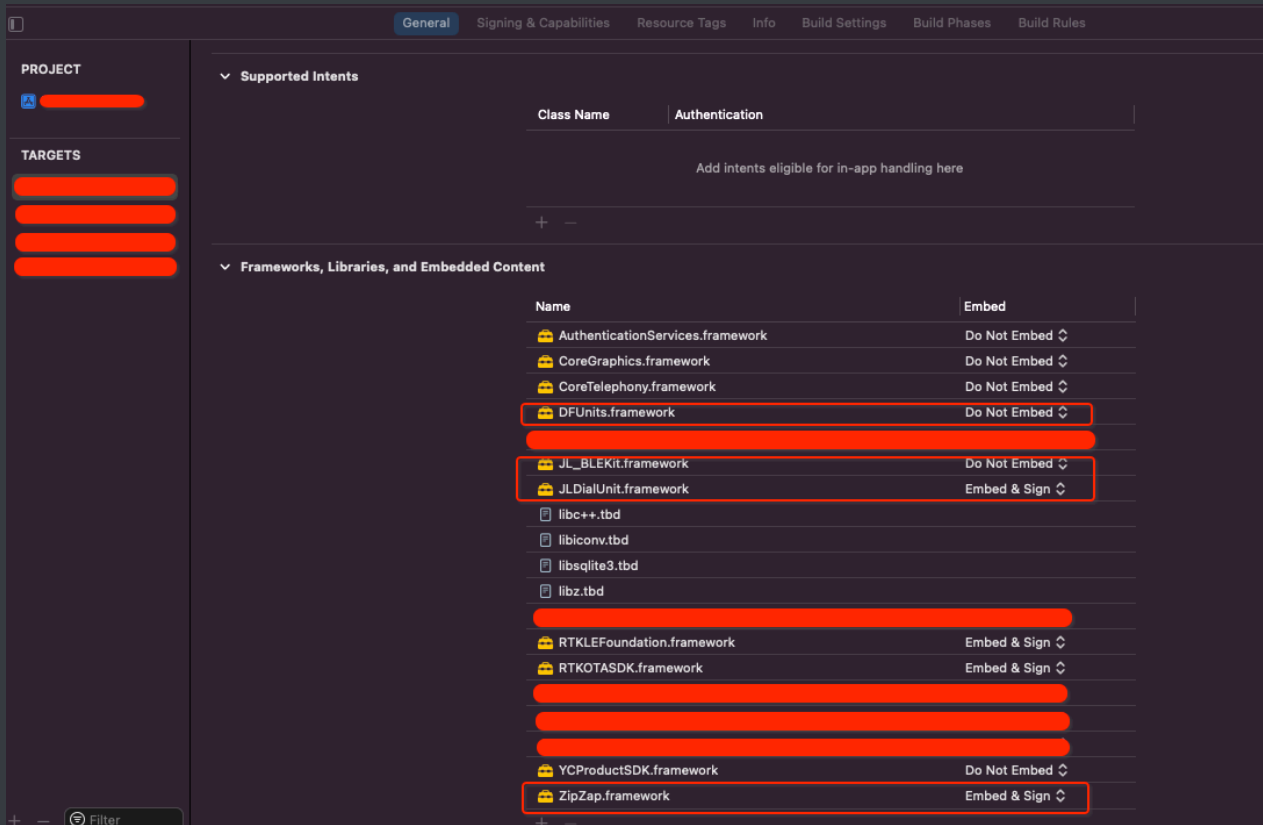
    /// Upgrade error (start)
    func dfuUpgrade(_ task: RTKDFUUpgrade, couldNotUpgradeWithError error:
Error) {
        print("Upgrade failed")
    }
}

```

11.4 JL Firmware Upgrade

11.2.1 Import library file

Ignore if it has been imported.



11.4.2 JL Firmware Upgrade

JL has many firmware upgrade processes, which are mainly divided into the following four steps:

1. Judge the current upgrade status. If it is normal, proceed to the next steps (2~3) in sequence. If it is forced, proceed directly to the last step (step 3).
2. Update the UI file (After the update, the device will be disconnected, and you need to manually reconnect to enter the next step.)
3. Update firmware

