OSC源创会

年终盛典 2016

Huawei LiteOS

The Open Source Operating System for IoT

Build a Better Connected World with Developers

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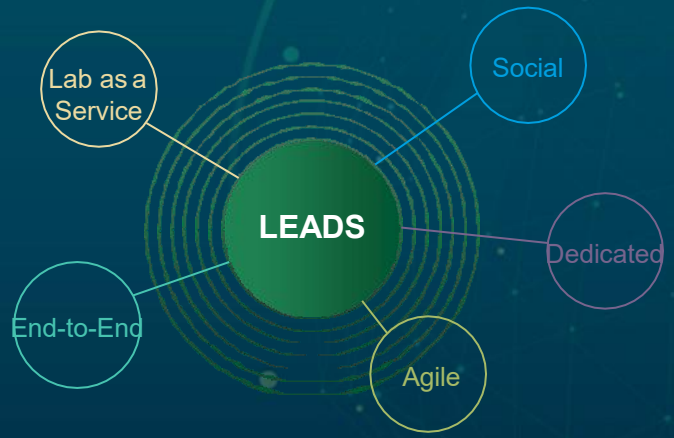

The LEADS concept is redefining Developer experience (DX)

US
$1Billion
in **5** YEARS

To develop an open enablement platform, improving developer experience

Dedicate

To dedvelop an open enablement platform, improving developer experience

Huawei LiteOS Enable Things More Intelligent

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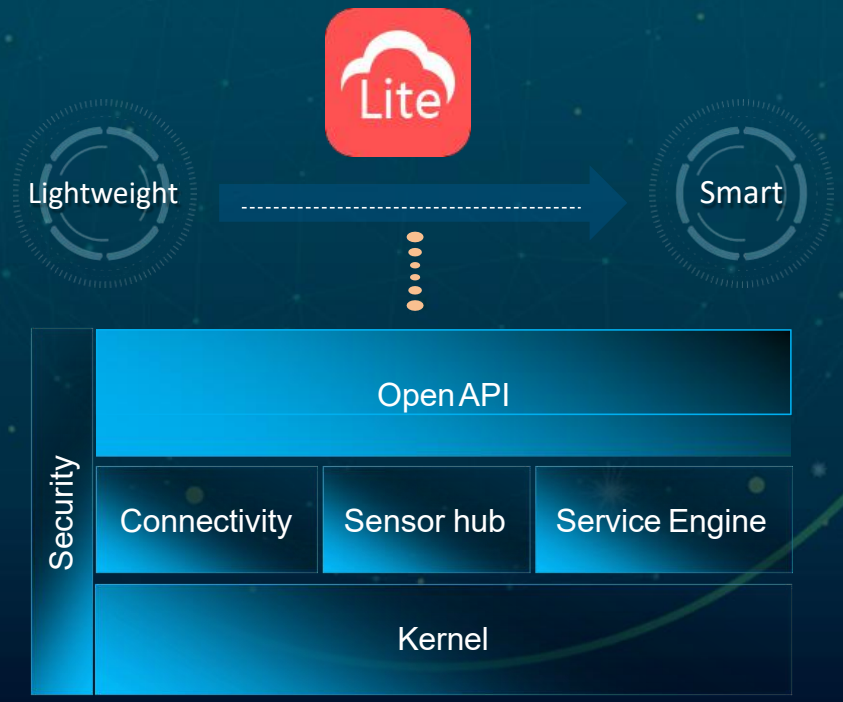
Huawei LiteOS

[KB kernel]

[mW power]

[mS response]



Lightweight Kernel + N Frameworks

[Better Sensing]

- Small Kernel
- Lower latency
- Lower Consumption

[Better Connecting]

- Multi-protocols supported
- Mesh network

[Simple Developing]

