Chipsee

Industrial PC

# Android OS on AM335X User Manual

For AM335X Products

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# Android OS

**Android OS User Manual**

This manual is used to provide users with a fast guide of Chipsee Industrial Computers (Abbreviated as IPC) about Android OS development. Through this manual, users can quickly understand the hardware resources; users can build a complete compilation of Android development environment; users can debug Android OS via serial, USB OTG and Internet.

| Revision | Date | Author | Description |
|---|---|---|---|
| V1.0 | 2021-12-09 | Randy | Initial Version |

**SUPPORTED BOARDS:**

> *CS80480T050 CS80600T080 CS10600T070 CS80480T070 CS10768T097*

**PREBUILT FILES PACKAGE:**

Prebuilt files for the various industrial PCs can be found in the OS Downloads.
Below are the links to the prebuilt files for each industrial PC model.

- CS80480T050
- CS80600T080
- CS10600T070
- CS80480T070
- CS10768T097

System Features

| Feature | Comment |
| --- | --- |
| System | Android 4.1 |

# Preparation

You will need to prepare the following items before you can start using the Prebuilt Files Package to re-flash the system.

Power Supply Unit (PSU) with the appropriate voltages, as follows:

- Products with 5” display panel require 6V to 36V PSU
- Products with 7” to 10.1” display panel and larger require 6V to 42V PSU
- USB to serial cable for debugging Chipsee Industrial Embedded Computers (Chipsee IPC)
- TF Card to create a bootable storage for re-flashing the system. Use the prebuilt files link above to re-flash the system.

## Hardware Requirements

- Chipsee Industrial PC
- PSU according to the instructions above
- USB-to-serial or other serial cable for debugging
- TF Card (at least 4GB) and card reader
- USB A-A cable (used only if the hardware configured as OTG)
- Windows 7 PC

## Software Requirements

- Android OS Prebuilt Files Package (from the link above)
- ADT for Windows
- Android USB driver (for Windows)

# Getting Started and Tests

## DIP Switch Configuration

Set the boot DIP switch, as shown on the figure below, to boot the system from the external SD Card.

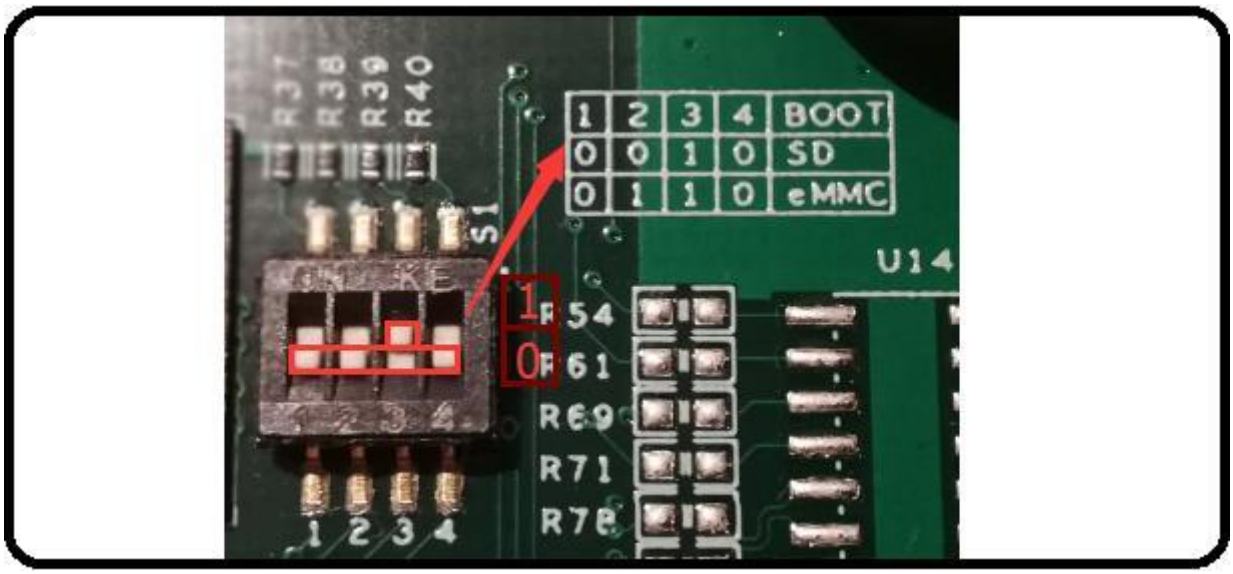


Figure 707: Boot Mode Setup

## Downloading Images

Chipsee IPC supports booting from an integrated eMMC or an external TF Card (also known as the micro SD card). Booting from the external TF Card allows flashing the system OS.

> **Note**
>
> The operator should use the prebuilt file we provided in the CD to test the hardware before re-flashing the system.

## Prebuilt Files Package

You can get the Prebuilt Files Package for each model from links mentioned at the beginning of this documentation. You can also get the Prebuilt Files Package from the DVD in /Android/Prebuilds folder. However, it may be outdated so always compare the versions (the last number in the filename is the release date).

The prebuilt package has the following content:

| Contents | Comment |
|---|---|
| boot/imx6ulipc.dtb | TF Card boot dtb file |
| boot/u-boot.imx | TF Card boot bootloader |
| boot/zImage | TF Card boot kernel file |
| filesystem/rootfs-emmc-flasher.tar.bz2 | TF Card boot rootFS |
| mksdcard.sh | Shell tools to make bootable TF Card |
| README | Simple guidelines |
| S1.jpg | Boot Switch Config Figure |
| emmc-flash/emmc/rootfs.tar.gz | RootFS in target eMMC |

| Contents | Comment |
| --- | --- |
| emmc-flash/emmc/u-boot.imx | Bootloader in target eMMC |
| emmc-flash/emmc/zImage | Kernel file in target eMMC |
| emmc-flash/emmc/imx6ul-eisd.dtb | dtb file in target eMMC |
| emmc-flash/mkemmc.sh | Shell tools to download images |

Table 206 Prebuilt Files Package

> **Note**
>
> The default `zImage` and `imx6q-sabresd.dtb` files support *'keep the logo from uboot to kernel'* but do not support framebuffer. Chipsee provides `zImage_framebuffer` and `imx6q-eisd.dtb_framebuffer` file versions that support the framebuffer function but do not support the *'keep the logo from uboot kernel'* feature. If you need the framebufer, just rename these two files to `zImage` and `imx6q-eisd.dtb`.

## How to make a bootable SD card

The Prebuilt Files Package has a shell tool that can help create a bootable SD card using a Linux platform (such as desktop PC or Virtual Machine running Ubuntu 14.04 distribution). Use the SD Card to download the bootable system image onto the Linux platform and follow the steps below to create a bootable SD card:

1. Copy the Prebuilt Files Package to a Linux environment (such as Ubuntu 14.04).
2. Insert the SD card into your computer. If you are using virtual machines, please ensure the SD card is mounted to the Linux operating system.
3. **Confirm the SD card mount point, `/dev/sdX` (e.g., `/dev/sdc` or `/dev/sdb`, be sure to use the right one). In a Linux system, you can use the command below to find out what *X* is.**

   ```
   $ sudo fdisk –l
   ```

4. Copy the `prebuilt-jb-hmi-XXXX.tar.gz` to somewhere(such as $HOME).
5. **Extract the `prebuilt-jb-hmi-XXXX.tar.gz`**

   ```
   $ tar -xzvf prebuilt-jb-hmi-XXXX.tar.gz
   ```

6. **Go to the folder**

   ```
   $ cd ~/Prebuilt-cs-androidXXXXX/prebuilt-sd/
   ```

7. **Use the following command to flash the Android OS to the SD card**

```
$ sudo ./mkmmc-android.sh --device /dev/sd<?>
```

> **Note**
>
> • sd<?> means the SD card mount point, (e.g., `/dev/sdc` or `/dev/sdb`) in Ubuntu system.
>
> • The recommended SD card should be Sandisk Class4 level SD card or above.

8. The bootable SD Card is now ready. Power OFF the industrial PC and insert the SD Card.
9. Set the DIP switch to uSD BOOT mode. (refer to DIP Switch Configuration above)
10. Connect the industrial PC to PC via COM1. Power ON the IPC.
11. After 20 minutes, if the LED on industrial PC stays lit, flashing is completed. Using COM1, you can also find this message **>>>>>>> eMMC Flashing Completed <<<<<<<** which indicates that the system image was downloaded correctly to the eMMC.
12. Power OFF the IPC and set the DIP switch to eMMC BOOT mode. (refer to DIP Switch Configuration above)

## How flash Android to NAND

The Prebuilt Files Package has a shell tool that can help create a bootable NAND card using a Linux platform (such as desktop PC or Virtual Machine running Ubuntu 14.04 distribution).

Follow the steps below to create a bootable NAND card:

1. Copy the Prebuilt Files Package to a Linux environment (such as Ubuntu 14.04).
2. Insert the SD card into your computer. If you are using virtual machines, please ensure the SD card is mounted to the Linux operating system.
3. **Confirm the SD card mount point, `/dev/sdX` (e.g., `/dev/sdc` or `/dev/sdb`, be sure to use the right one). In a Linux system, you can use the command below to find out what *X* is.**

```
$ sudo fdisk –l
```

4. Copy the prebuilt file `prebuilt-jb-hmi-XXXX.tar.gz` to somewhere(such as $HOME).
5. **Extract the prebuilt file `prebuilt-jb-hmi-XXXX.tar.gz`**

```
$ tar -xzvf prebuilt-jb-hmi-XXXX.tar.gz
```

6. **Go to the folder `prebuilt-jb-hmi-XXXX/prebuilt-nand/`**

```
$ cd ~/prebuilt-jb-hmi-XXXX/prebuilt-nand/
```

7. **Use the following command to flash the Android OS to the NAND card**

```
$ sudo ./mkmmc-android-nand.sh --device  /dev/sd<?>
```

> **Note**
>
> • sd<?> means the SD card mount point, (e.g., `/dev/sdc` or `/dev/sdb`) in Ubuntu system.
>
> • The recommended SD card should be Sandisk Class4 level SD card or above.

8. The bootable NAND Card is now ready. Power OFF the industrial PC and insert the NAND Card.
9. Set the DIP switch to NAND BOOT mode. (refer to DIP Switch Configuration above)
10. Connect the industrial PC to PC via COM1. Power ON the IPC.
11. After 20 minutes, if the LED on industrial PC stays lit, flashing is completed. Using COM1, you can also find this message **>>>>>>> eMMC Flashing Completed <<<<<<<** which indicates that the system image was downloaded correctly to the eMMC.
12. Power OFF the IPC and set the DIP switch to eMMC BOOT mode. (refer to DIP Switch Configuration above)

## Start Android OS

The first time you start Android OS on the industrial PC will take a little time. But after the first time, Android OS will start quickly. When the Android OS starts up, you will see the Chipsee Logo on the LCD screen. It is a successful start if you see the Android OS desktop such as the one shown in the figure below:

Figure 708: Android OS start-up screen

## Tests

### Touch screen test

Run **MultiTouch** Tester App.
The screen will show the number and position of the touch point when touching the screen.

