1. Introduction

1.1. Product Summary and Functions

The BT-2000 is a smart headset for business use. The same optical see-through technology as the consumer orientated MOVERIO BT-200 has been adopted. This allows information to be displayed across a wide viewing area while keeping eye movement to a minimum, thereby reducing fatigue and making it suitable for use at work. This also allows you to view your surroundings while projecting an image, which adds an aspect of safety.

The weight of the product is supported by the entire head, allowing you to work for long periods of time without feeling fatigued. You can work while checking images in a hands-free environment.

1.2. Main System Specifications

Item	Specifications
Model number	MOVERIO Pro BT-2000
Main processor	OMAP4460 (dual core ARM Cortex A9)
System clock	Max 1.2 GHz (Auto adjusts according to the system load and temperature)
System software	Android 4.0.4 / Linux 3.0.21
Internal storage (emmc)	8 GB (2 GB reserved for the system)
Main memory	1 GB
Power	Battery operated/AC power operated
External memory	MicroSD/MicroSDHC supported (32 GB max.)
No. of pixels in LCD panel	960x540 (QHD)/16 : 9/Refresh rate 60 Hz
Virtual screen size	80" (for virtual viewing distance of 5 m)
Color reproduction	24 bit full color (16,770,000 colors)
3D display	Available (only for side by side)
User interface	Audio commands: supports Japanese and English Hardware keys: Power, lock, D-pad/OK key and A, B, X, Y keys Others: Headset tap input function
Camera	Built-in headset, stereo camera
Sensor	Built-in headset, Gyro/acceleration/geomagnetic/tap detection
Wi-Fi	IEEE 802.11a/b/g/n, Wi-Fi Direct
Wi-Fi Security	WEP WPA – Enterprise, Personal WPA2 – Enterprise, Personal EAP Types EAP-TLS EAP-TTLS/MSCHAPv2 PEAPv0/EAP-MSCHAPv2 PEAPv1/EAP-GTC
Bluetooth	A2DP, HSP, HID, OPP, SPP, BLE support
GPS	GPS function (cold start only), hot start support planned*

Safety shield is applying ANSI/ISEA Z87.1 (2015 version).

1.3. Basic Information for App Development

Item	Description
CPU/ABI	ARMv7 armeabi
Android API level	15
Device screen density	mdpi
Screen type	Tablet UI
Screen orientation	Fixed at Landscape (without sensor rotation)
USB vendor ID	0x04B8

■ HOME, MENU, and BACK keys are supported by hardware keys

■ Touch screen is not used

■ Track pad is not supported

■ Except for Wi-Fi, data communication, such as 3G, is not supported

■ This is not a Google Certified device, meaning the following services which require Google Certification are not available:

- Google Play

- Google location information service

- Additional services only available on Google Certified devices.

1.4. Other Main Functions

As well as the standard Android API, the BT-2000, includes an EPSON original API, which includes the following functions.

- Display control
- Physical UI control
- Audio commands
- Camera control
- Sensor control
- Bluetooth/BLE
- Power control

The following chapters explain how to use these from an app.

2. Developing Apps

2.1. Pre-Caution for Developing Apps

BT-2000 is using Android platform, but considering the product's use purpose, it is applying own funcitions. Therefore it is neseccary to control by EPSON own API. There are some cases that Android emulator or Anddorid applications that operated with Android Smartphones may not operate. Please take attention when transplanting APK or diverting source code. Below API needs attention specially, please refer details at each chapter.

Module lists that need attention for developing Apps.

- Camera ・・・ Chapter 6 Camera control
- BLE ・・・ Chapter 8 Bluetooth/BLE

2.2. Summary of Developing Apps

The BT-2000 has adopted Android as the system software. Therefore, you can develop apps for the BT-2000 in the same enviroment as developing apps for Android smartphones. However, when connecting the BT-2000 with the app development computer, or when using functions unique to the BT-2000, you need to provide BT-2000 compatibility.

