



# MediaTek X20 96Boards Android 开发入门

*ArcherMind*

诚迈科技(南京)股份有限公司  
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# 目录

MediaTek X20 96Boards 介绍

安卓系统开发

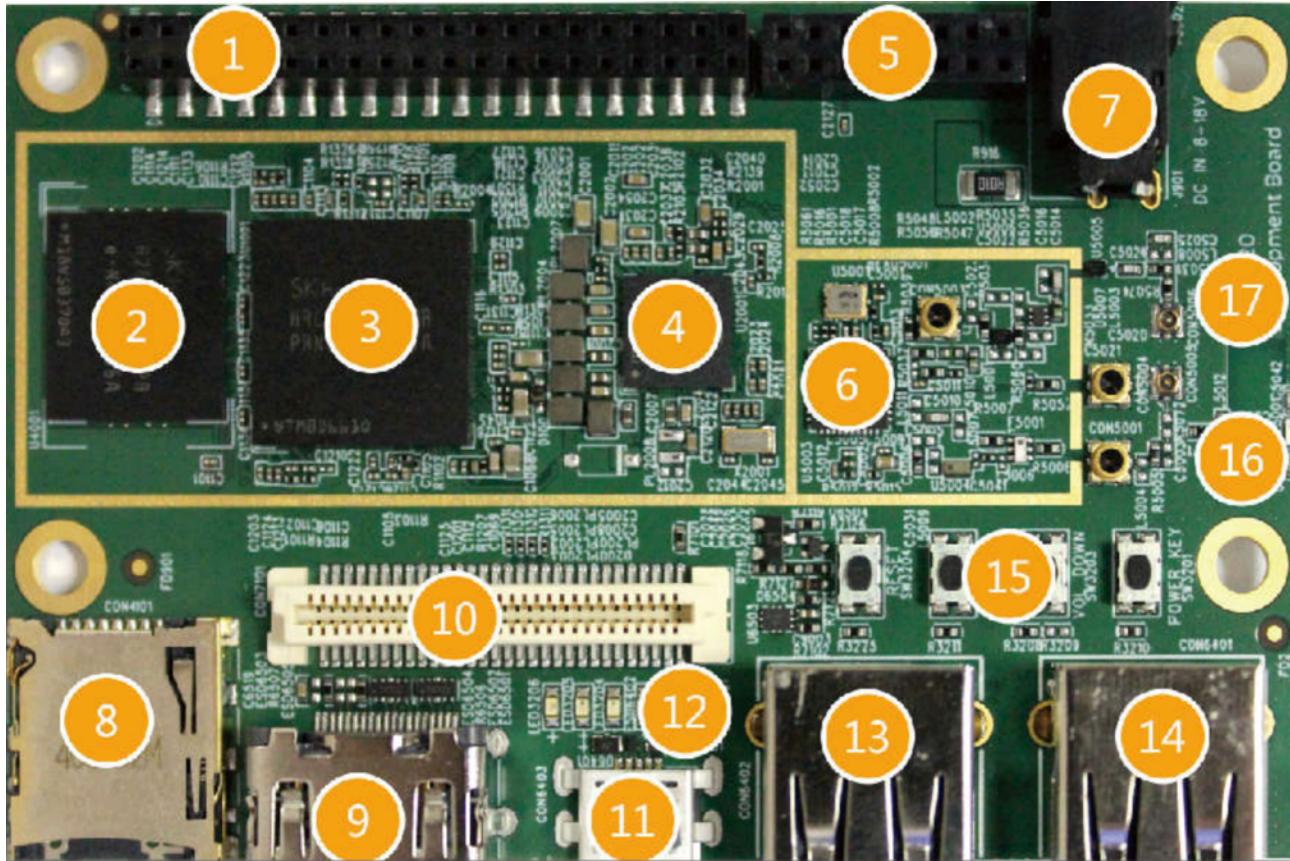


是为所有人，包括学生，研究人员，业余爱好者，黑客，工程师，开发商，发明家和创新者，开放源代码，遵循 Linaro 96Boards 规范。

- X20 96Boards 是一个运行Android系统、搭载64位十核处理器的开发板，给创客带来全新的开源体验
- 通过该开发板，您可以开发解决方案原型产品，如无人机，机器人，移动POS，VR等