> **Note**
>
> Resistive screen expansion board only supports single-touch, and capacitive screen expansion board supports five-point touch as described in the figure below.

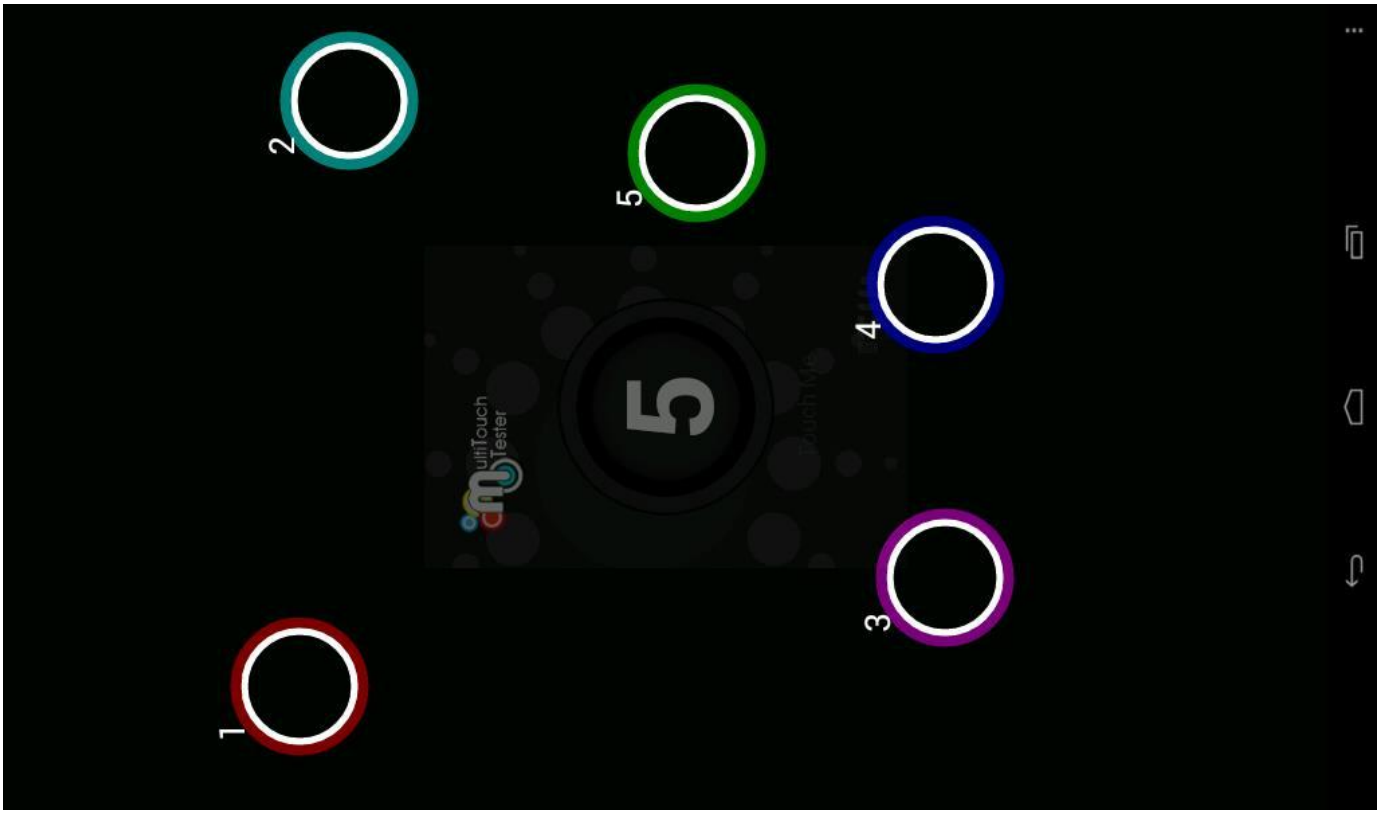


Figure 709: Touch screen test (Capacitive touch)

After working for some time, the resistive touch screen may not be accurate. The user must run a touch screen calibration test.
Run **Chipsee TouchCal** App as described in the figure below.

Figure 710: Touch screen calibration test (Resistive touch)

### Buzzer test

Run **Chipsee Buzzer** App.
Push the *"OpenBuzzer"* button to start the buzzer sound.
Push the *"CloseBuzzer"* button to stop the sound.

### Gravity sensor test

You can test the gravity sensor by whirling the screen.

- Run **SensorList** App.
- In the *"Analog Device 3 axis accelerometer"* option, you can see real-time changes of the three-axis acceleration value curve, as shown on the figure below.

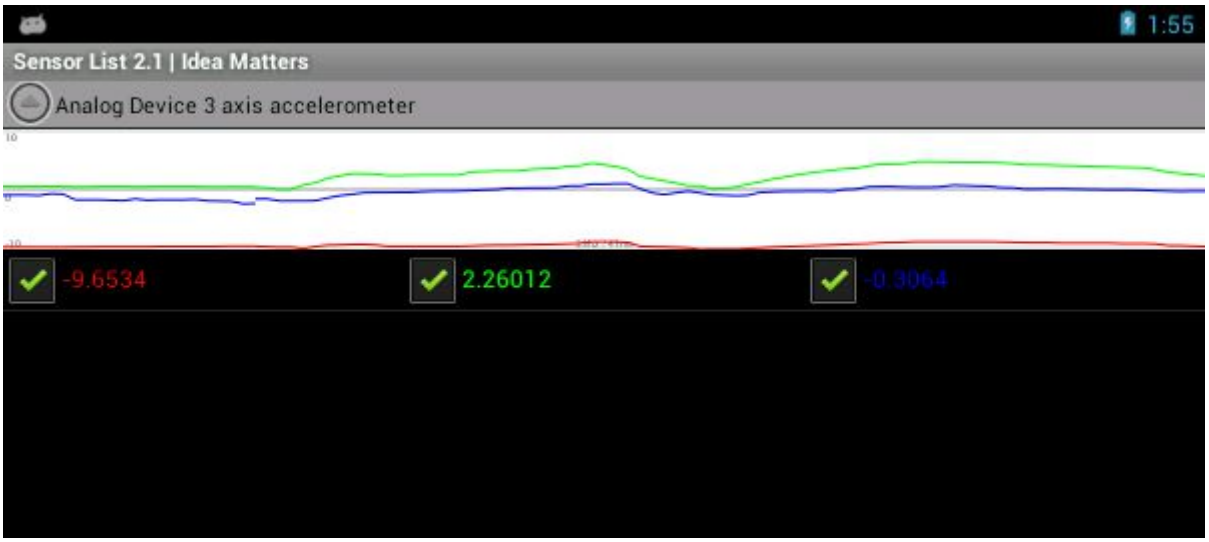


Figure 711: Real-time acceleration curve

- You can also test gravity using a gravity sensing game, such as "NFS shift" or "Tilt 3D laby". If you use "NFS shift", please run the **ChipseeSensorTool** app to adjust the direction of the axis by selecting "Invert X-axis" and "Swap X/Y axes". If you use other games, please adjust the settings as default.

### Audio IO test

Insert the microphone and earphones into the Audio IO interface (Audio IN coloured pink, Audio OUT coloured light blue).
Start **Talking Tom** App (Tom Cat).
Speak into the microphone, Tom the cat will repeat spoken content.

### Serial test

There are four serial ports on the Chipsee IPC: 2 X RS232 and 2 X RS485. Refer to the table below for the available serial device nodes.

| Ports | Device Node |
|---|---|
| COM1(RS232, Debug) | /dev/ttyO0 |
| COM2(RS232) | /dev/ttyO1 |
| COM3(RS485) | /dev/ttyO2 |
| COM4(RS485) | /dev/ttyO4 |

Table 207 Serial Ports Nodes on the System

You can install the **SecureCRT** or **Putty** software on a Windows 7 PC to test the serial ports by following these steps:

- Connect COM1 on industrial PC board to Windows 7 PC.
- Run **Serial Port API** App to communicate with Windows 7 PC, as shown on the figure below.

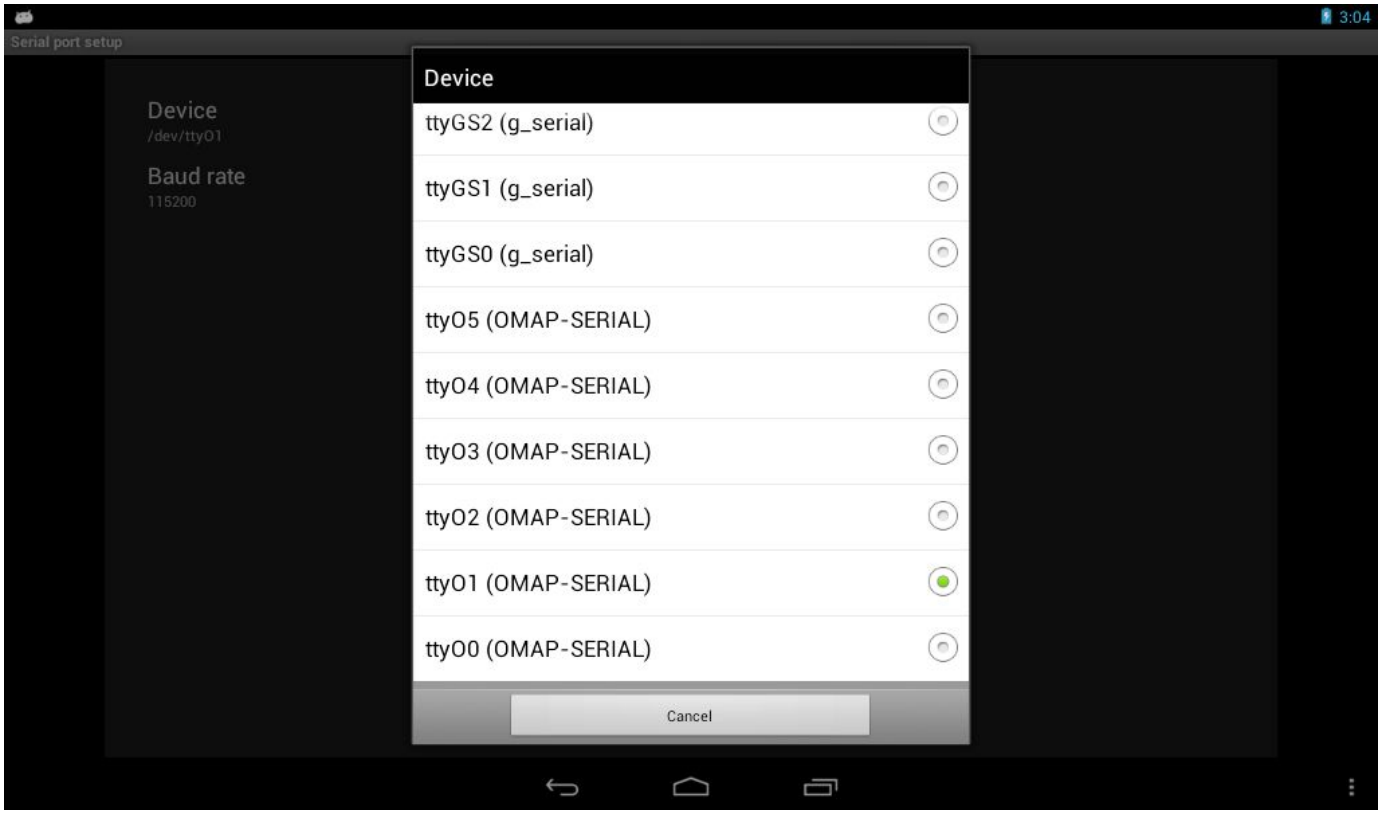


Figure 712: Serial settings

- Push the button with the label “Send 01010101”, you will see something on the Windows 7 PC that looks similar to the figure below.