- High-level lauguage for development
- Re-Active programming model

Lighter, Lower Power, Faster Response

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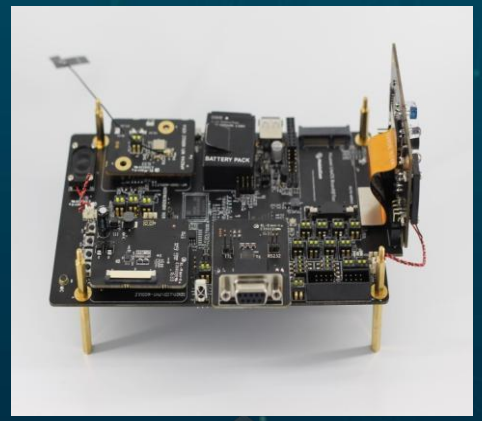
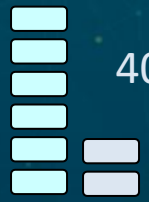
Smart Camera



Huawei LiteOS + HiSilicon

[Start-up speed： 1 / 8]



400ms

Cold start to the preview:

[Power： 2 / 3]

30m **60m** **90m** **120 m**

1080p recording scene, 1000mAh battery capacity

Lower Latency, Higher Precision
SensorHub Framework Makes Sensors Smarter

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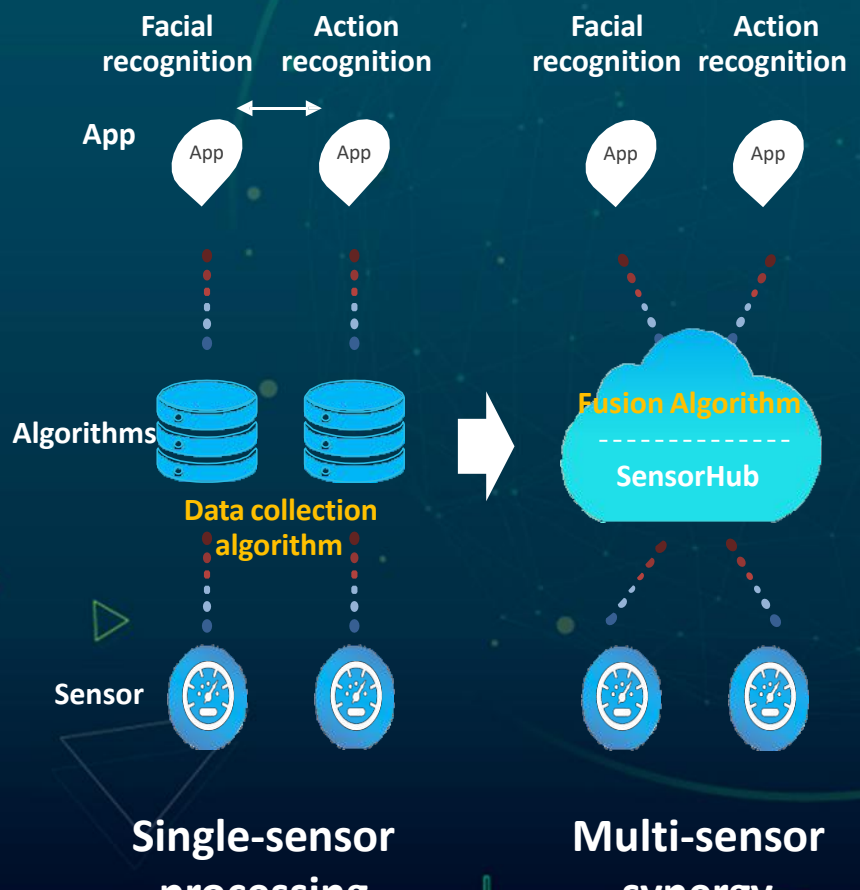
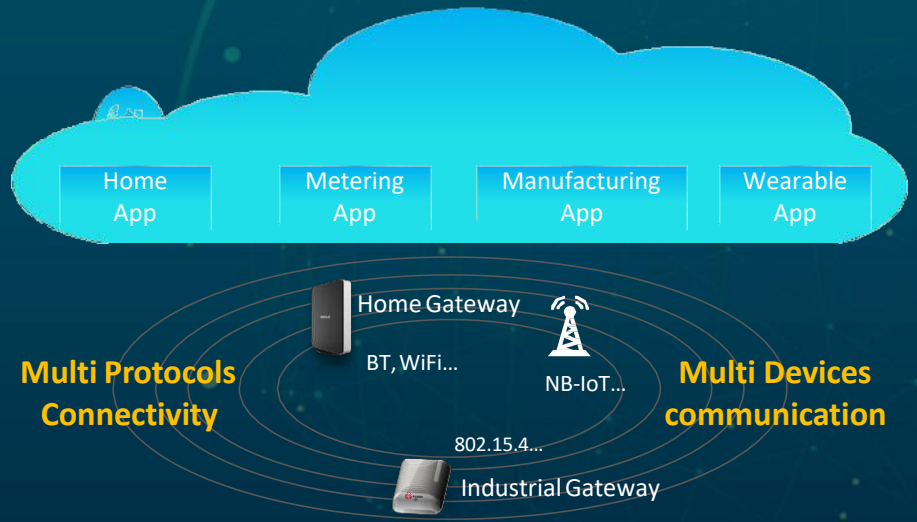