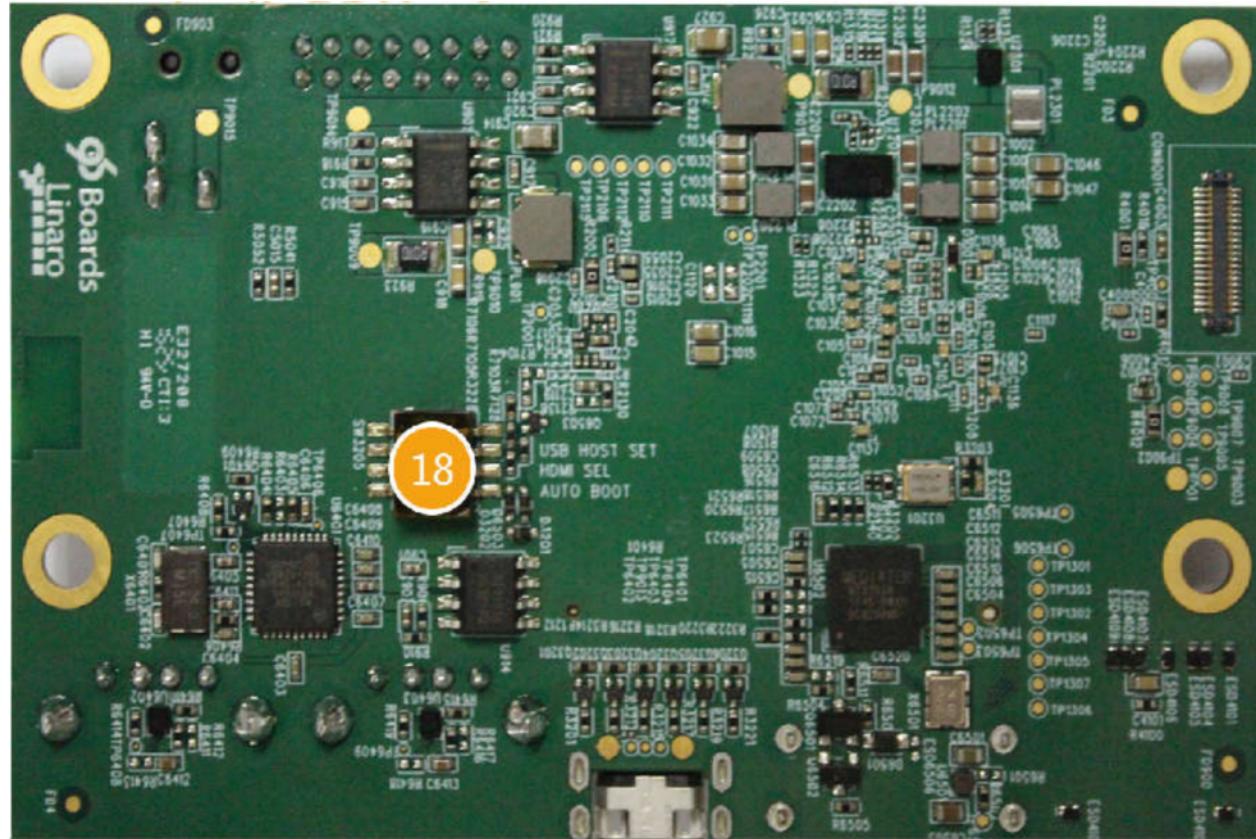


# X20 96Boards 正视图



1. 40 Pins Low Speed Expansion CNT
2. 8GB EMMC
3. X20 SoC + 2GB LPDDR3 SDRAM
4. MT6351 PMU
5. 16 Pins Analog Expansion CNT
6. WLAN/BT/GPS/FM
7. DC In Jack
8. Micro SD Card Slot
9. HDMI Female A Port
10. 60 Pins High Speed Expansion CNT
11. Micro USB (Device)
12. 4 x User LEDs (Green) / WLAN LED (Yellow) / BT LED (Blue)
13. USB 2.0 (Host)
14. USB 2.0 (Host)
15. Key: Power/Vol-/Vol+/Reset
16. BT/WLAN Ant. Connector
17. GPS Ant. Connector