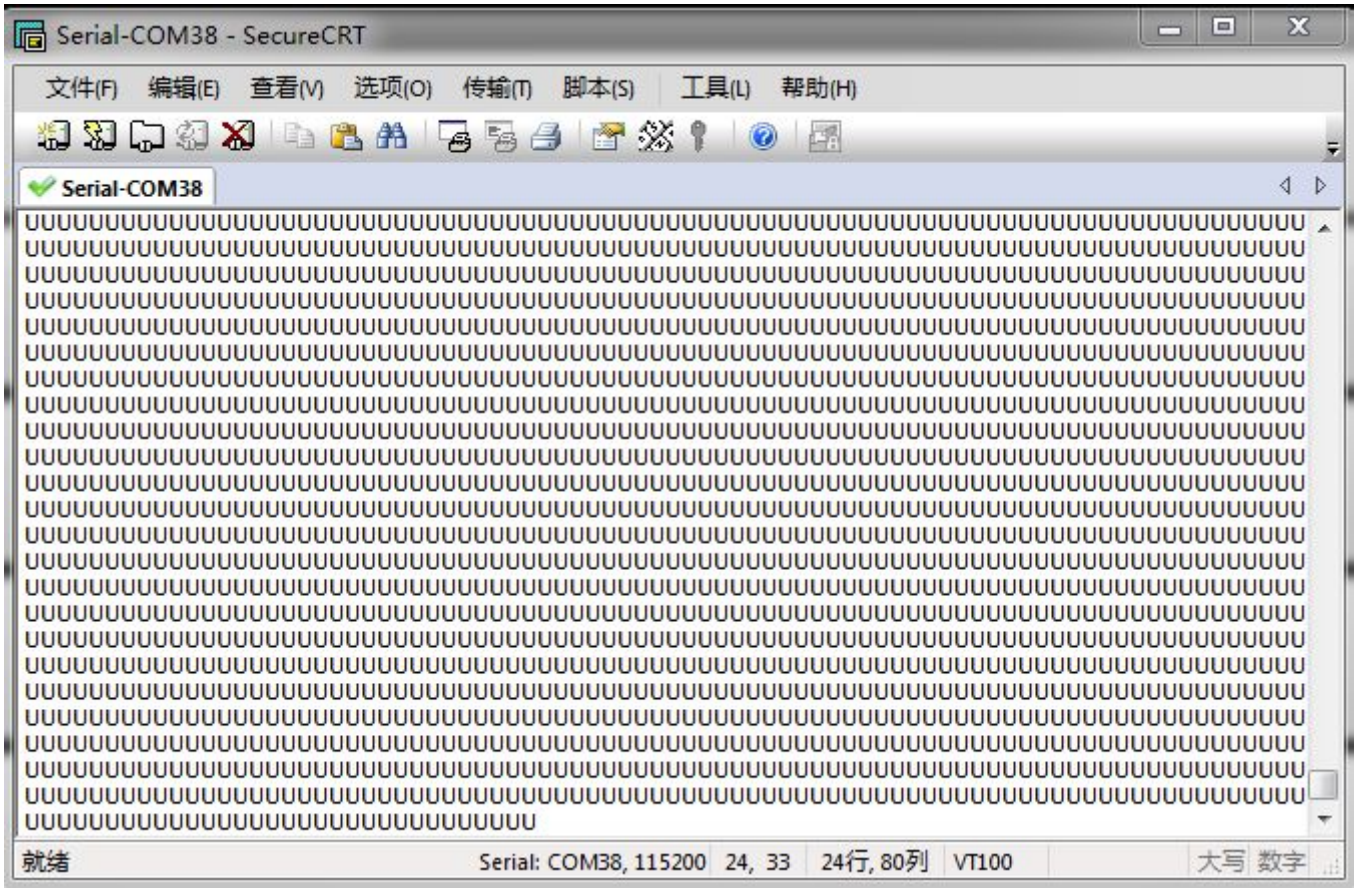


Figure 713: Serial send test

- Push the button with the label “Console”, to send whatever you like as shown on the figure below.

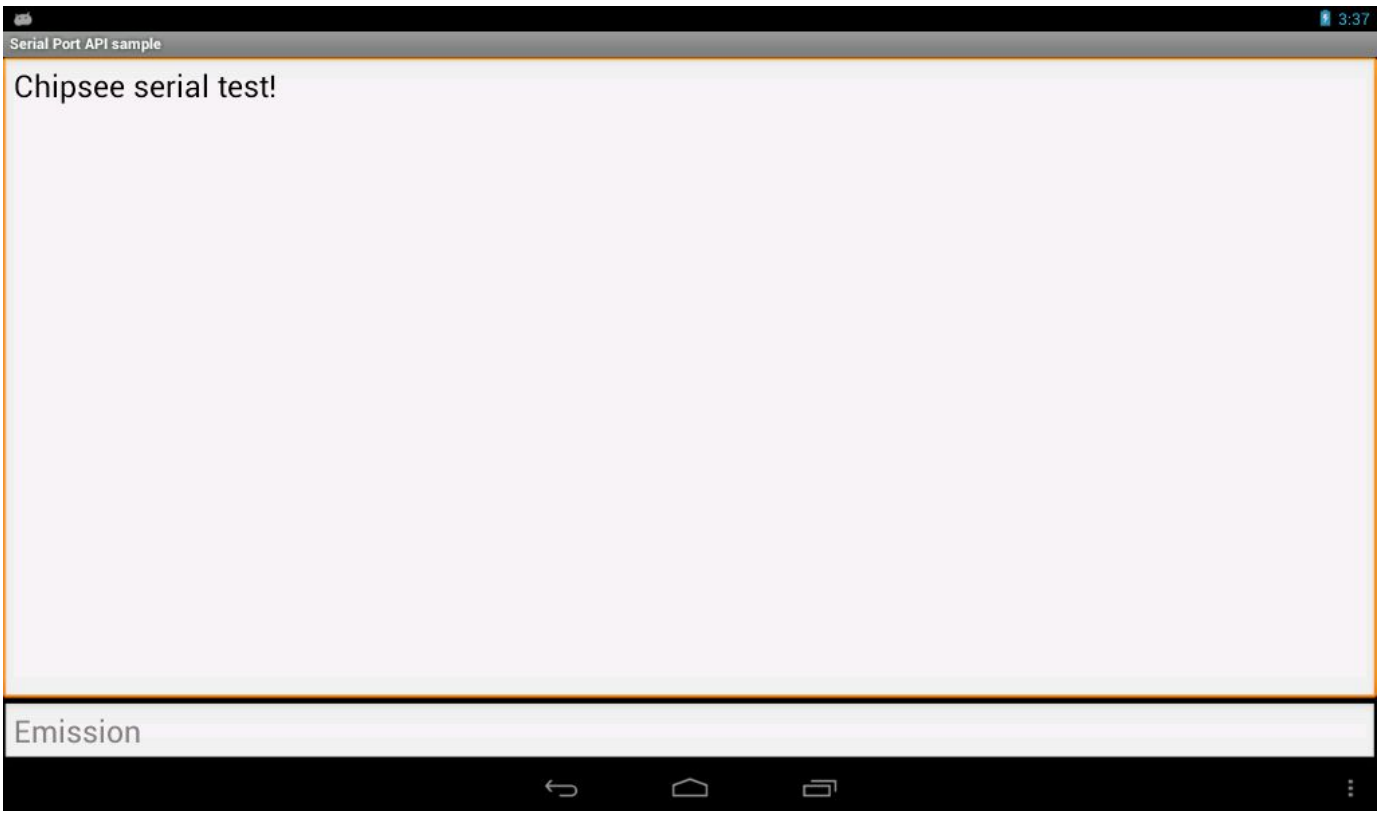


Figure 714: Serial receive test

### USB device test

### USB-WiFi

The Android OS supports USB-WiFi (RTL8188). You can find the device in settings, as shown on the figure below.

