# IOSMacBrainLinkProSDKSpecialEditon V1.3.3

Date: 0812, 2022

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SDK Version: 1.3.3

MCU: 4.201

## Update record:

1. V1.3.3 Added new Bluetooth data fields HRV
2. V1.3.1 Added new Bluetooth data fields temperature and Heartrate
3. V1.3 fix the bug of failed callback in iOS13.5 system, and supports both iOS and macOS
4. V1.2 supports multiple or single connections
5. V1.0 supports single connection

# Content

# IOSMacBrainLinkProSDKSpecialEditon

# Development Guide

## Introduction

This guide will teach you how to use HZLBlueTooth SDK for iOS to write iOS applications that can acquire brainwave data from Macrotellect 's Hardware（BrainLink Pro & BrainLink Lite）. This will enable your iOS apps to receive and use brainwave data such as BLEMIND and BLEGRAVITY acquired via Bluetooth, Macrotellect 's Hardware and File source encapsulated as HZLBlueTooth. HZLBlueTooth SDK for iOS supports upgrading Hardware

Function:
Receive brainwave data. One or more Bluetooth devices can be connected at the same time.

**Files included:**

- API Reference (this document)
- SDK static library and headers
- iOSMacBrainLinkProSDKSpecialEditon V1.3.3.a
- HZLBlueData.h
- Blue4Manager.h
- IOS_HZLBlue4Demo/ Mac_HZLBlue4.0Demo