This chapter explains the following procedures necessary to develop apps for the BT-2000.

- Introduction to the Android SDK
- ADB driver settings
- Connecting the BT-2000 to a computer
- Including the SDK provided by EPSON

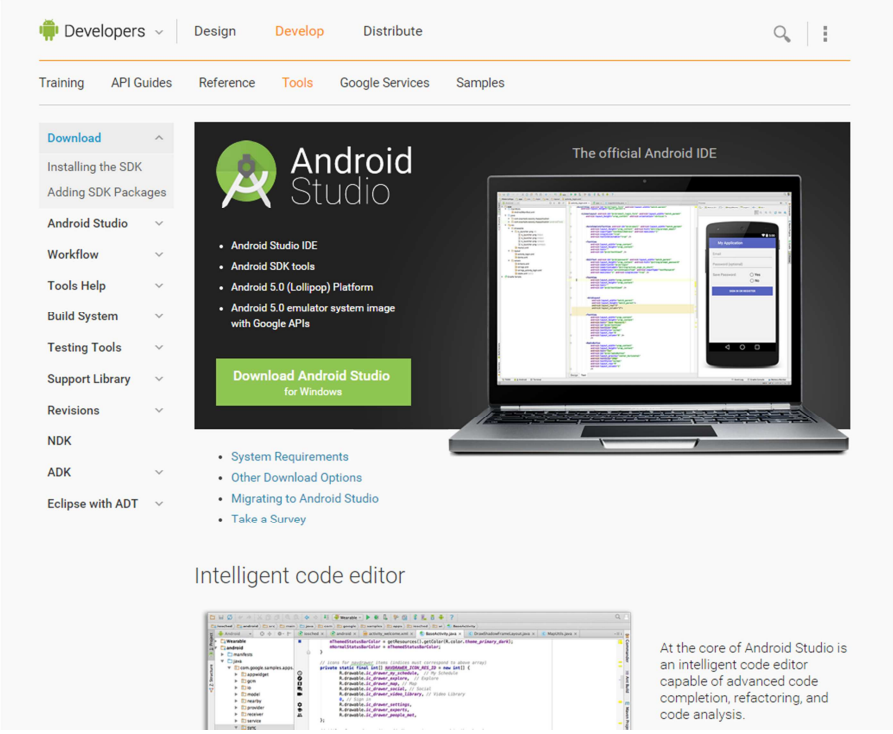
2.3. Introduction to the Android SDK

The introduction to the Android SDK assumes the following steps will be performed in a Windows 7 environment.

2.3.1.1. Acquiring Android Studio

Download Android Studio from the following Website.

https://developer.android.com/sdk/index.html



2.3.1.2. Acquiring and installing JDK

Download the JDK (7 or later) from the following Website, and then install.

http://www.oracle.com/technetwork/java/javase/downloads/jdk8-downloads-2133151.html

(Not sure if it's a good idea to include the link above as it may change over time)