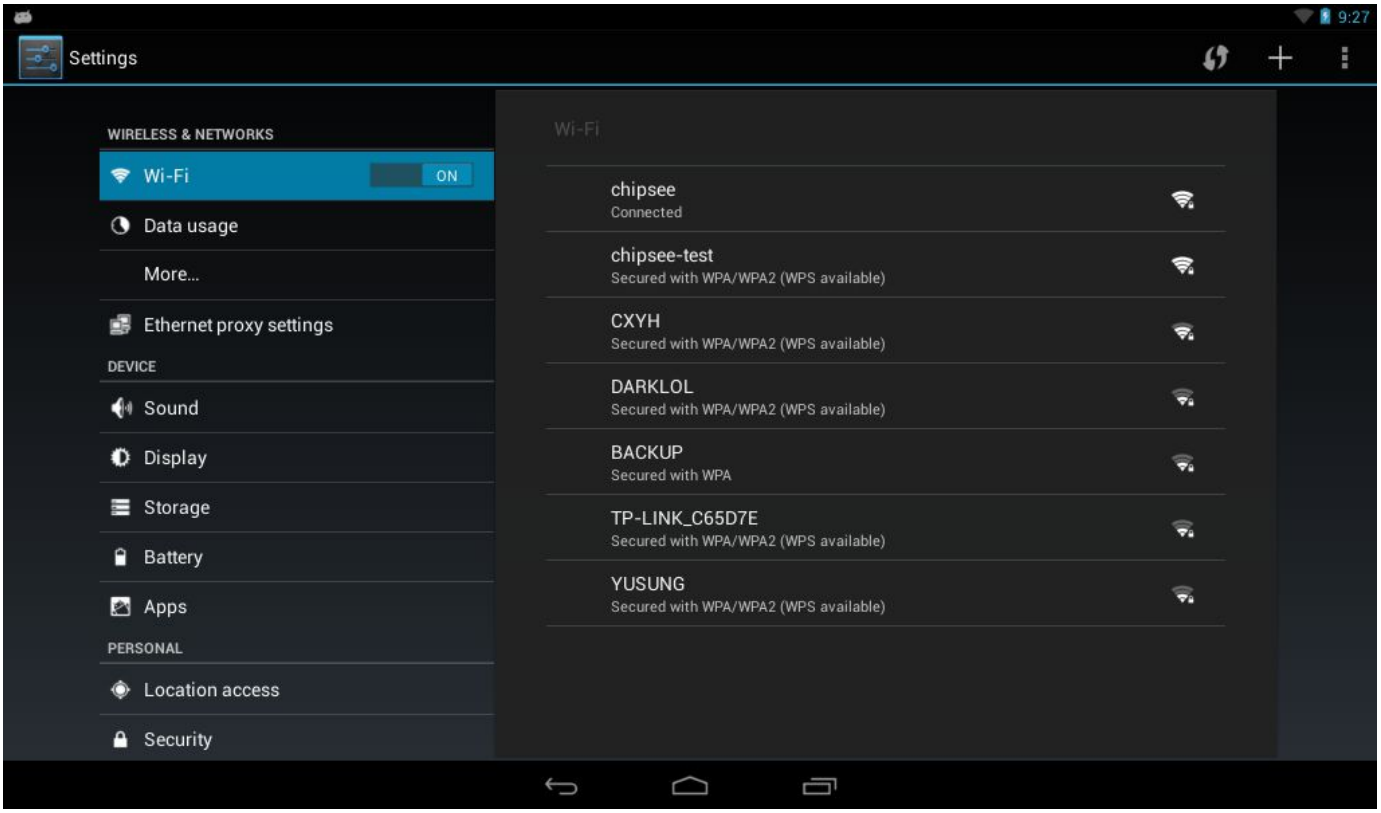


Figure 715: USB-WiFi

### USB-Camera

The Android OS supports USB-Camera. You can find the device in settings, as shown on the figure below.

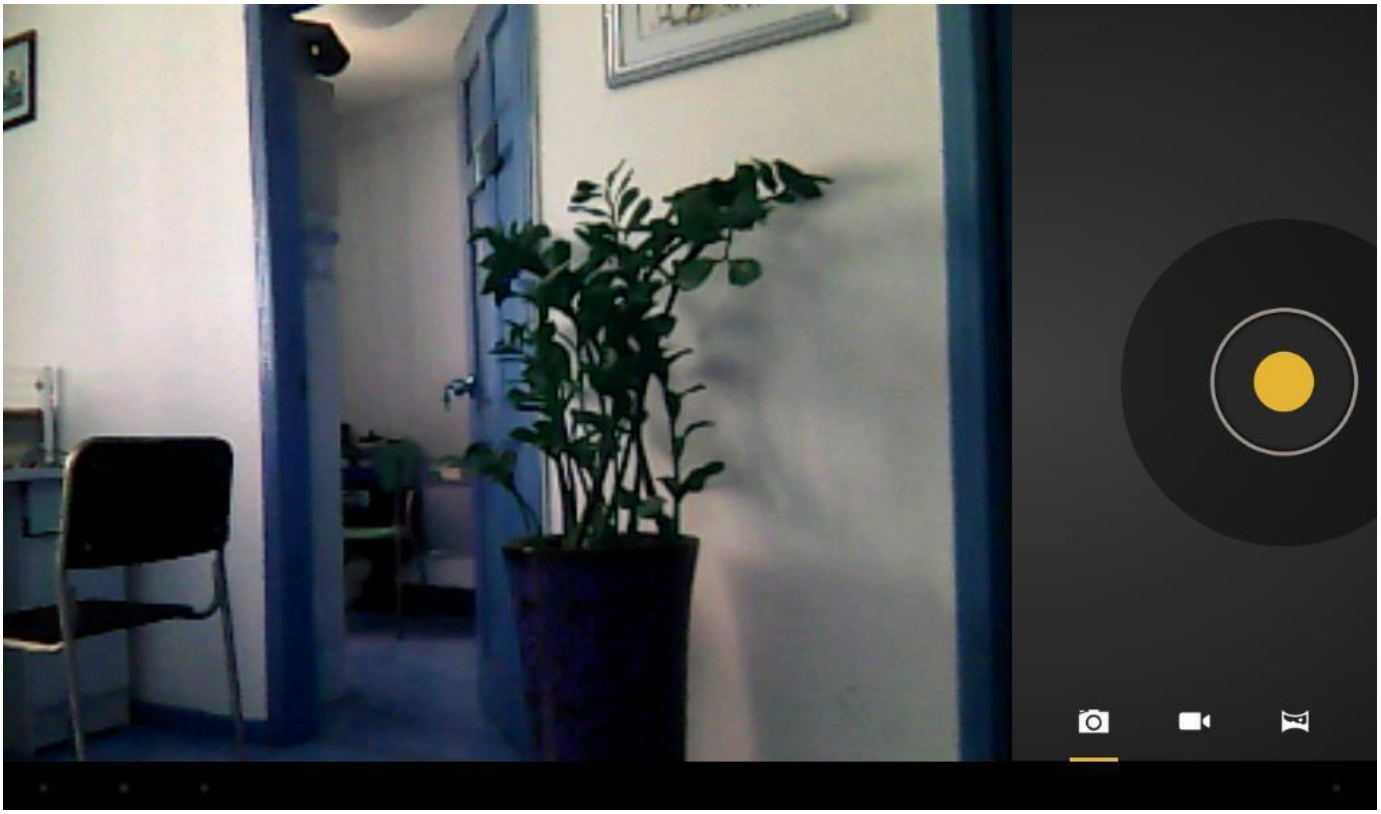

Figure 716: USB-Camera

## Modify OS Start up Logo

Chipsee® provides a software to change the OS boot up logo. The software `ChipSee_LOGO_MOD_EN.exe` is provided on the CD for a product.
To change the logo, follow these steps:

1. **Open the software:** `Chipsee_LOGO_MOD_EN.exe` **in Windows**

Figure 717: Chipsee OS Boot-up Logo Modify Software

2. **Click the first Browse button. Select the picture file you want to use as the logo.**

Figure 718: Choose the Logo you want

3. **Click the second Browse button. Select the `u-boot.img` file you want to use.**

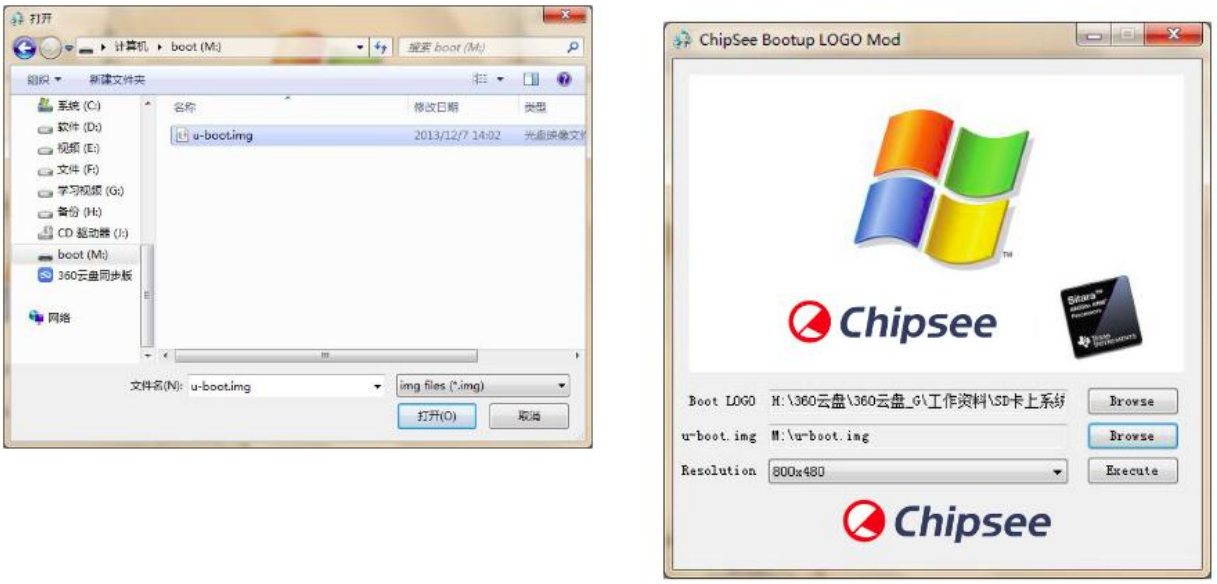


Figure 719: Choose the u-boot.img file

4. **Choose the correct resolution for your product, then click Execute.**

Figure 720: Change the Logo successful

5. Insert the SD card into the IPC. Power ON the IPC and the Logo will be replaced.

## IP settings

To make changes to the IP address, follow these steps:

- Search the **boot partition** for the `uEnv.txt` file.
- **Open and edit the file `uEnv.txt` with any text editor.**

```
bootargs=console=ttyO0,115200n8 androidboot.console=ttyO0 mem=512M root=/
dev/mmcblk0p2 rw rootfstype=ext4 rootwait init=/init ip=off
```

- **Edit the part with ip=value, where value = off OR <iPv4 address>:::<Subnet mask>**

  For example: .. code:

```
bootargs=console=ttyO0,115200n8 androidboot.console=ttyO0 mem=512M root=/
dev/mmcblk0p2 rw rootfstype=ext4 rootwait init=/init ip=192.168.1.111:::
255.255.0.0
```

**Note**

Inputting wrong details could harm the industrial PC and because of that you should backup the file before making any changes. This can help you reverse changes easily if an error occurs.

# Android system debug in Windows

In this section, we will discover how to view the Android system via the serial port and debug the system via USB OTG.
Also, we will discover how to install and uninstall applications via USB OTG.
The following operation is under the Windows 7 x64 environment, similar to other Windows platforms.

## View Android system via the serial port

Install the **SecureCRT** or **Putty** software on a Windows 7 PC to view the Android system via the serial ports.
Follow these steps to view Android system via the serial port:

- Connect COM1 on the industrial PC board to Windows 7 PC.
- Open the **SecureCRT** or **Putty** software on the Windows 7 PC.
- Power ON the industrial PC. You will see the serial output information as shown on the figure below.