**Supported devices:**

- Data format with power
  - BrainLink_Pro
  - Jii

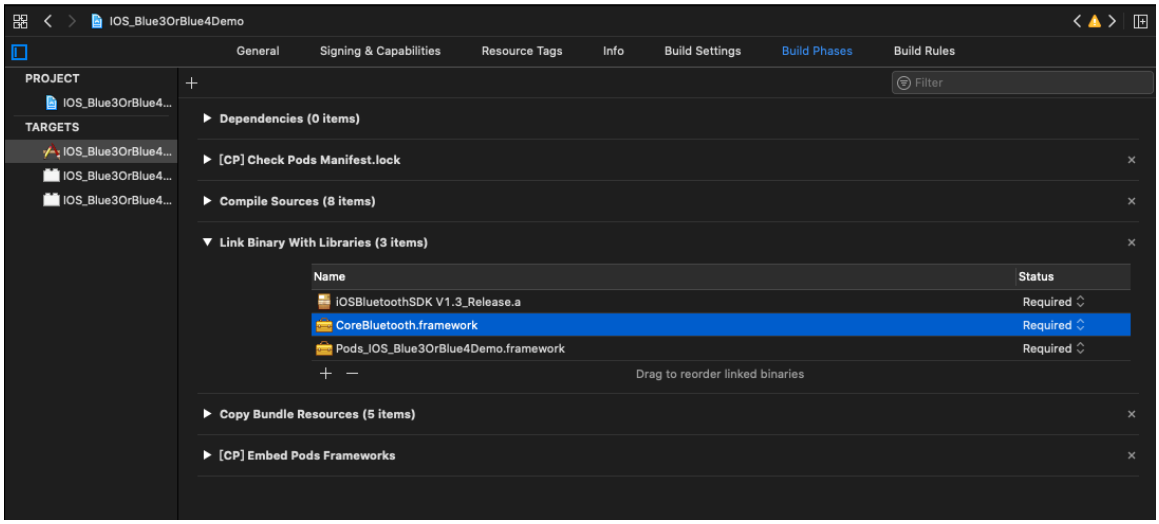
**iOS/ macOS Verrsion:**

- iOS 9.0 + / macOS 10.10+

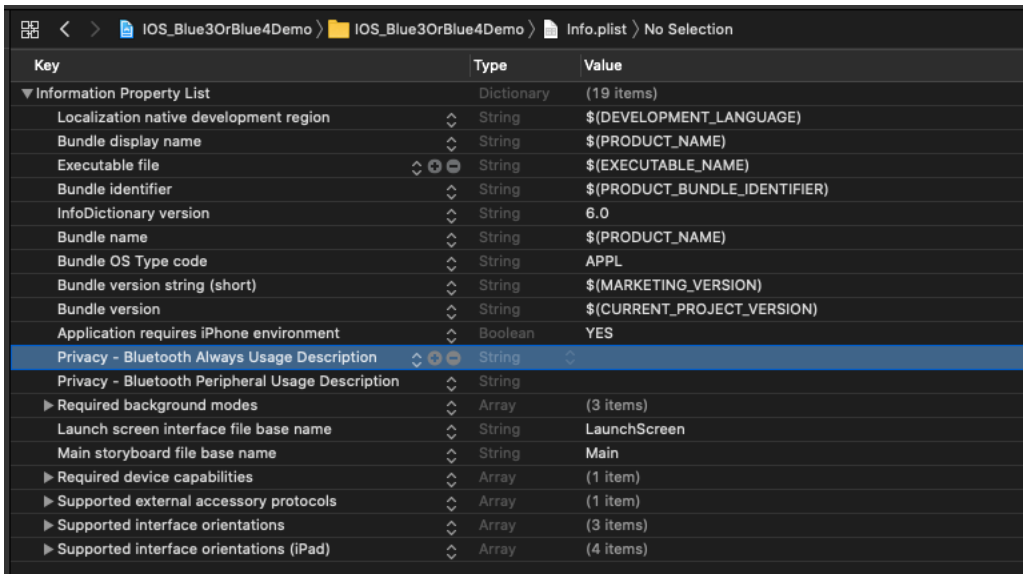
# Your First Project: IOS_HZLBlue4Demo

**Step 1:**

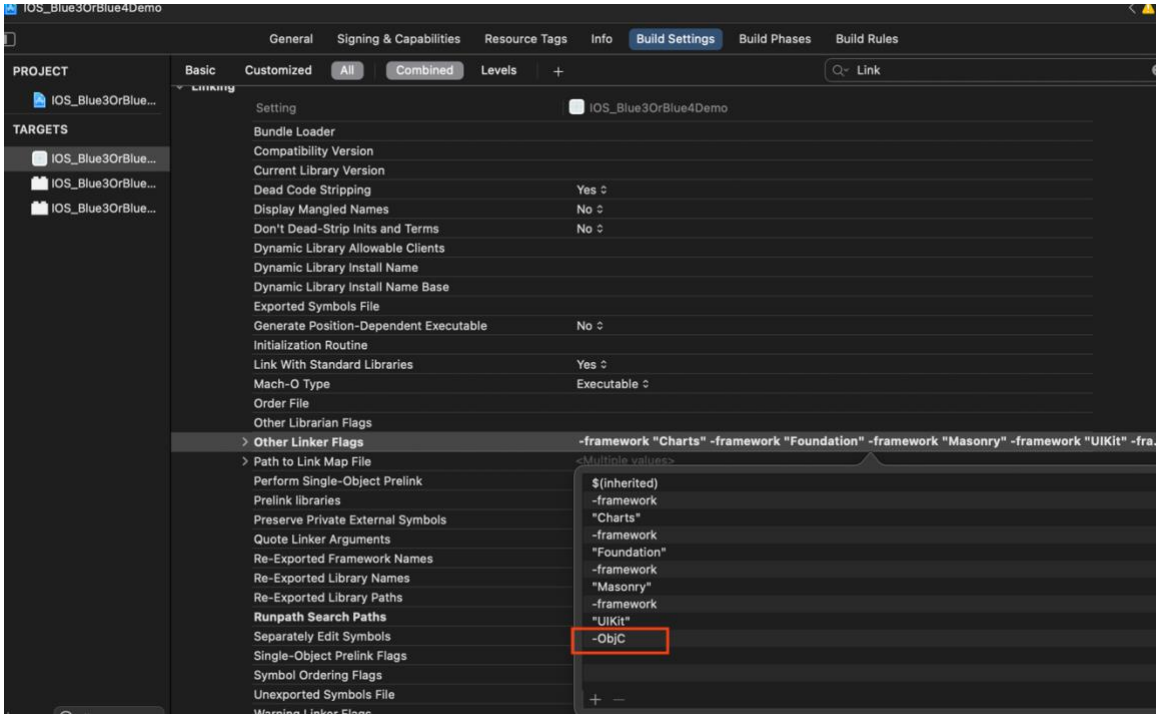
1.1 Import the IOS framework libraries CoreBluetooth.framework in the Build Phases of TARGETS in the Xcode project:



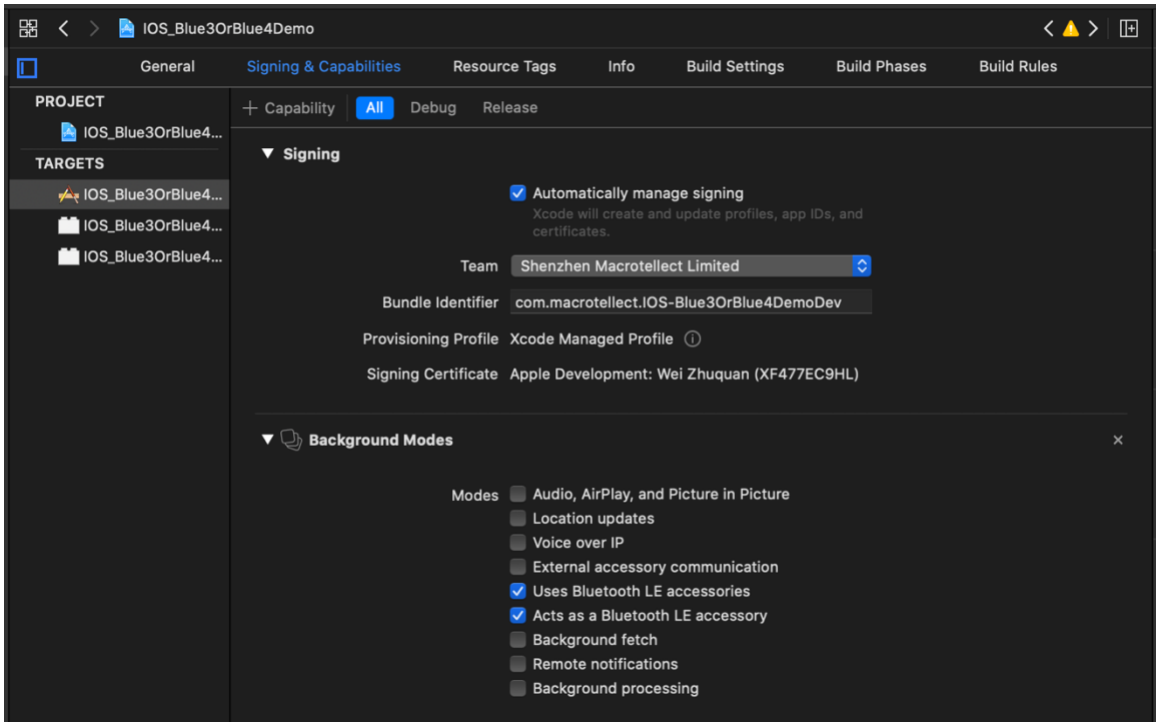

Add the Bluetooth permission privacy permission privacy In the Info.plist: (ios13 needs to add the Bluetooth permission privacy - Bluetooth always usage description and privacy - Bluetooth peripheral usage description)