Single-sensor processing

Multi-sensor synergy

- ↓50% delay
- 2X+ accuracy
- collection algorithm -> fusion algorithm

Better Connecting, Multi-Protocols Supported



- **Self healing network**
- **Mesh Large-scale networking**
- **Multi-processor support system architecture**

Home Profile

Manufacturing Profile

Wearable Profile

An App-framework for IoT, delivers performance and low power like C

FPS: 38 CPU: 5

Frame per sec CPU usage (%)

MapleJS version

VS

FPS: 43 CPU: 3

Frame per sec CPU usage (%)

C version

Huawei LiteOS, Reduce Metering Cost

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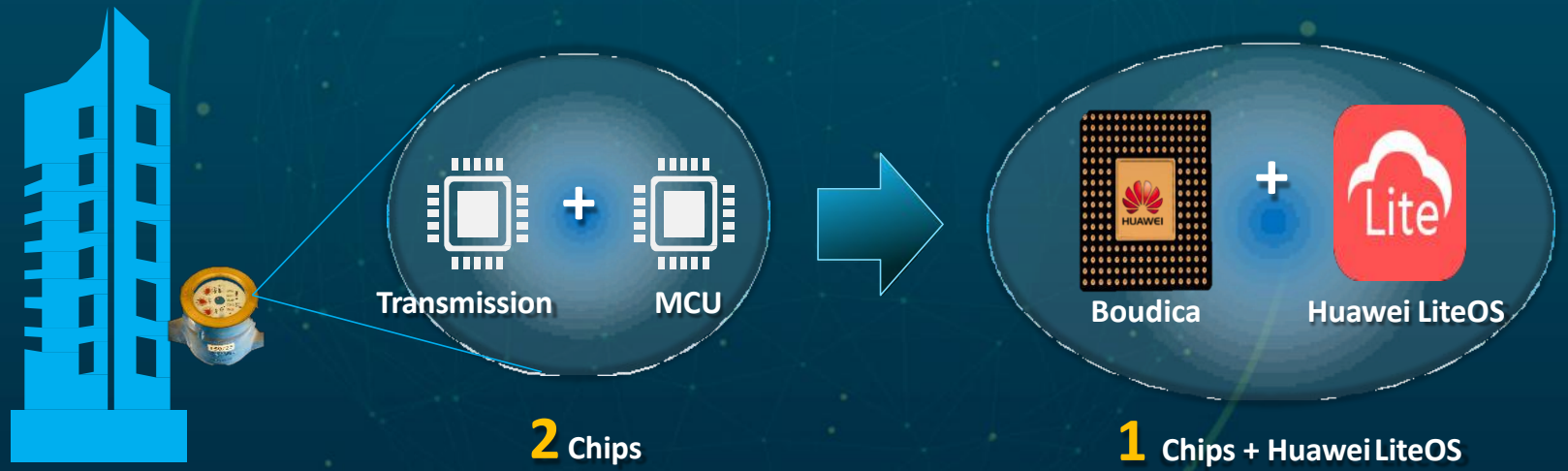