2.3.1.3. Installing Android Studio

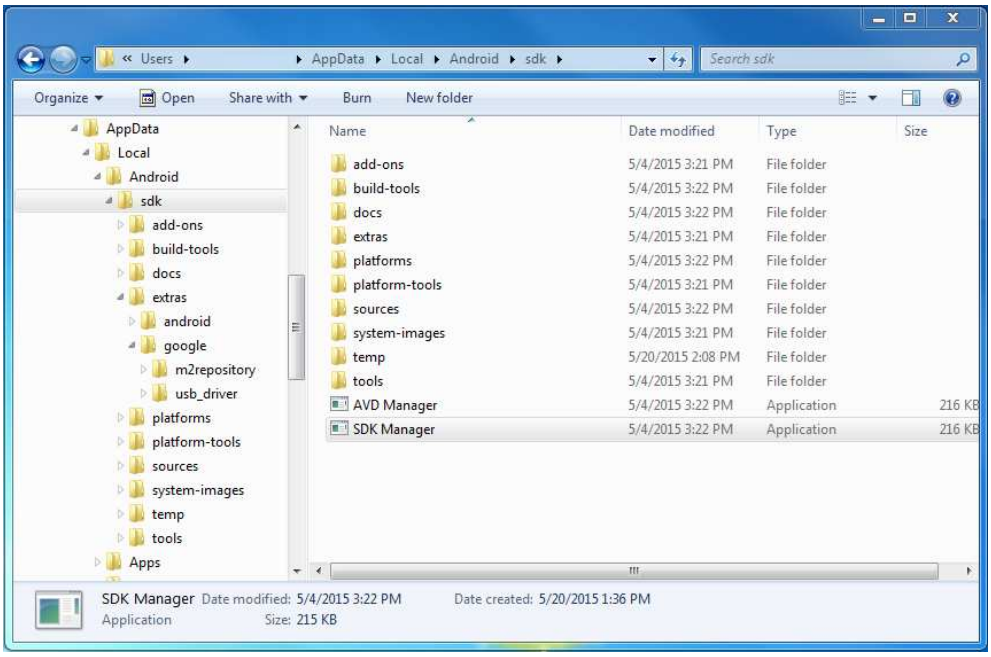
Follow the directions provided by the installer to install Android Studio.

Example) C:\Users\User name\AppData\Local\Android\sdk

* From here on, instructions assume Android Studio is installed in the folder above.

2.3.1.4. Installing Platform-tools, SDK Platform, and USB Driver

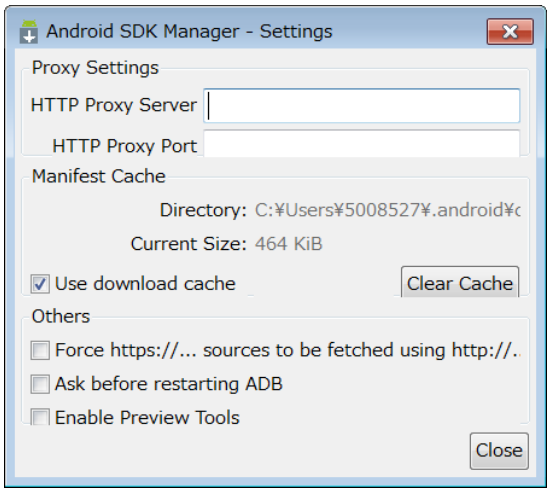
Execute "C:\Users\User name\AppData\Local\Android\sdk\SDK Manager.exe".



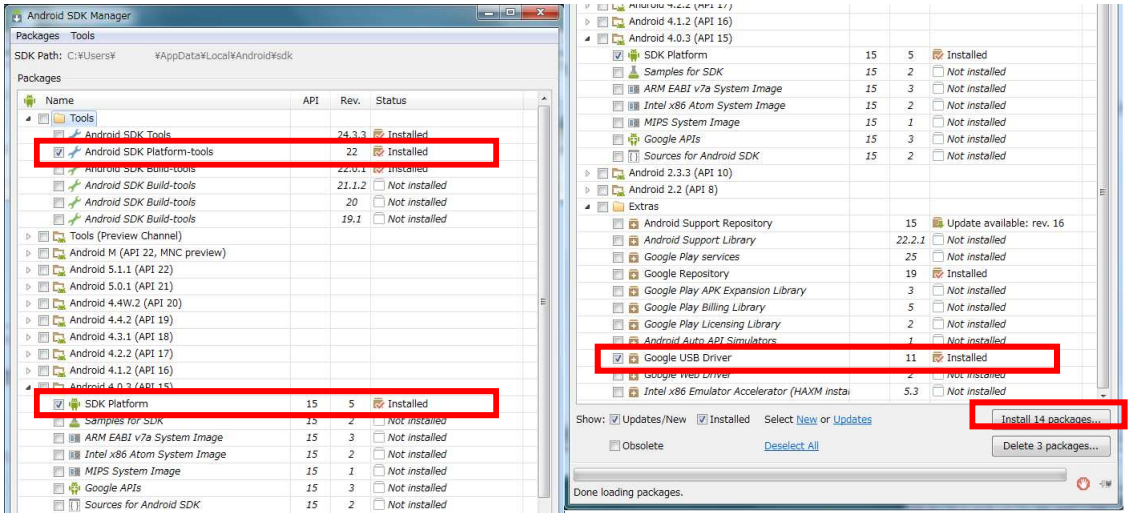
* When you start SDK Manager, the dialog "No packages found" may be displayed.