Add -objc to link-- >Other Linker Flags in TARGETS Build Settings




1.2 If you want Bluetooth to work in the background, please set it as follows,
Don't set it if you don't need it:




**Step 2:**

Import header file

```
#import "HZLBlueData.h"
#import "Blue4Manager.h"
```

Function one：Receive data

```
// Bluetooth multi-connection
// blueNames: connectable device
NSArray *blueNames = @[@"BrainLink",@"BrainLink_Pro",@"jii@jii-***"];
[Blue4Manager logEnable:YES];
[[Blue4Manager shareInstance] configureBlueNames:blueNames ableDeviceSum:7];

// Connect bluetooth callback successfully
  __weak FactoryViewController *weakSelf = self;
[Blue4Manager shareInstance].blueConBlock =   ^(NSStrig * markKey){
      // Determine connected devices    123456 corresponds to ABCDEF respectively
       if ([markKey isEqualToString:@"1"]) {
            NSLog(@"Bluetooth device A is connected");
        }
       .....
       else if ([markKey isEqualToString:@"6"]){
            NSLog(@"Bluetooth device F is connected");
       }
};
```

```
    // Bluetooth disconnect callback
    [Blue4Manager shareInstance].blueDisBlock =    ^(NSStrig * markKey){
     // Determine disConnected devices
          if ([markKey isEqualToString:@"1"]) {
              NSLog(@"Bluetooth device A is disConnected");
           }


              .......
              else if ([markKey isEqualToString:@"6"]){
                   NSLog(@"Bluetooth device F is disConnected");
              }
          }
    };

  // Bluetooth data callback
     [Blue4Manager shareInstance].hzlblueDataBlock_A = ^(HZLBlueData *blueData, BlueType conBT,
BOOL isFalseCon) {
            if (conBT == BlueType_Pro) {
                if (blueData.bleDataType == BLEMIND) {
                   NSString *hrvStr = @"";
                   if (blueData.HRV != nil) {
                        for (int i = 0; i < blueData.HRV.count; i++) {
                             if(i >= 1){
                                  hrvStr = [hrvStr stringByAppendingString:[NSString
stringWithFormat:@",%dms",[blueData.HRV[i] intValue]]];
                             }else{
                                  hrvStr = [hrvStr stringByAppendingString:[NSString
stringWithFormat:@"%dms",[blueData.HRV[i] intValue]]];
                             }
                        }
                   }

                   weakSelf.ALabl.text = [NSString stringWithFormat:@"sigal:%d att:%d med:%d ele:%d
ap:%d del:%d theta:%d lowAlp:%d highAlp:%d lowBe:%d highBe:%d lowGa:%d highGa:%d version:%@
grid=%@temp=%@,heartRate=%@,hrvStr=%@",blueData.signal,blueData.attention,blueData.meditati
on,blueData.batteryCapacity,blueData.ap,blueData.delta,blueData.theta,blueData.lowAlpha,blueData.
highAlpha,blueData.lowBeta,blueData.highBeta,blueData.lowGamma,blueData.highGamma,blueData
.hardwareVersion,blueData.grind,blueData.temperature, blueData.heartRate, hrvStr];
                   // when the signal value is 0, the bluetooth device is worn
                  // note: if the bluetooth device is connected but not worn, Greater than 0 and less
than or equal to 200
                   if(blueData.signal == 0){
                        weakSelf.ASignalIV.image                =                [UIImage
imageNamed:@"signal_zhengChang"];
                   }else{
```

```
                    weakSelf.ASignalIV.image = [UIImage imageNamed:@"signal3.png"];
                }
            }
            else if (blueData.bleDataType == BLEGRAVITY) {
                weakSelf.ACircleLabl.text = [NSString stringWithFormat:@"x:%d y:%d
z:%d",blueData.xvlaue,blueData.yvlaue,blueData.zvlaue];
            }
            else if (blueData.bleDataType == BLERaw) {
                weakSelf.ARawLabl.text = [NSString stringWithFormat:@"raw:%d
eye:%d",blueData.raw,blueData.blinkeye];
            }
        }
        else if (conBT == BlueType_Jii){
            if (blueData.bleDataType == BLEMIND) {
                weakSelf.ALabl.text = [NSString stringWithFormat:@"sigal:%d att:%d med:%d
ele:%d
ap:%d",blueData.signal,blueData.attention,blueData.meditation,blueData.batteryCapacity,blueData.ap
];

                if(blueData.signal == 0){
                    weakSelf.ASignalIV.image = [UIImage
imageNamed:@"signal_zhengChang"];
                }else{
                    weakSelf.ASignalIV.image = [UIImage imageNamed:@"signal3.png"];
                }
            }
        }
        else if (conBT == BlueType_Lite) {
            if (blueData.bleDataType == BLEMIND) {
                weakSelf.ALabl.text = [NSString stringWithFormat:@"sigal:%d att:%d
med:%d del:%d theta:%d lowAlp:%d highAlp:%d lowBe:%d highBe:%d lowGa:%d
highGa:%d",blueData.signal,blueData.attention,blueData.meditation,blueData.delta,blueData.theta,blu
eData.lowAlpha,blueData.highAlpha,blueData.lowBeta,blueData.highBeta,blueData.lowGamma,blueD
ata.highGamma];
                // If the signal value is 0, the Bluetooth device is worn
                // Note: If a Bluetooth device is connected but not worn, the signal value is
                    greater than 0 and less than or equal to 200
                if(blueData.signal == 0){
                    weakSelf.ASignalIV.image = [UIImage
imageNamed:@"signal_zhengChang"];
                }else{
                    weakSelf.ASignalIV.image = [UIImage imageNamed:@"signal3.png"];
                }
            }
            else if (blueData.bleDataType == BLERaw) {
                weakSelf.ARawLabl.text = [NSString stringWithFormat:@"raw:%d
eye:%d",blueData.raw,blueData.blinkeye];
```

```
                    }
                }

                if (isFalseCon) {
                    NSLog(@"A device has a false connection");
                }
            };
    ......

    [Blue4Manager shareInstance].hzlblueDataBlock_G = ^(HZLBlueData *blueData, BlueType conBT, BOOL isFalseCon) {
            ......
    };


    [[Blue4Manager shareInstance] connectBlue4];

    // Active bluetooth disconnect
    [[Blue4Manager shareInstance]disConnectBlue4];
```