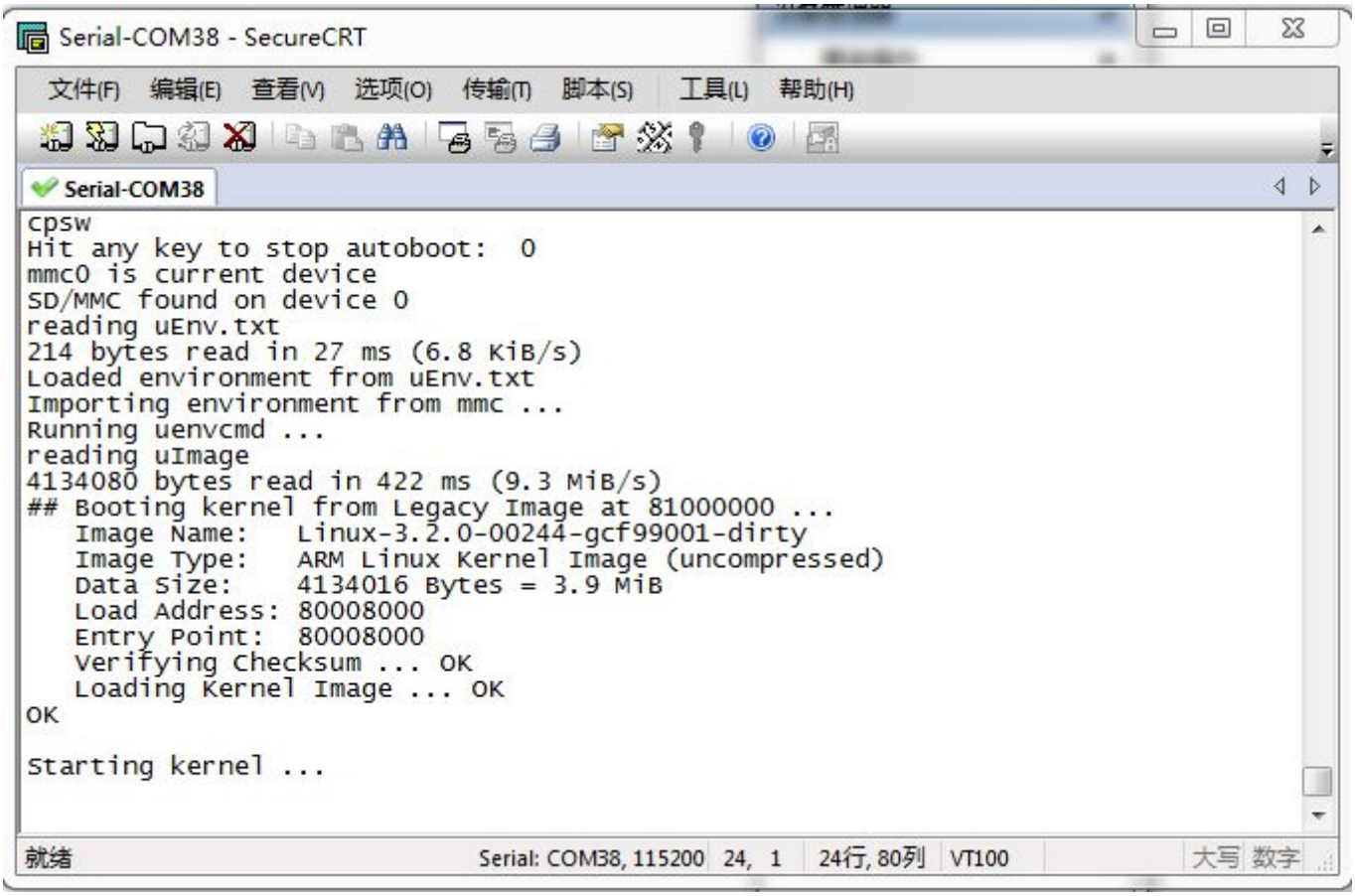


Figure 721: Serial output information

## Adb connect via USB OTG

1. Download Oracle JDK 6 and Android Studio SDK for Windows. We suggest you download JDK-6u45.
2. Install Oracle JDK 6 and Android Studio SDK for Windows.
3. Extract the file somewhere (the name for the extracted folder is ADT).
4. The ADB command is in the `<ADT>\sdk\platform-tools` folder.
5. **Optionally, you can add the location of the SDK's primary tools directory to your system PATH by following these steps:**
    - Right-click on My Computer, and select Properties.
    - Under the Advanced tab, hit the Environment Variables button.
    - In the dialogue that comes up, double-click on Path (under System Variables).
    - Add the full path to the toolsdirectory to the path.
6. **Install Android USB driver on Windows:**
    - Copy the `usb_driver` folder on the CD to a folder on the Windows 7 PC.
    - Boot the board as normal and wait until shell prompt is available (disconnect the micro-B USB cable).

- Connect a micro-B USB cable between the board and Windows 7 PC.
- If it is proceeding as planned, Windows will recognise the new hardware and ask you to install drivers for it.
- Right click on the hardware. Click on install driver.
- Choose the answer **No, not this time** to the question about running Windows Update to search for software.
- Choose **Install the hardware that I manually select from a list (Advanced)** this is the 2nd option, then click **Next**.
- Browse to your driver folder ( `\usb_driver` ). and look for a `.inf` file.
- Select `android_winusb.inf` and click **Open** then **OK**. It's the only file in the folder, so you shouldn't go wrong.
- Select **Android ADB Interface** then click the **Next** button.
- A warning will appear, answer **Yes** but read the warning, anyway.
- When the wizard finishes, click the **Close** button .
- Now you can see it installed the driver successfully, as shown on the figure below.

Figure 722: ADB Driver

7. **Test ADB by following these steps:**

- Press the **Win+r** key combination to open the *Run Command* dialogue box.
- Type **cmd** and press enter.
- Execute the commands below in the command prompt.

```
> cd <ADT>\sdk\platform-tools\
> adb kill-server
> adb start-server
```

```
> adb devices
> adb shell
```

- If the `#` prompt appears at the beginning of the command line, it means we connected the industrial PC with the Windows 7 PC successfully as shown on the figure below.

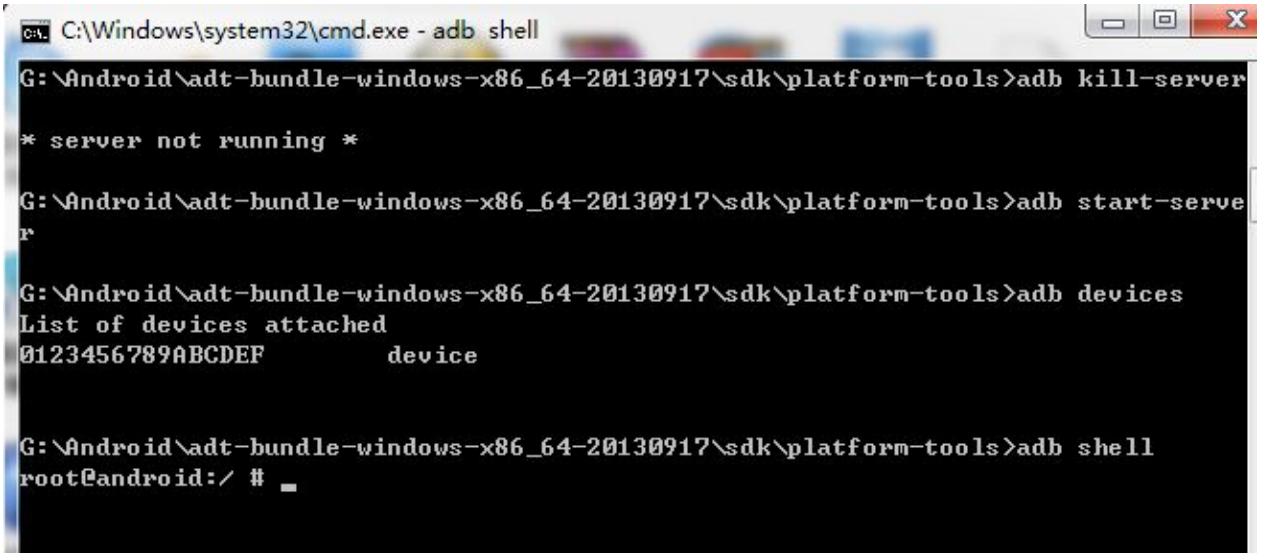


Figure 723: ADB Command

- Now you can use Linux commands like `ls`, `cd` and so on. Press **Ctrl + C** to exit the shell and return to the Windows system.

8. **Use the `adb` command to install an Android App: for example SogouInput.apk. If there is a SUCCESS message, as shown on the figure below, then the app installation was successful.**

```
> adb install SogouInput.apk
```

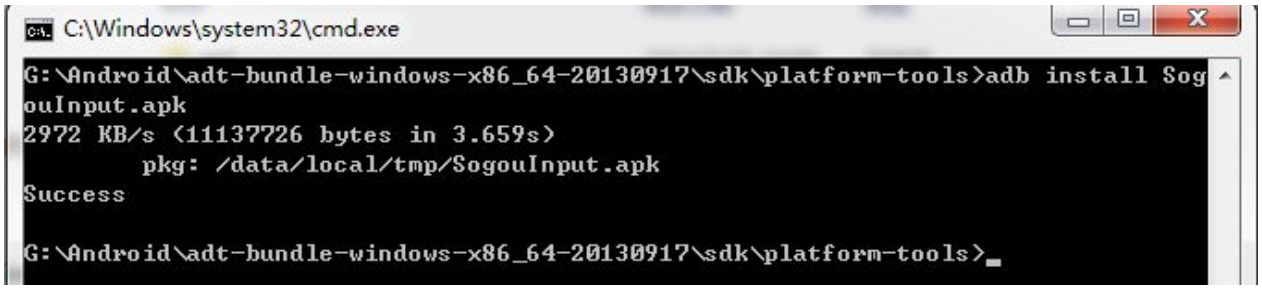


Figure 724: Install App

9. **Use `adb` command to uninstall an Android app: for example SogouInput.apk. Follow these commands to uninstall an app.**

```
> adb shell pm list packages
> adb uninstall com.sohu.inputmethod.sogou
```

- The `pm list` command gets the full name of the app, as shown on the figure below.