# X20 96Boards 底视图



## 18. Switch

- ① AUTO BOOT
- ② HDMI SEL
- ③ USB HOST SET
- ④ USER

# 开发板结构图

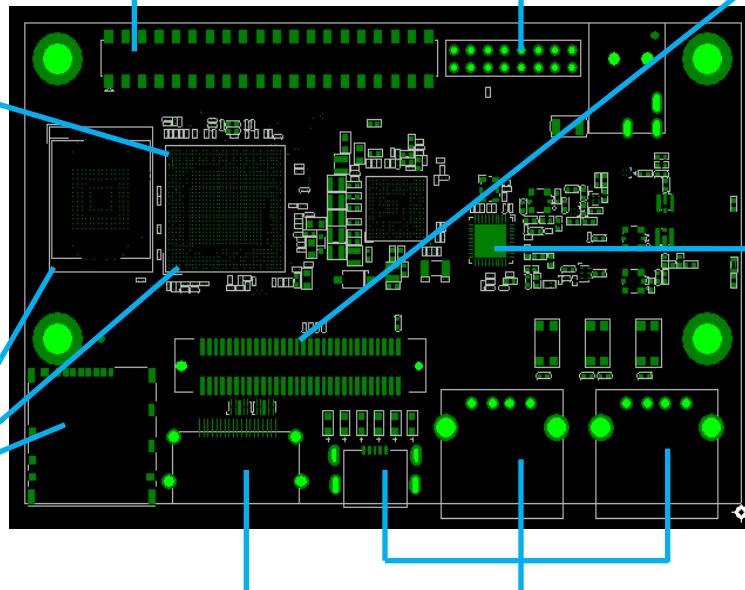
## A wide array of expansion capability

### AP MT6797

Dual-core ARM@Cortex-A72 at up to 2.3GHz  
Quad-core ARM@Cortex-A53 at up to 1.95GHz  
Quad-core ARM@Cortex-A53 at up to 1.4GHz

### Memory and Storage

2GB LPDDR3  
8GB EMMC5.1  
Micro SD card slot



### Integrated Connectivity

WIFI /BT/GPS

### I/O Interfaces

HDMI Full-size Type-A connector	1xUSB2.0 micro B(Device mode) 2xUSB2.0 Type A(Host mode)
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# 扩展接口定义