# HZLBlueData Reference

**Overview**

The HZLBlueData class is a data model

**Enum**

```
typedef enum : NSUInteger {
    BlueType_NO = 0,
    BlueType_Lite,
/*The current connection is the BrainLink_Lite data format device with BLEMIND and BLERaw type data*/
    BlueType_Pro,
/* The current connection is the BrainLink_Pro data format device with BLEMIND, BLEGRAVITY, and BLERaw type data*/
    BlueType_Jii,
/* The current connection is Jii*/
}BlueType;

 typedef NS_ENUM(NSUInteger,BLEDATATAYPE){
        BLEMIND  =  0,          // basic brain wave data
        BLEGRAVITY,             // gravity data
        BLERaw,                 // blink data
};
```

**Basic Brainwave Data：**

- signal,
- attention,
- meditation,
- delta,
- theta,
- lowAlpha,
- highAlpha,
- lowBeta,
- highBeta,
- lowGamma,
- highGamma,
- ap,
- batteryCapacity,
- hardwareVersion,
- grind
- temperature
- heartrate

- HRV Heart rate variability

**Gravity Sensor Data:**

- xvlaue,
- yvlaue,
- zvlaue

**Raw& Blink Data:**

- raw,
- blinkeye

**Note:**

When Jii is connected, only signal, attention, meditation, batteryCapacity, ap data type is available.

When BrainLink_Lite is connected, only signal, attention, meditation, delta, theta, lowAlpha, highAlpha, lowBeta, highBeta, lowGamma, highGamma, raw, blinkeye data type is available.