- Huawei LiteOS instead of MCU, reduce cost
- Low power consumption, about 10 years

Huawei LiteOS, Saving Energy For Smart Lighting

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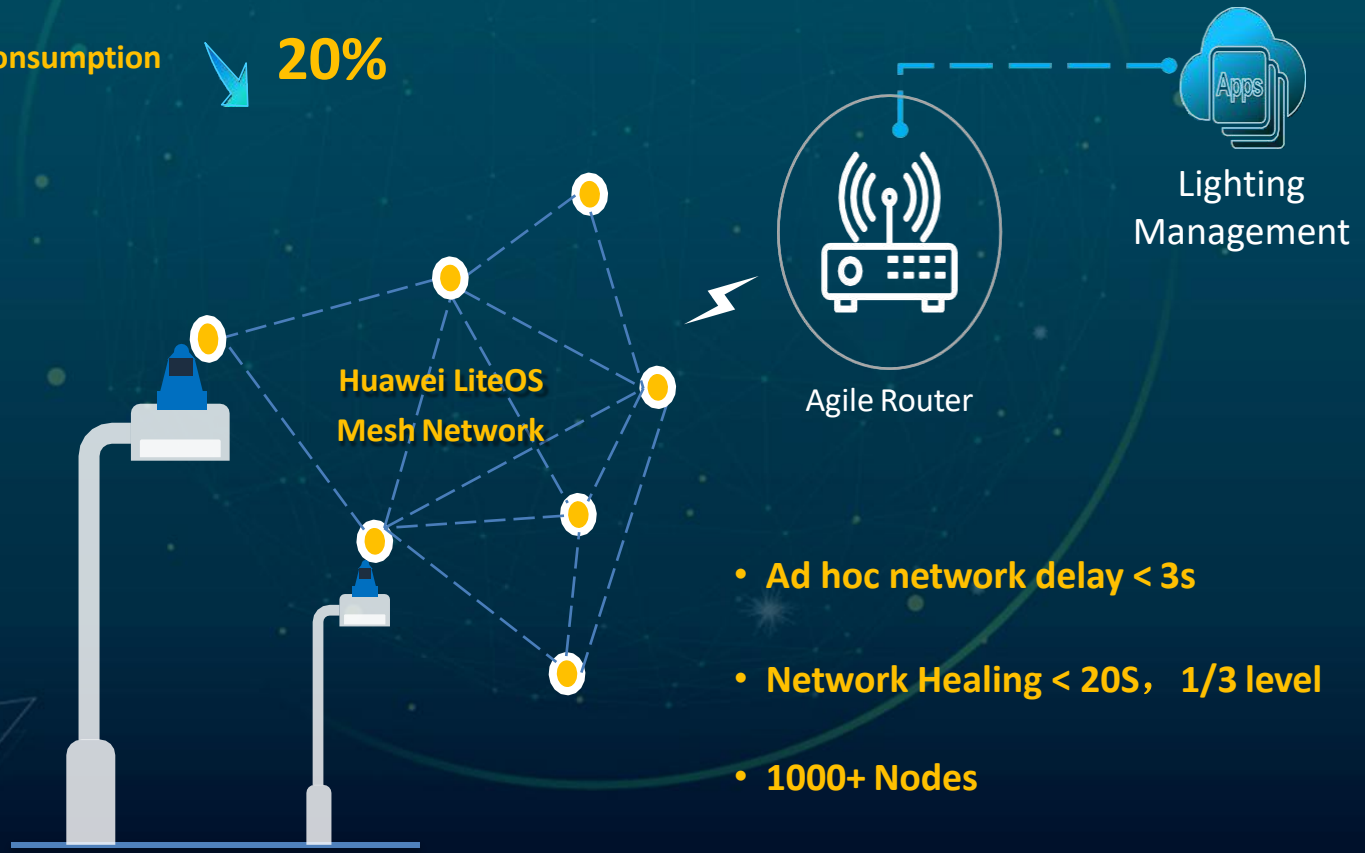
Operation cost ↘ 50%