This occurs when the proxy is not set correctly, and information cannot be updated.

Close all dialogs except for "Android SDK Manager", and then set the proxy in [Tools] - [Options].



Select the following necessary files in the SDK Manager, and then install.

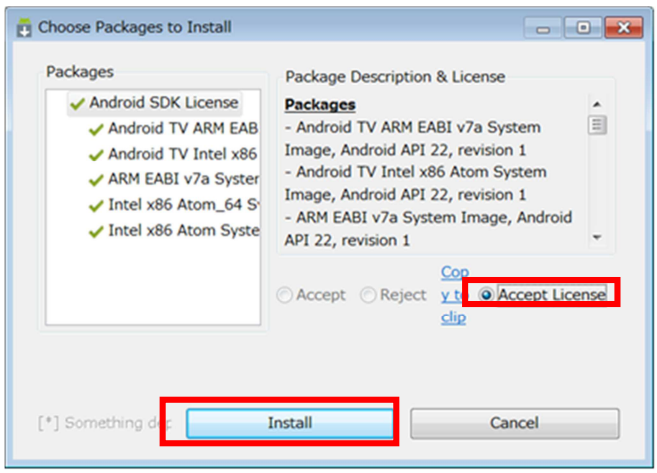


■ [Tools] - [Android SDK Platform-tools]

■ [Android 4.0.3] - [SDK Platform]

■ [Extras] - [Google USB Driver」

Select the above, click [Install], and then select ‘Accept’ all.



This completes the introduction to the Android SDK.

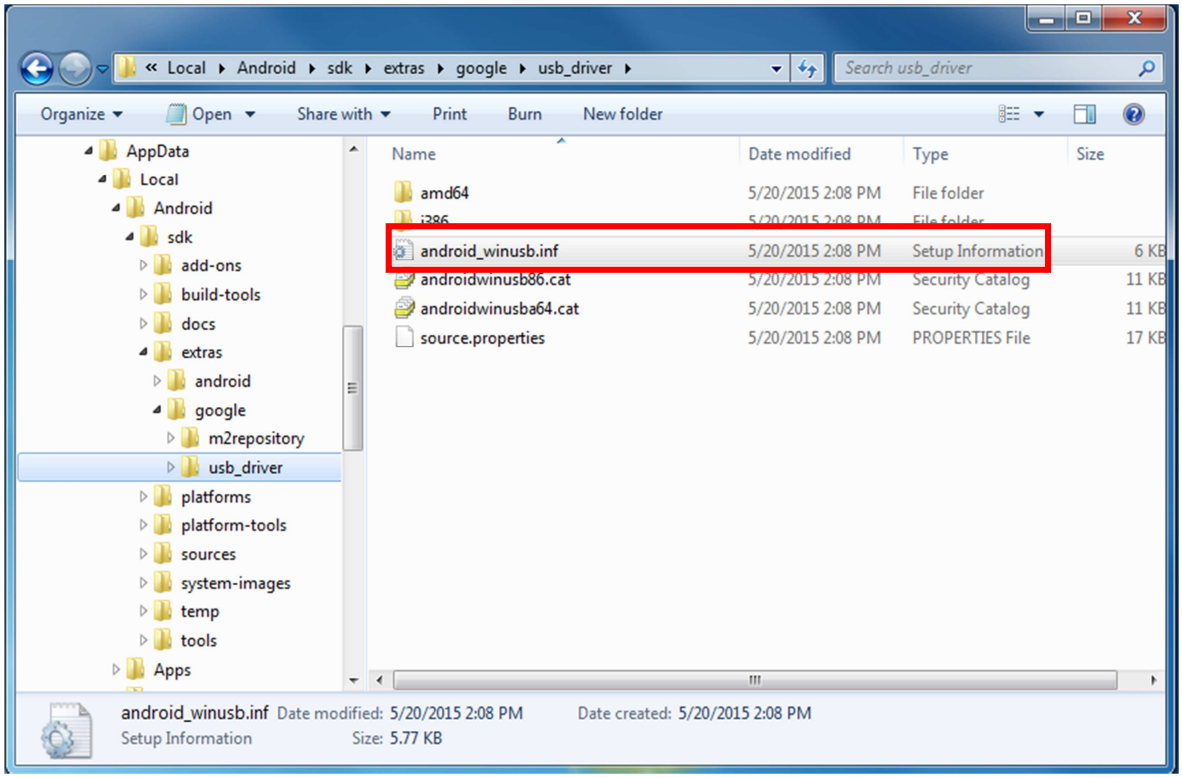
Next, we will explain how to connect the BT-2000 to the app development computer, and setting up the ADB driver.