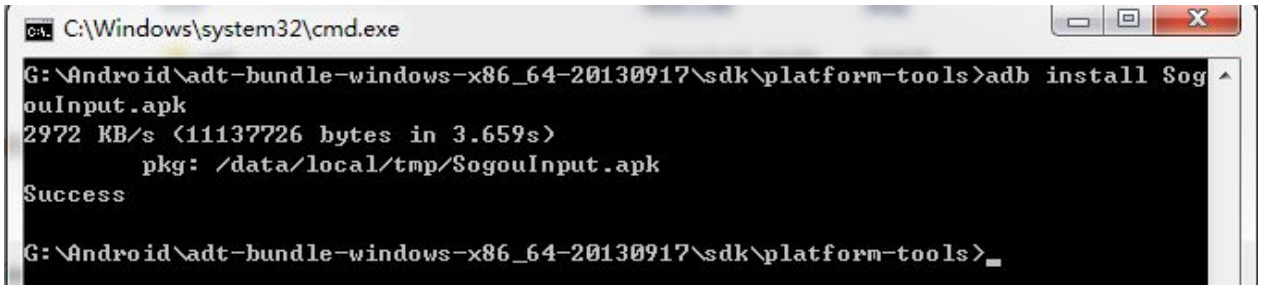


Figure 725: Command `pm list` to get app's name

- The `uninstall` command uninstalls the app from the Android system.
- Delete the apk file for the app by using these commands:

```
> adb shell
# cd /system/app/
# ls
# rm Browser.apk
```

10. **Use `adb` command to transport files between the industrial PC and Windows 7 PC.**

    - Transfer file from the industrial PC to Windows 7 PC using `adb pull` command.

```
> adb pull <pathTo_file_on_board> <pathTo_store_file_on_PC>
```

    - Transfer file from the Windows 7 PC to the industrial PC using `adb push` command.

```
> adb push <pathTo_file_on_PC> <pathTo_store_file_on_board>
```

## Adb connect via internet

1. **The Ethernet port on the industrial PC and the host machine (Windows 7 PC) should connect to the network. Check Ethernet configuration for the industrial PC using the command below.**

```
# netcfg
lo       UP    127.0.0.1       255.0.0.0       0x00000049
eth0     UP    192.168.1.117/24   255.255.252.0   0x00001043
```

2. **If the industrial PC's Ethernet is not configured, configure the Ethernet using the `ifconfig` / `netcfg` command as shown below.**

```
# netcfg eth0 dhcp
```

3. **Configure the ADB Daemon to use an Ethernet connection using the `setprop` command, as shown below.**

```
# setprop service.adb.tcp.port 5555
```

4. **If the network is configured successfully using the steps above, then Restart `service  adbd` on the Windows 7 PC.**

```
# stop adbd
# start adbd
```

5. **On the host machine (Windows 7 PC) use the following commands to establish the `adb` connection.**

```
$ adb kill-server
$ adb start-server
$ adb connect :5555
```

6. **Verify the device connectivity, by executing the following commands. If connected, find the device name listed as``IPADDRESS:PORT``.**

```
$ adb devices
List of devices attached
emulator-5554    device
192.168.1.117:5555  device
```

7. **An example of using the `adb` command to install software for Android. Make sure the `"**".apk` file is at the current folder, and export the adb path.**

   • Use the argument `–s` to assign the device to use over the internet.

```
$ adb –s 192.168.1.117:5555 install "**".apk
```

## Android App Development

In this section, we will introduce the development of an Android app with Eclipse on Windows. We assume that the USB is OTG model and the driver is already installed. (See Adb connect via USB OTG)