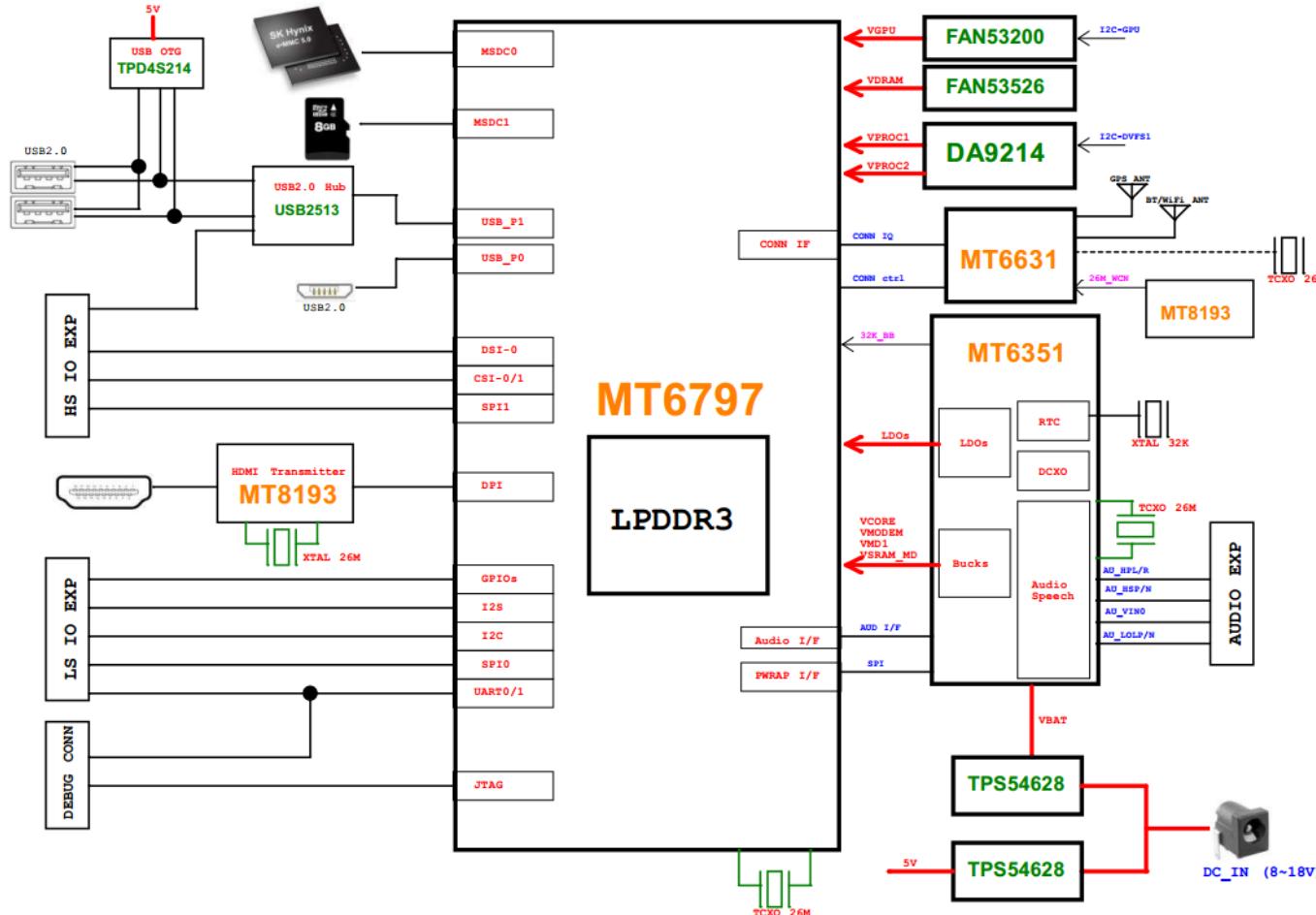
## ■ 40针低速数字接口

- UART 0
- UART 1
- I<sup>2</sup>C 0
- I<sup>2</sup>C 1
- GPIO A~L
- SPI 0
- PCM/I<sup>2</sup>S

## ■ 60针高速数字接口

- MIPI DSI 0
- MIPI CSI 0
- MIPI CSI 1
- I<sup>2</sup>C 2
- I<sup>2</sup>C 3
- SD/SPI

# X20 96Boards 功能框图



# X20 96Boards 规格

项目	参数
CPU	MT6797 64-bit 十核 2x Cortex-A72 @ 2.1GHz ~ 2.3GHz 4x Cortex-A53 @ 1.85GHz 4x Cortex-A53 @ 1.4GHz
多合一芯片	MT6631 •WLAN 802.11a/b/g/n 2.4GHz and 5GHz(On-board BT and WLAN antenna ) •Bluetooth 4.1 +HS compliant • GPS (with antenna connector)
图形处理器	ARM Mali-T880 MP4 700MHz
多媒体	32MP @ 24fps / 25MP @ 30 fps WQXGA 2560×1600 60fps FHD 1920×1080 120fps 4Kx2K 30fps H.265 w/HDR
内存&存储	2GB LPDDR3 2CH,933MHz 8GB EMMC5.1

扩展存储接口	支持Micro SD card(SD3.0)
HDMI接口	HDMI Full-size Type-A , 支持1080P@ 30 fps
USB接口	1xUSB2.0 high speed micro B(Device mode) 2xUSB2.0 high speed Type A(Host mode)
IO扩展接口	One 40-pin Low Speed (LS) expansion connector <ul style="list-style-type: none"> <li>● UART, SPI, I2S, I2C x2, GPIO x12, DC power</li> </ul> One 60-pin High Speed (HS) expansion connector <ul style="list-style-type: none"> <li>● 4L-MIPI DSI, USB, I2C x2, 2L+4L-MIPI CSI</li> </ul> one optional 16-pin analog expansion connector for stereo headset/line-out, speaker and analog line-in
用户接口	4个机械按键：Power/Reset/Volume Up/down 6 LED 指示灯： <ul style="list-style-type: none"> <li>● 4 -user controllable</li> <li>● 2 -for radios (BT and WLAN activity)</li> </ul>
供电	DC JACK INPUT +8V ~ +18V
操作系统	Android Marshmallow 6.0
尺寸	85mm × 54mm