2.4. ADB driver settings

Here we will explain how to connect the BT-2000 to the app development computer, and set the ADB driver.

2.4.1.1. Editing the Google USB Driver

Settings for the BT-2000 are added to the Google USB Driver installed in the previous item.



Open [C:\Users\User name\AppData\Local\Android\sdk\extras\google\usb_driver\android_winusb.inf] in a text editor, and then add the following 6 lines to 2 points in the [Google.NTx86] and the [Google.NTamd64].

```
;EPSON MOVERIO BT-2 series MTP

%SingleAdbInterface% = USB_Install, USB¥VID_04B8&PID_0C06

%CompositeAdbInterface% = USB_Install, USB¥VID_04B8&PID_0C06&MI_01

; EPSON MOVERIO BT-2 series PTP

%SingleAdbInterface% = USB_Install, USB¥VID_04B8&PID_0C07

%CompositeAdbInterface% = USB_Install, USB¥VID_04B8&PID_0C07&MI_01
```

```
[Google.NTx86]

;Google Nexus One
%SingleAdbInterface%        = USB_Install, USB¥VID_18D1&PID_0D02
%CompositeAdbInterface%     = USB_Install, USB¥VID_18D1&PID_0D02&MI_01
%SingleAdbInterface%        = USB_Install, USB¥VID_18D1&PID_4E11
%CompositeAdbInterface%     = USB_Install, USB¥VID_18D1&PID_4E12&MI_01
```

Omit

```
%CompositeAdbInterface%     = USB_Install, USB¥VID_18D1&PID_4D07

;EPSON MOVERIO BT-2 series MTP
%SingleAdbInterface% = USB_Install, USB¥VID_04B8&PID_0C06
%CompositeAdbInterface% = USB_Install, USB¥VID_04B8&PID_0C06&MI_01
; EPSON MOVERIO BT-2 series PTP
%SingleAdbInterface% = USB_Install, USB¥VID_04B8&PID_0C07
%CompositeAdbInterface% = USB_Install, USB¥VID_04B8&PID_0C07&MI_01

[Google.NTamd64]

;Google Nexus One
%SingleAdbInterface%        = USB_Install, USB¥VID_18D1&PID_0D02
%CompositeAdbInterface%     = USB_Install, USB¥VID_18D1&PID_0D02&MI_01
%SingleAdbInterface%        = USB_Install, USB¥VID_18D1&PID_4E11
%CompositeAdbInterface%     = USB_Install, USB¥VID_18D1&PID_4E12&MI_01
```

Omit

```
%CompositeAdbInterface%     = USB_Install, USB¥VID_18D1&PID_4D07

;EPSON MOVERIO BT-2 series MTP
%SingleAdbInterface% = USB_Install, USB¥VID_04B8&PID_0C06
%CompositeAdbInterface% = USB_Install, USB¥VID_04B8&PID_0C06&MI_01
; EPSON MOVERIO BT-2 series PTP
%SingleAdbInterface% = USB_Install, USB¥VID_04B8&PID_0C07
%CompositeAdbInterface% = USB_Install, USB¥VID_04B8&PID_0C07&MI_01

[USB_Install]
Include = winusb.inf
```

2.4.1.2. Vendor ID setting

Set ADB as the vendor ID.