## Preparation

1. Download and install Eclipse IDE.
2. **Go to the `/eclipse` folder, start eclipse.exe.**

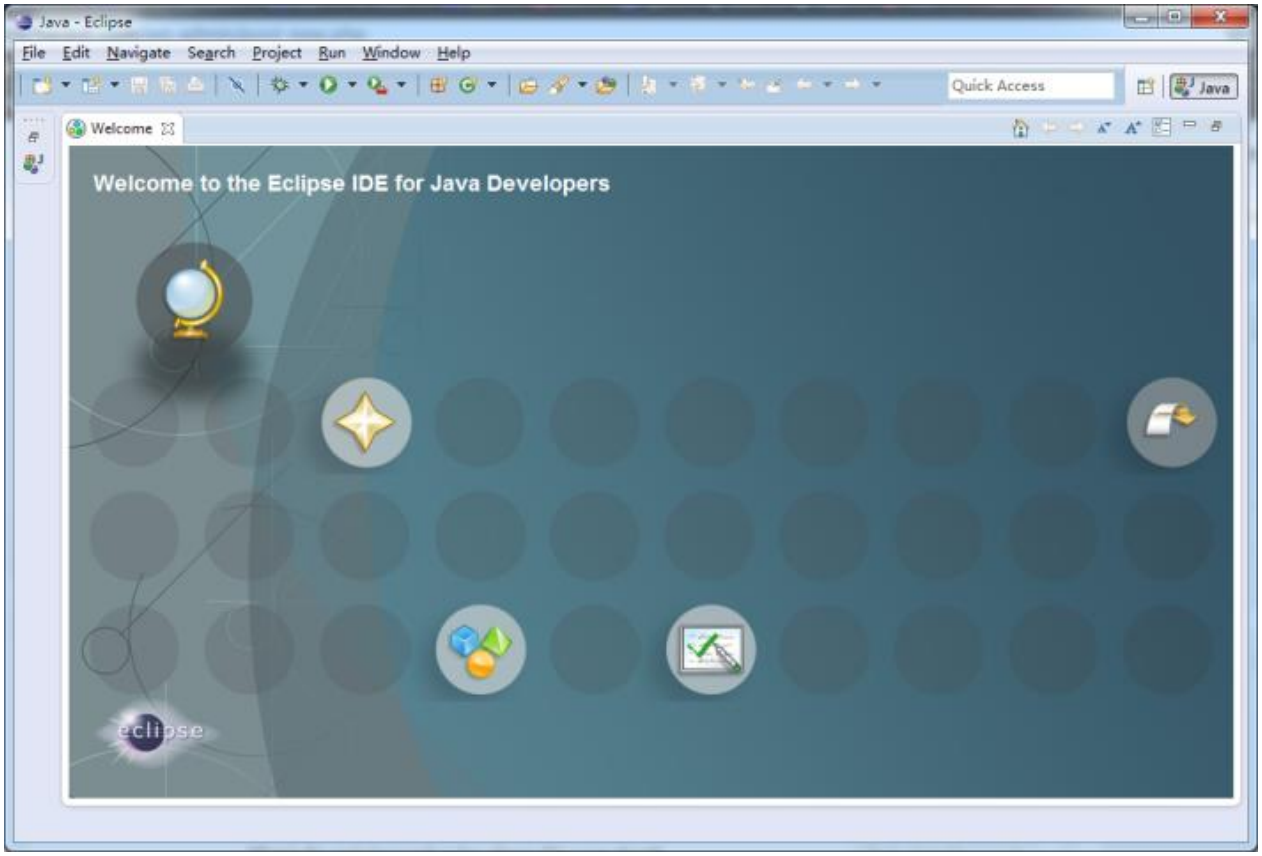


Figure 726: Start eclipse

3. **Click Windows–>Android SDK Manager to open SDK Manager.**

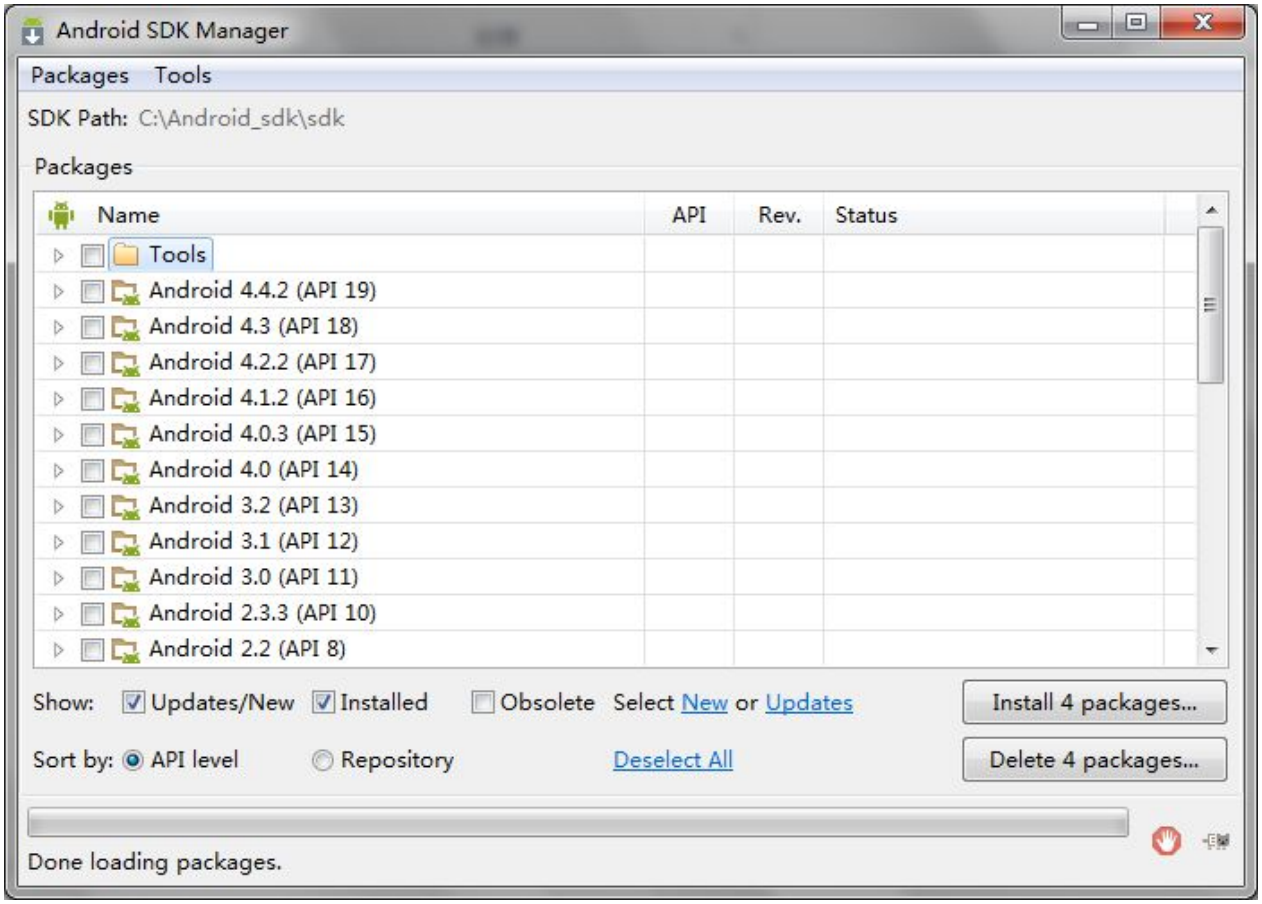


Figure 727: Android SDK Manager

4. **Click Tools–>Options, check the `Force` box and click close.**

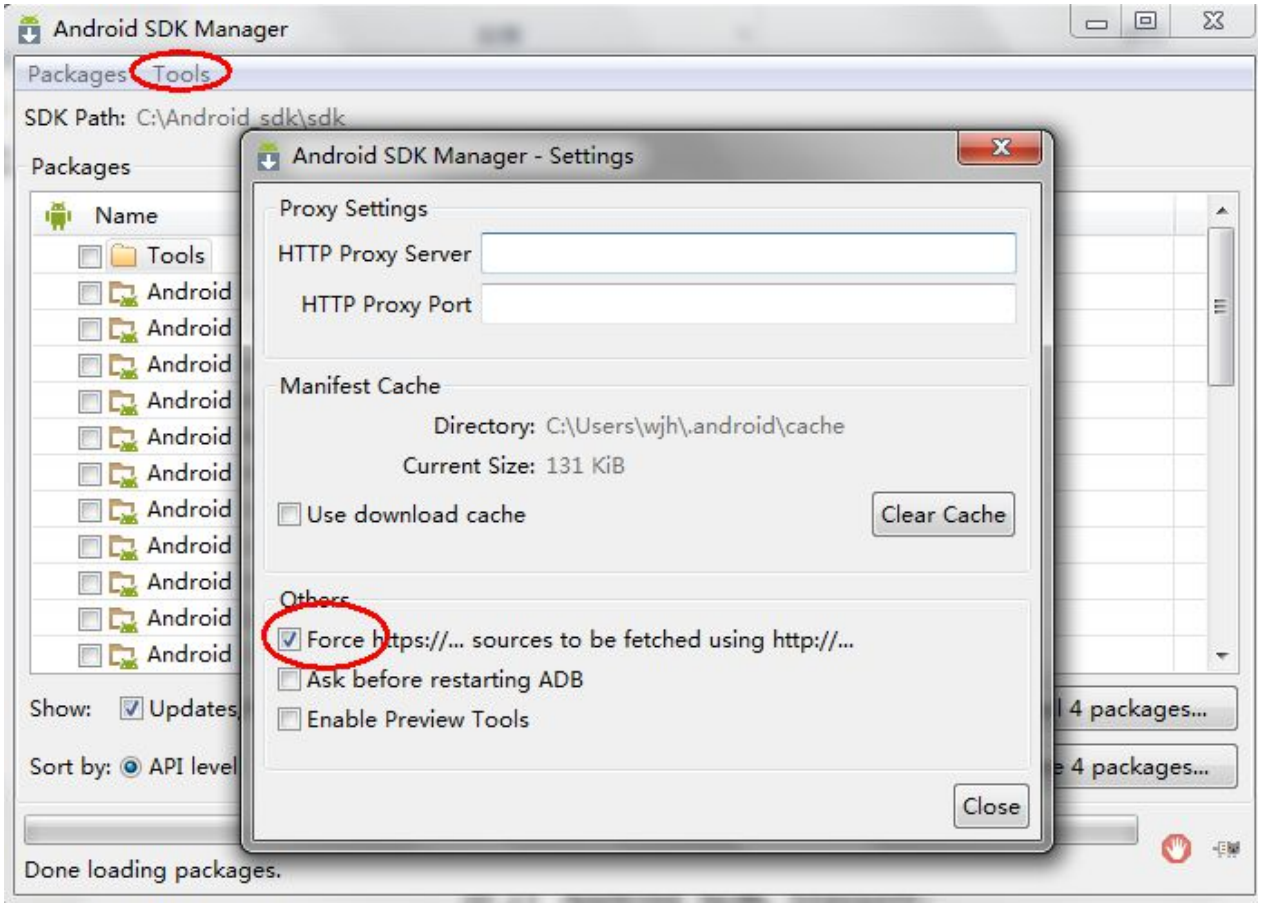


Figure 728: Android SDK Manager Settings

5. **Choose the API, such as Android4.2.2(API 17), then click the Install packages button to start the download and installation of API packages.**

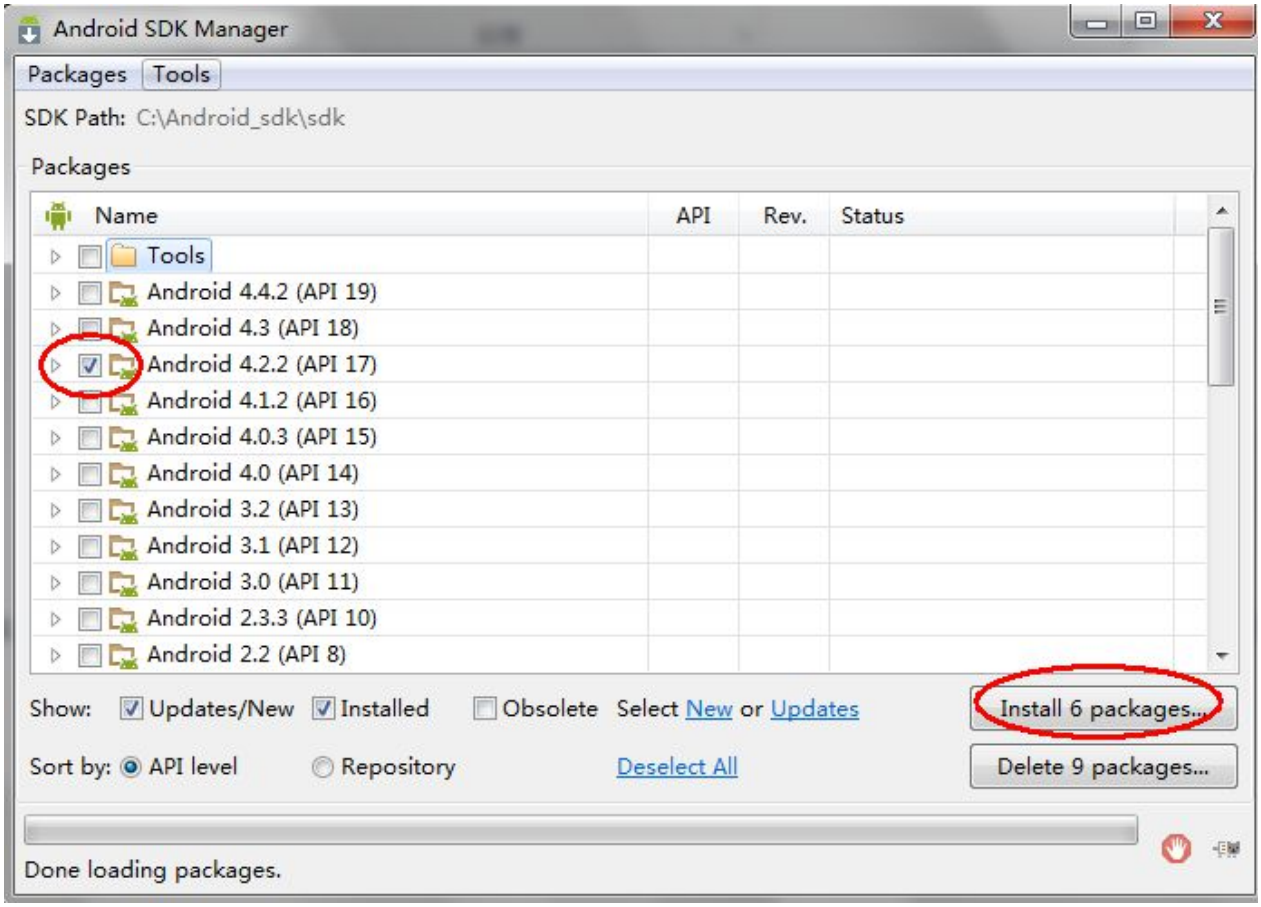


Figure 729: Install API packages

6. Downloading and installing the packages will take some time. When the process completes, close the Android SDK Manager.

## Example — Develop a `HelloWorld` Program

1. **Click File–>New–>Android Application Project**

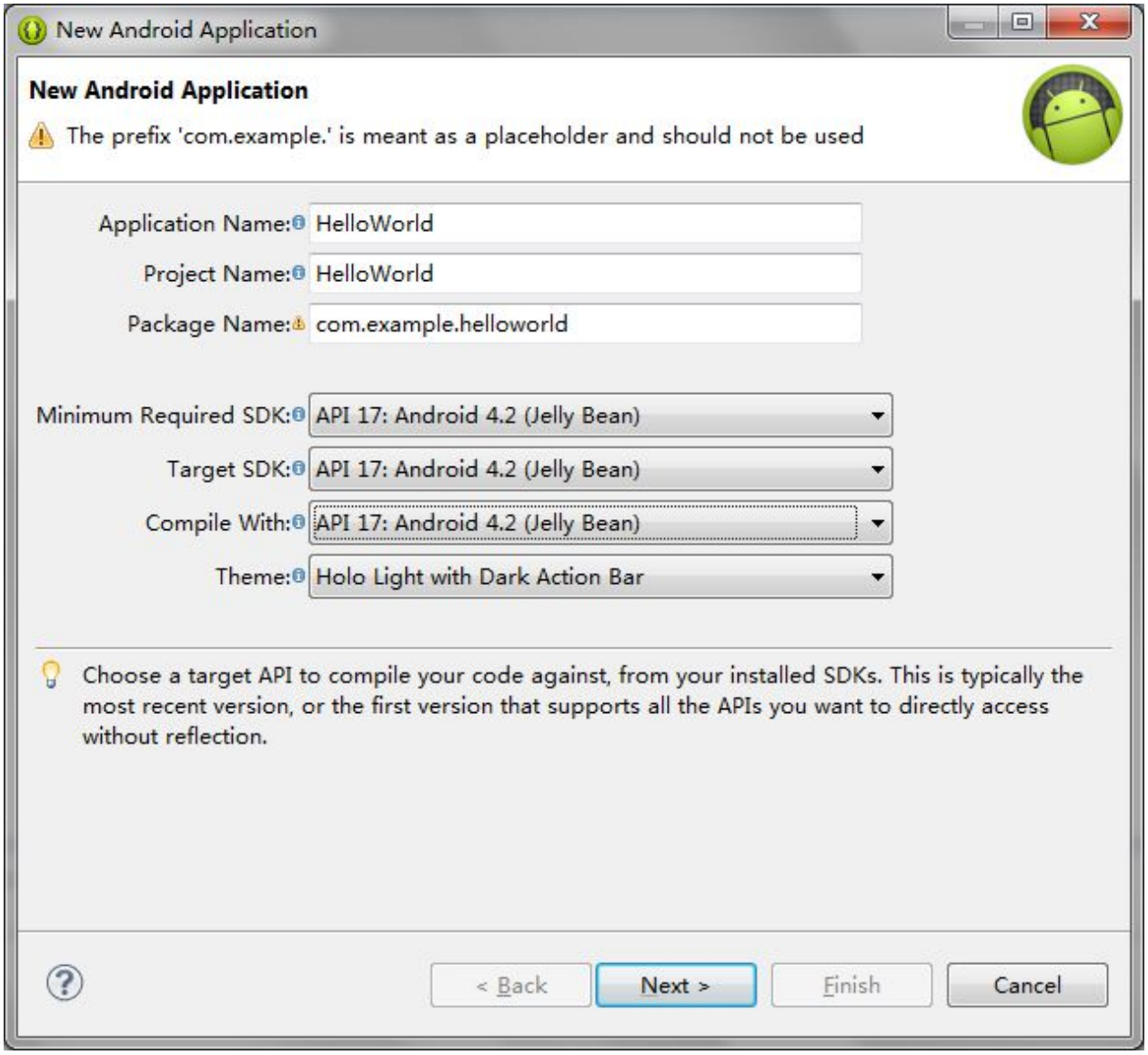


Figure 730: New Application

2. **Click on the Next button until the app project is created. Connect the industrial PC to Windows 7 PC via the USB cable (A-A). If the connection is successful, you will see the device in the DDMS window (Windows–>Open Perspective–>Other–>DDMS)**