```
/// JL Firmware Upgrade Status
@objc public enum JLDeviceUpdateState: Int {
    case start = 0
    case resourceUpdating
    case updateResourceFinished
    case uiUpdating
    case updateUIFinished
    case upgrading
    case success
    case failed
}
```



```

    /// Whether to force upgrade
    /// - Returns: true - Force Upgrade
    public static func isJLDeviceForceOTA() -> Bool

    /// JL Equipment Upgrade File
    /// - Parameters:
    ///- filePath: upgrade file path
    ///- completion: state Upgrade status, progress: progress 0~1.0, didSend:
    number of bytes sent
    public static func jlDeviceUpgradeFirmware(
        filePath: String,
        completion: ((_ state: JLDeviceUpdateState, _ progress: Float, _
        didSend: Float) -> ())?
    )

```

```

import UIKit
import YCProductSDK
import JLDialUnit
import JL_BLEKit

    /// Limit on number of repeated scans
    private let REPEAT_SCAN_JL_FORCE_OTA_COUNT = 5

    /// Number of repeated scans
    private var repeatScanJLCount: Int = 0

    /// Upgrade files
    private var upgradeFilePath: String = ""

    /// Connect back to device address
    private var reconnectMacAddress: String = ""

    /// device list
    private var deviceArray = [CBPeripheral]()

    // MARK: - OTA
    extension YCDeviceUpgradeManager {

```

```

    /// firmware upgrade
    /// - Parameters:
    ///   - filePath: firmware file path
    ///   - device: device
    func startJLFirmwareUpgrade(_ filePath: String,
                                device: CBPeripheral) {

        upgradeFilePath = filePath
        reconnectMacAddress = device.macAddress

        jlDeviceOTA(device, filePath: filePath)

    }

    /// OTA
    /// - Parameters:
    ///   - device: <#device description#>
    ///   - filePath: <#filePath description#>
    private func jlDeviceOTA(
        _ device: CBPeripheral,
        filePath: String
    ) {

        YCProduct.jlDeviceUpgradeFirmware(device, filePath: filePath) {
[weak self] state, progress, didSend in

            switch state {

                case .start:
                    // start
                    break

                case .success:
                    // success
                    break

                case .failed:
                    // failed
                    break

                case .uiUpdating:
                    // update ui ...
                    break

```

```

        case .upgrading:
            // update firmware
            break

        case .updateUIFinished:
            self?.reconnectWithMacAddr()

        default:
            break
    }
}

}

/// Connecting devices back
func reconnectWithMacAddr() {

    // Need to wait for the device to restart
    usleep(2500_000)

    repeatScanJLCount = 0
    scanJLForceOtaDevice()
}

/// scan devices
@objc private func scanJLForceOtaDevice() {

    repeatScanJLCount += 1
    if repeatScanJLCount >= REPEAT_SCAN_JL_FORCE_OTA_COUNT {

        // Device not found, upgrade failed.
        return
    }

    // Search Device
    YCProduct.scanningDevice(delayTime: 4.0 ) { devices, error in
        for device in devices where deviceArray.contains(device) ==
false {
            deviceArray.append(device)
        }
    }

    // Search ended, prepare to connect
    perform(

```

```

        #selector(connectForceOtaDevice),
        with: nil,
        afterDelay: 4.5
    )
}

/// Reconnect equipment
@objc private func connectForceOtaDevice() {

    // Find devices
    for device in deviceArray {

        if device.macAddress.uppercased() ==
reconnectMacAddress.uppercased() {

            YCProduct.connectDevice(device) { [weak self] state, error
in

                if state == .connected {

                    // Successfully reconnected, preparing for upgrade
                    self?.startJLFirmwareUpgrade(
                        upgradeFilePath,
                        device: device
                    )

                } else {

                    // Reconnect failed, search again.
                    self?.scanJLForceOtaDevice()

                }

            }

            return
        }

        // No device found, search again.
        scanJLForceOtaDevice()
    }

}

```