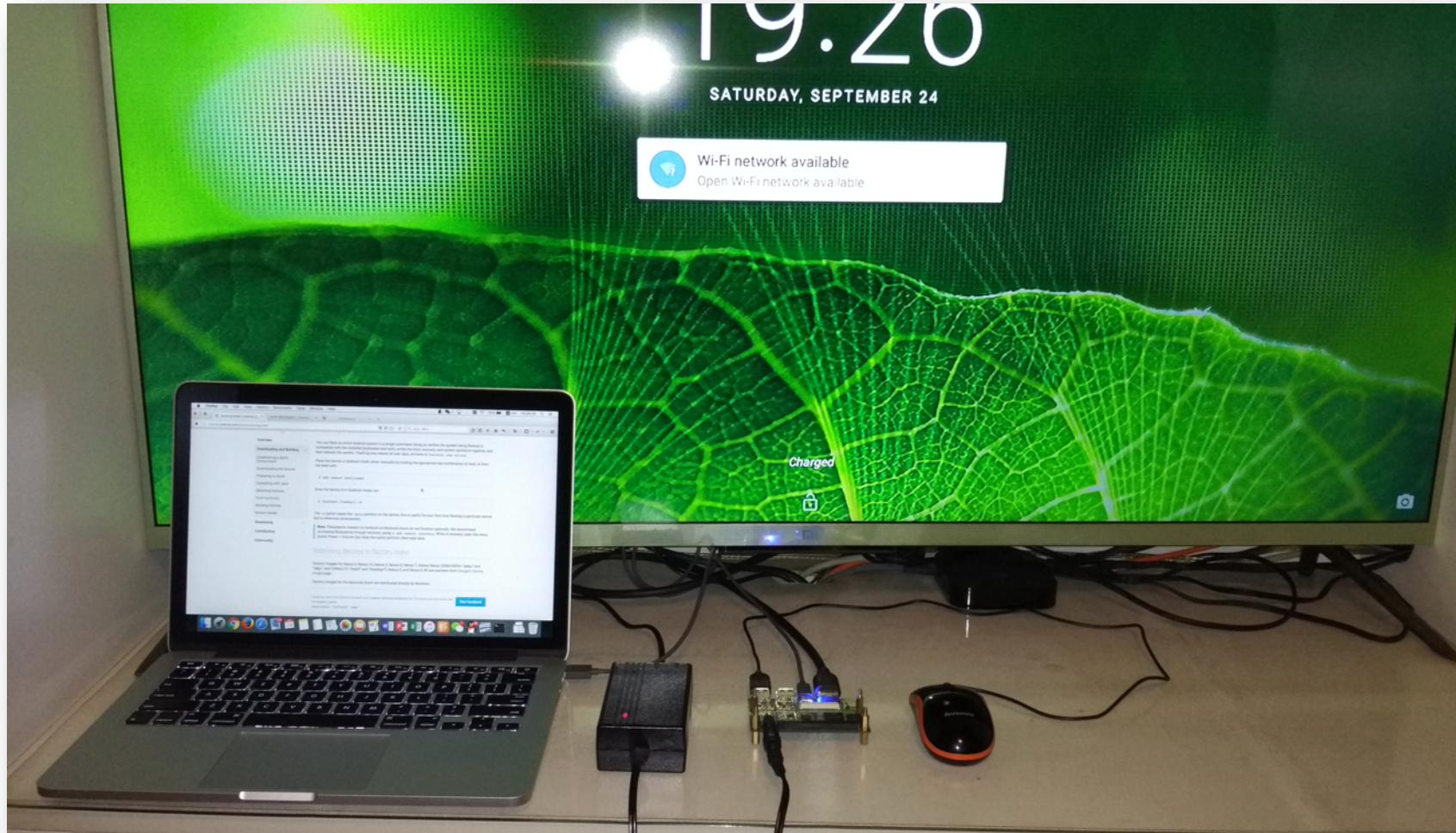
# 周边外设

- 12V@2A电源适配器
- 带HDMI接口的显示器
- HDMI连接线
- Micro USB 连接线
- USB鼠标

- 额外
  - LCM子板
  - Camera子板
- 96Boards Mezzanine
  - <http://www.96boards.org/products/mezzanine/>