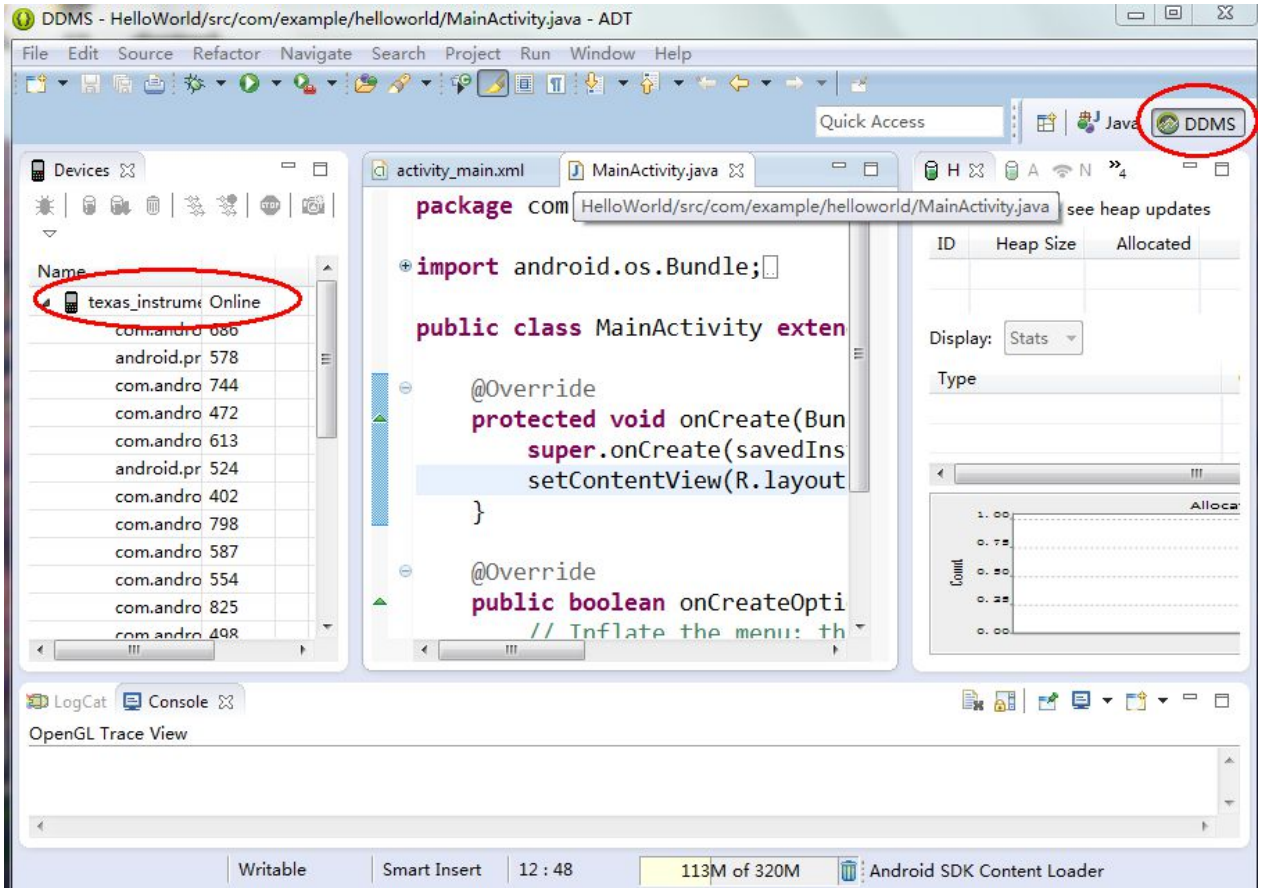


Figure 731: DDMS

3. **You can capture the desktop of Android**

Figure 732: Capture Android Desktop

4. **Click run, and choose the device**

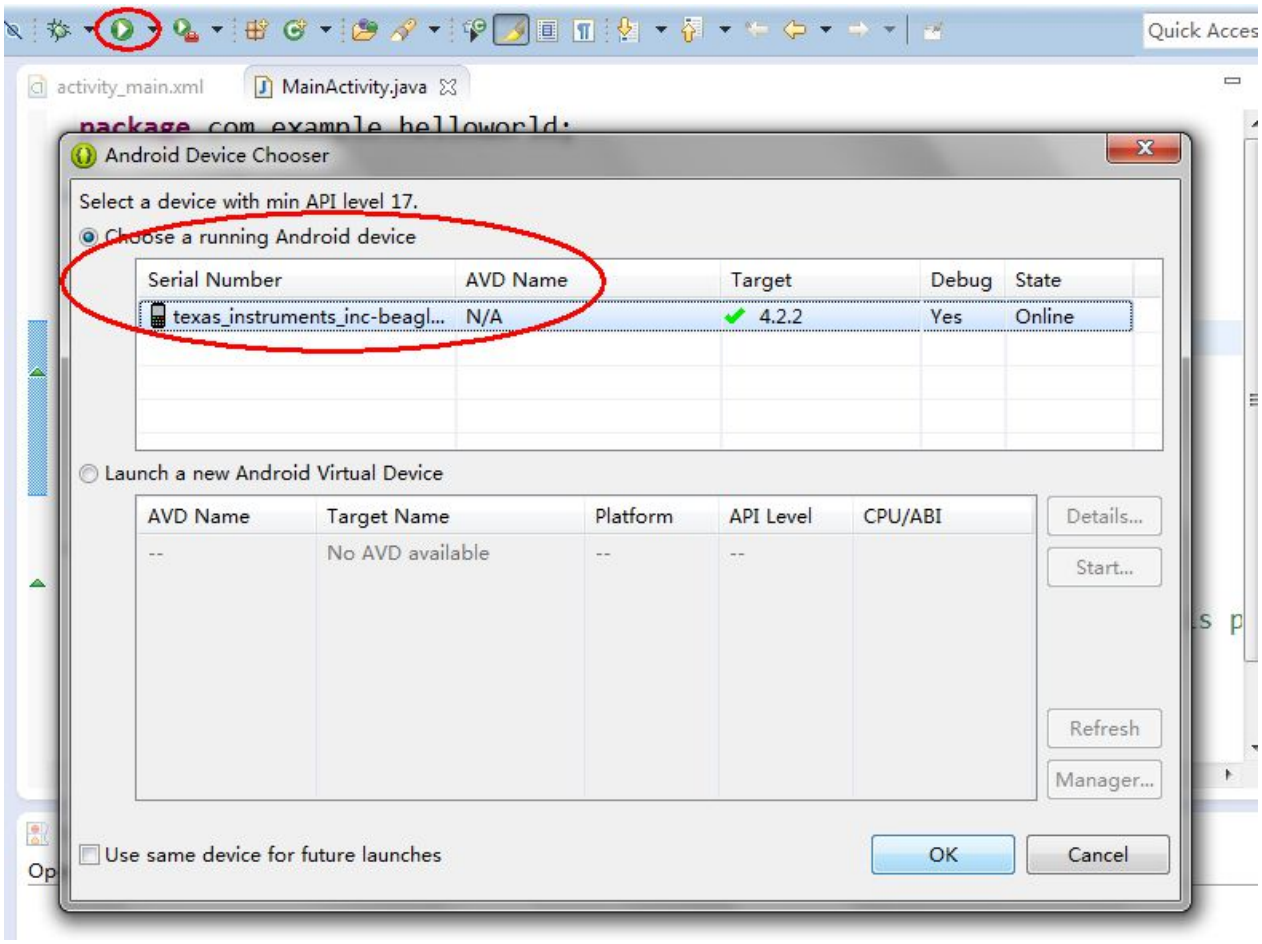


Figure 733: Run HelloWorld Program

5. **Result**

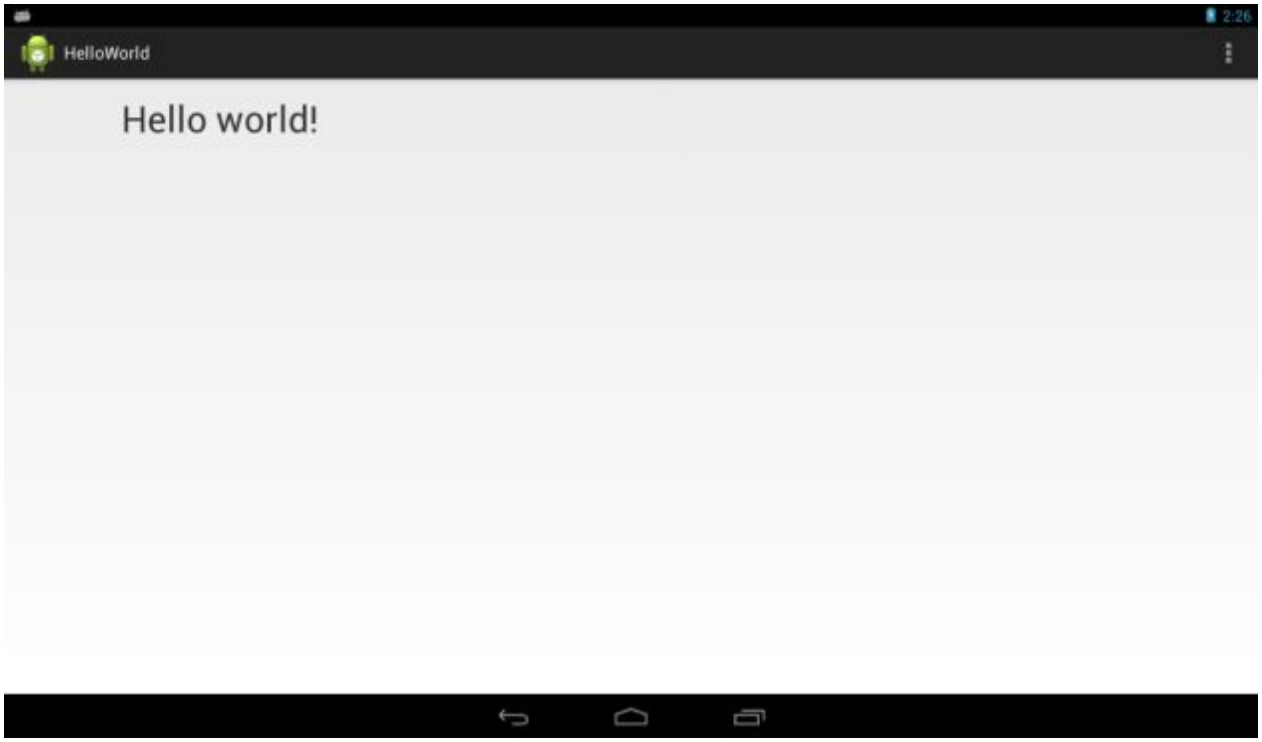


Figure 734: HelloWorld Program

**Note**

> If the USB is not configured as an OTG model, you can copy and install the file `HelloWorld.apk` from the project folder `HelloWorld/bin/`, or install the `HelloWorld.apk` via the internet (See Adb connect via internet).

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