Start the command prompt, run " cd C:\Users\User name\AppData\Local\Android\sdk\tools " and change the work folder.

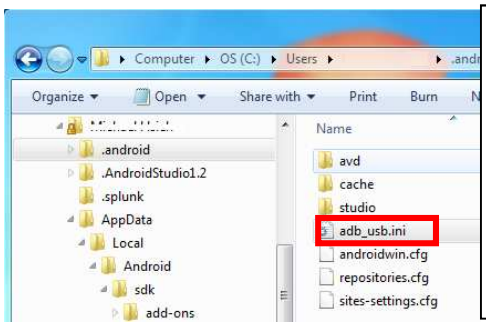
Execute the android.bat, and handle the "update adb" argument as shown below.

```
C:¥Users¥ User >cd AppData/Local/Android/sdk/tools

C:¥Users¥ User ¥AppData¥Local¥Android¥sdk¥tools>android.bat update adb
```

The file is created in [C:\Users\User name\.android\adb_usb.ini]

Open this file (adb_usb.ini) in notepad, and add the vendor ID (0x04B8) as shown below.




```
# ANDROID 3RD PARTY USB VENDOR ID LIST -- DO NOT EDIT.
# USE 'android update adb' TO GENERATE.
# 1 USB VENDOR ID PER LINE.
0x04B8
```

This completes setting up the ADB driver in the app development environment.

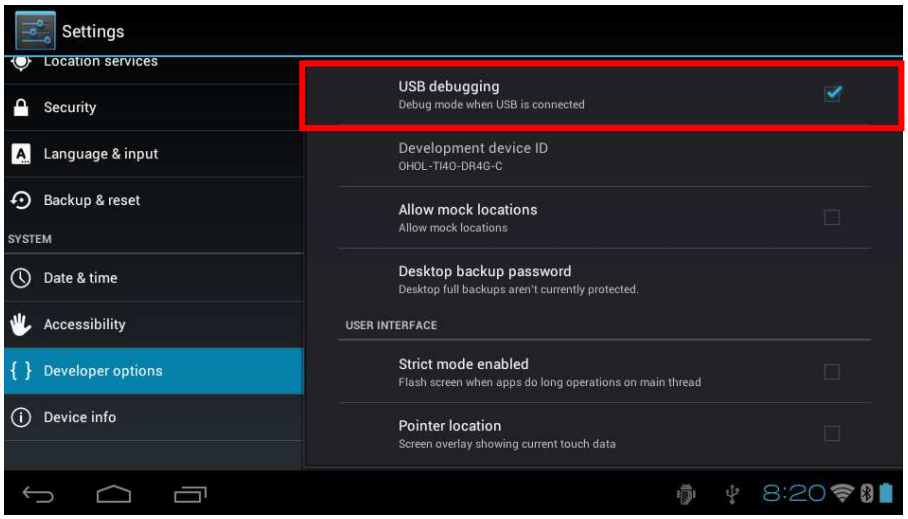
The next section explains how to connect the BT-2000 to a computer.

2.5. Connecting the BT-2000 to a computer

This section explains how to connect the BT-2000 to a computer after the ADB driver setting has been completed.

2.5.1.1. BT-2000 settings

Start the BT-2000, and then select "Settings" - "Developer options" - "USB debugging".