# Demo环境展示



# 硬件开发

- [Schematic Diagram](#)
- [Board Placement](#)
- [BOM](#)
- [GPIO Interface Denfinition](#)
- [Hardware User Manual](#)
- [2D Drawing](#)

# 安卓系统开发



# 编译环境

- 参考AOSP官网
  - <http://source.android.com/source/initializing.html>
- 关键点
  - 根据可靠性测试，推荐安装Ubuntu LTS 14.04系统作为Android 6系统开发和编译环境
  - 安装JDK 7

```
$ sudo apt-get update  
$ sudo apt-get install openjdk-7-jdk
```

- 安装必须的工具包

```
$ sudo apt-get install git-core gnupg flex bison gperf build-essential \  
zip curl zlib1g-dev gcc-multilib g++-multilib libc6-dev-i386 \  
lib32ncurses5-dev x11proto-core-dev libx11-dev lib32z-dev ccache \  
libgl1-mesa-dev libxml2-utils xsldproc unzip
```

- 设置独立的编译输出目录

```
$ export OUT_DIR_COMMON_BASE=<path-to-your-out-directory>
```

# 源代码

## ■ 下载源代码

### ➤ 安装Repo工具

```
$ mkdir ~/bin  
$ PATH=~/bin:$PATH  
$ curl https://storage.googleapis.com/git-repo-downloads/repo > ~/bin/repo  
$ chmod a+x ~/bin/repo
```

### ➤ 下载AOSP代码

```
$ repo init -u https://android.googlesource.com/platform/manifest -b android-6.0.0_r1  
$ repo sync -j8
```

### ➤ 下载Linux Kernel

```
$ git clone https://github.com/helio-x20/linux.git
```

### ➤ 下载MediaTek X20 96Boards SLA

```
$ curl https://builds.96boards.org/releases/helio-x20 MEDIATEK/aosp/latest/sla.tar.gz
```

## ■ 合并代码

```
$ mv linux my_android/kernel-3.18  
$ tar -vxfz sla.tar.gz  
$ cp -rf sla/* my_android/
```

# 编译ROM镜像包

## ■ 环境清理

```
$ make clobber
```

## ■ 设置环境变量

```
$ source build/envsetup.sh
```

## ■ 选择目标平台

```
$ lunch full_amt6796_64_open-eng
```

## ■ 编译代码

```
$ make -j8
```

# 工具与下载镜像

## ■ 工具: xflash (由MediaTek提供)

```
$ cp xflash ~/bin/  
$ chmod 755 ~/bin/xflash  
$ cp libxflash-lib.so /usr/lib/  
$ chmod 644 /usr/lib/libxflash-lib.so
```

## ■ 工具: fastboot

```
$ sudo apt-get install android-tools-fastboot
```

## ■ 下载镜像

```
$ xflash enter-fastboot MT6797_Android_scatter.txt  
$ fastboot devices  
$ fastboot flash gpt PGPT  
$ fastboot flash preloader preloader_amt6797_64_open.bin  
$ fastboot flash recovery recovery.img  
$ fastboot flash scp1tinysys-scp.bin  
$ fastboot flash scp2tinysys-scp.bin  
$ fastboot flash lk lk.bin  
$ fastboot flash lk2 lk.bin  
$ fastboot flash boot boot.img  
$ fastboot flash logo logo.bin  
$ fastboot flash tee1 trustzone.bin  
$ fastboot flash tee2 trustzone.bin  
$ fastboot flash system system.img  
$ fastboot flash cache cache.img  
$ fastboot flash userdata userdata.img  
$ fastboot reboot
```

# 安装应用

## ■ 工具: adb

```
$ sudo apt-get install android-tools-adb  
$ echo "0x0e8d" > ~/.android/adb_usb.ini
```

## ■ 安装应用

```
$ adb install antutu-6.2.1.apk  
$ adb install antutu-3d-6.1.1.apk  
$ adb install 3dmark-android-v-1-5-3285.apk  
$ adb install opencl-z-1.0.1.apk
```