**Instructions of some Instance Property**

- **signal:** It represents the signal value of the Macrotellect 's Hardware. When the signal is 0, it means that the Macrotellect 's Hardware has been put on, and when the signal is greater than 0 and less than or equal to 200, it means that the Macrotellect 's Hardware is connected to the iPhone.
- **batteryCapacity:** In percentage terms. minimum value is 0, maximum value is 100
- **ap:** Appreciation value
- **hardwareVersion:** Hardware version. The first version value is 255, when you update the Macrotellect 's Hardware, the version value will be smaller.
- **xvlaue:** gravity value in The x axis (Pitching Angle)
- **yvlaue:** gravity value in The y axis (Yaw Angle)
- **zvlaue:** gravity value in The z axis (Roll Angle)

# Blue4ManagerReference

## Overview

The Blue4Manager class handles interaction between a Macrotellect's Hardware and an iOS device.

## Instance Property

**Successful callback of bluetooth connection**

@property (nonatomic,copy)Blue4Connect blueConBlock;

**Bluetooth disconnect callback**

@property (nonatomic,copy) BlueConnectdismiss blueDisBlock;

Note: devices are connected in the order of A B C D E F. Six data callbacks (hzluedatablock_A ...) are used to ensure the independence of data. The data between various devices can be accepted at the same time without mutual influence. Bluetooth 4.0 devices can connect up to six, but it is difficult to connect successfully.

If you want to use a single connection, the input parameter of abledevicesum is 1. Only call hzluedatablock_A.

**Data callback for every device.**

@property(nonatomic,copy)Blue4DataBlock hzlblueDataBlock_A;
@property(nonatomic,copy)Blue4DataBlock hzlblueDataBlock_B;
@property(nonatomic,copy)Blue4DataBlock hzlblueDataBlock_C;
@property(nonatomic,copy)Blue4DataBlock hzlblueDataBlock_D;
@property(nonatomic,copy)Blue4DataBlock hzlblueDataBlock_E;
@property(nonatomic,copy)Blue4DataBlock hzlblueDataBlock_F;

**Connection status of every device**

@property (nonatomic,assign)BOOL connected_A;
@property (nonatomic,assign)BOOL connected_B;
@property (nonatomic,assign)BOOL connected_C;
@property (nonatomic,assign)BOOL connected_D;
@property (nonatomic,assign)BOOL connected_E;
@property (nonatomic,assign)BOOL connected_F;

## Method

**Print log does not print by default**

+ (void)logEnable:(BOOL)enable;

**Initialization (singleton)**

+ (instancetype)shareInstance;

## Parameter Configuration:

Parameter interpretation：

blueNames: **Device name (Bluetooth 4.0 device) or MFI (Bluetooth 3.0 device) that can be connected**

NSArray *blueNames = @[@"BrainLink",@"BrainLink_Pro",@"jii@jii-***"];

1.jii@jii-***： indicates the device name with the prefix of jii - that can be connected ，‘jii@’ means jii device. The content After @ is the device name. ‘***’ indicates the prefix is the same.

ableDeviceSum: Number of Bluetooth devices that can be connected

-(void)configureBlueNames:(NSArray *)blueNames ableDeviceSum:(int)deviceSum;

/*! @brief 连接配置(仅用于宏智力公司内部测试)

appSoleCode: The unique code of app

defaultBlueNames: Default array of connectable Bluetooth names

ableDeviceSum: Number of Bluetooth devices that can be connected

result: Returns the name of the device that can be connected

-(void)configureBlueNamesWithAppSoleCode:(NSString *)appSoleCode defaultBlueNames:(NSArray

*)defaultBlueNames ableDeviceSum:(int)ableDeviceSum result:(void(^)(NSArray*))result;

*/

**Connect bluetooth device**

-(void)connectBlue4;

**Disconnect bluetooth device**

-(void)disConnectBlue4;

**Manual test of false connection (definition of false connection: when signal is equal to 0 and the continuous 10 values of attention and mediation remain unchanged, it is considered to be a false connection. SDK will disconnect the Bluetooth connection of the current device and automatically connect again)**

-(void)testAFalseCon:(BOOL)isTest; //Manual test A device false connection

-(void)setTestToZero;//Cancel all manual test false connections