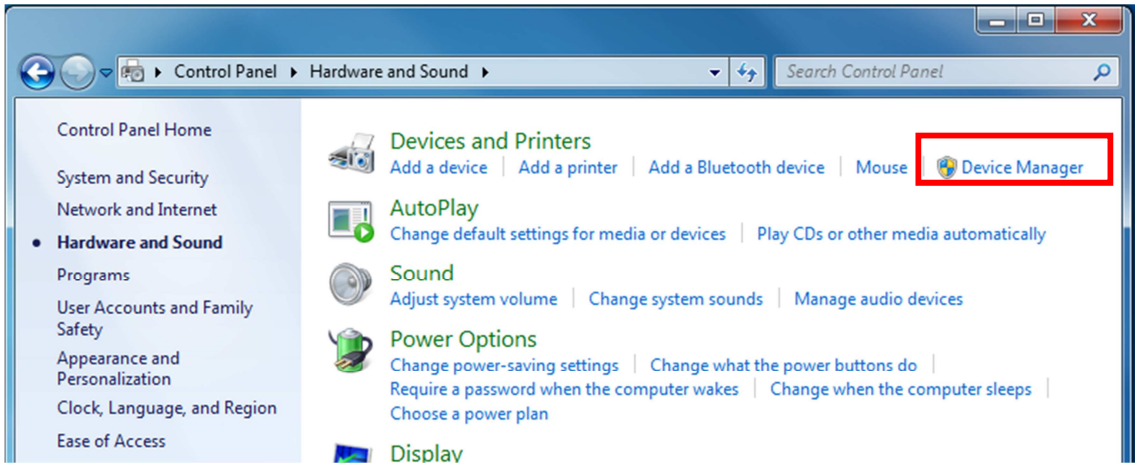


2.5.1.2. Install the BT-2000 driver

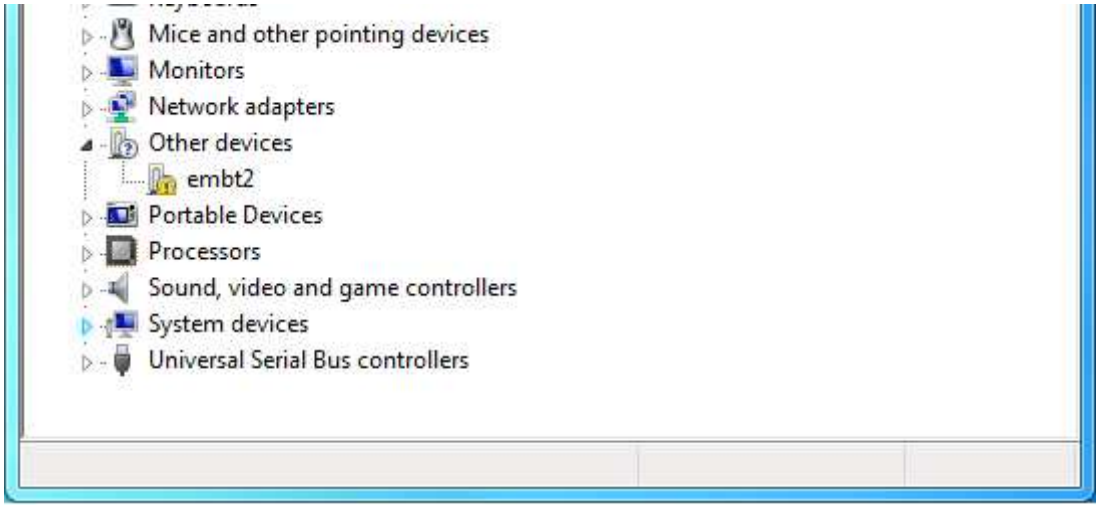
Connect a USB cable to the computer on which the BT-2000 is running and the ADB driver settings are complete.

If the computer does not respond, disconnect the USB cable, restart the BT-2000, and then reconnect the USB cable.

When "New device detected" is displayed on the computer, select [Control Panel] - [Hardware and Sound] - [Device Manager].



Right-click [embt2] from [Other devices], and then select Update Driver Software.