# 如何调试？

## ■ 调试用户自定义LED指示灯

- 关闭LED指示灯

```
$ sudo echo off > /sys/class/misc/96board_leds/96_led0  
$ sudo cat /sys/class/misc/96board_leds/96_led0
```

- 打开LED指示灯

```
$ sudo echo on > /sys/class/misc/96board_leds/96_led0  
$ sudo cat /sys/class/misc/96board_leds/96_led0
```

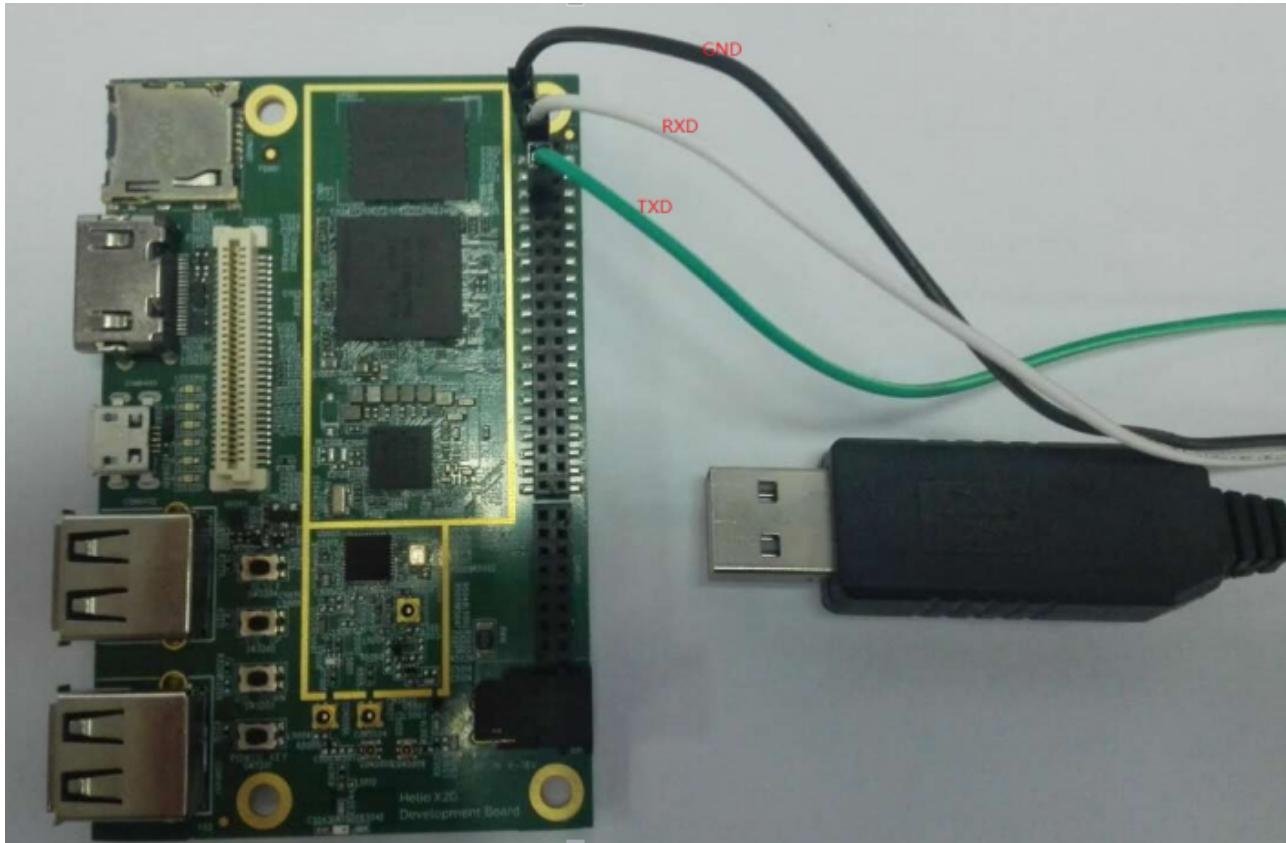
## ■ 获取安卓调试日志

- logcat: get the Android debug log via adb

```
$ adb logcat > ~/x20_logcat.log
```

# 如何调试 (续) ?

- 通过UART接口获取内核日志





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