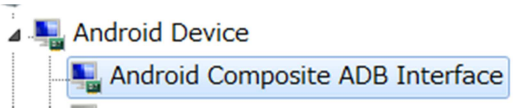


Select [Browse my computer for driver software].

Select the driver from the following path.

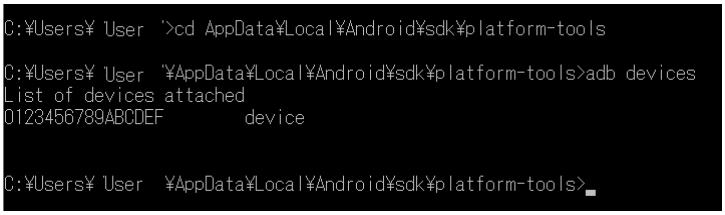
“C:\Users\User name\AppData\Local\Android\sdk\extras\google\usb_driver”

When [Android Composite ADB Interface] is displayed in [Android Device] as shown below, ADB connection is available.



2.5.1.3. Checking the connection

You can check if the computer and the BT-2000 are connected by using the ADB check command.
Start the command prompt, run "cd C:\Users\ User name \AppData\Local\Android\sdk\tools ", and move the folder.* It is useful to maintain the environment variable path mentioned above.
When you execute "adb devices" the message "0123456789ABCDEF2 device" is displayed. ADB connection is complete.



* If this is not displayed, reconnect the BT-2000 to the USB port, and rerun the "adb devices" command.

2.6. Including the SDK provided by EPSON

2.6.1. Cautions for using SDK provided by EPSON

Please make sure to confirm the version of SDK provided by EPSON and the version of system software inside BT-2000.

If the version of SDK provided by EPSON used for Apps development and the version of system software is not matching, due to the difference of API included, developed Apps may not operate.

This phenomenon may occur in below Apps.

・Apps using Voice command class(VoiceCommandClientCallbacks)

If it happens, please solve by below procedure.

1） Change the SDK of Apps development environment to SDK that matching system software version.

2） Revise the source code according to SDK and re-build.

2.6.2. How to use SDK provided by EPSON

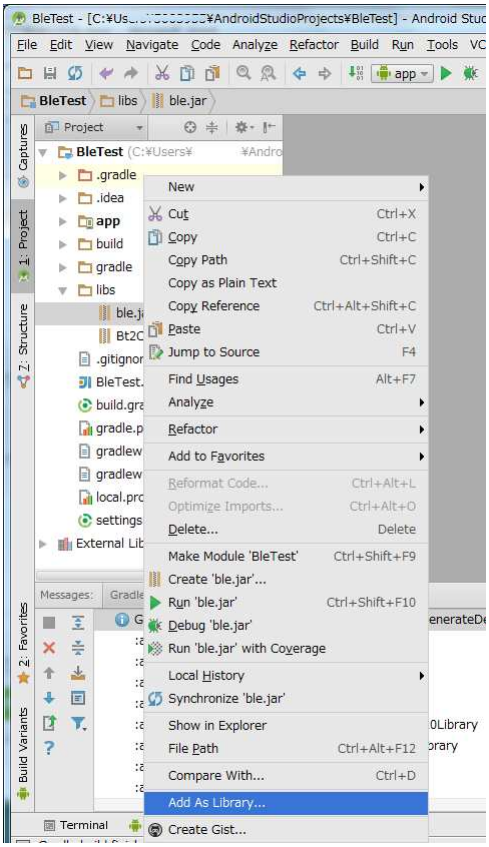
The following procedures assume app development in Android Studio.

- Create a Project from [File] - [New Project]

- Display Project View in Android Studio, and then create a "libs" folder in the Project folder from [File] - [New] - [Directory].

- Copy the "*.jar" file you want to use for Explorer to the "libs" folder.

- Right-click the *.jar file in Project View from Android Studio, and then select [Add as Library...].



- Import necessary packages in the application source code.

- Add the necessary access permission in AndroidManifest.xml.

  * The package name, permissions etc indicate the necessary items for each of the following function sections.