Energy Consumption ↘ 20%



- Ad hoc network delay < 3s
- Network Healing < 20S， 1/3 level
- 1000+ Nodes

Huawei LiteOS Community, Helping Partners Innovating

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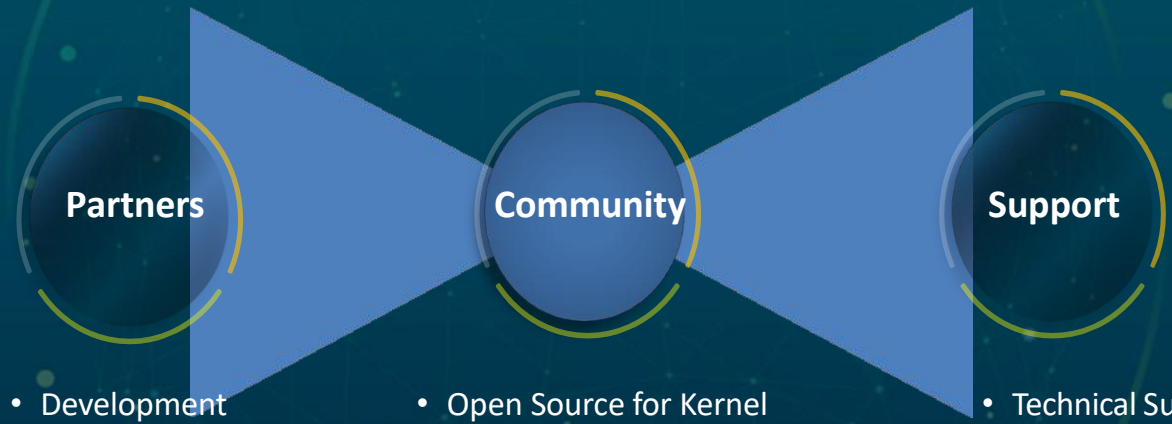
Open Source, Commercialized directly



- Development
- Open Source for Kernel
- Open SDK
- Hardware Developing Board
- Technical Support
- Test, Authentication

Remote Lab | Open Source/API | Support | IDE | Authentication

How to get Huawei LiteOS ?

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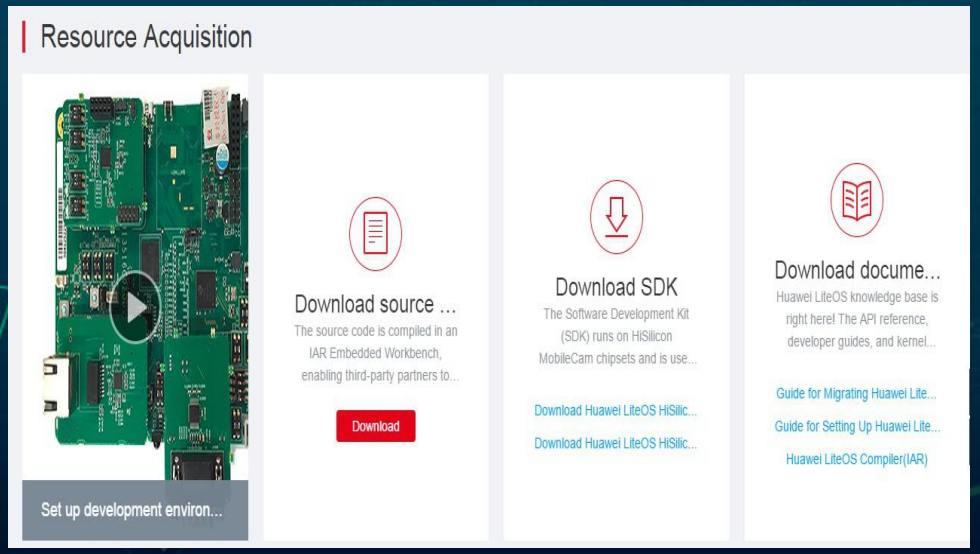
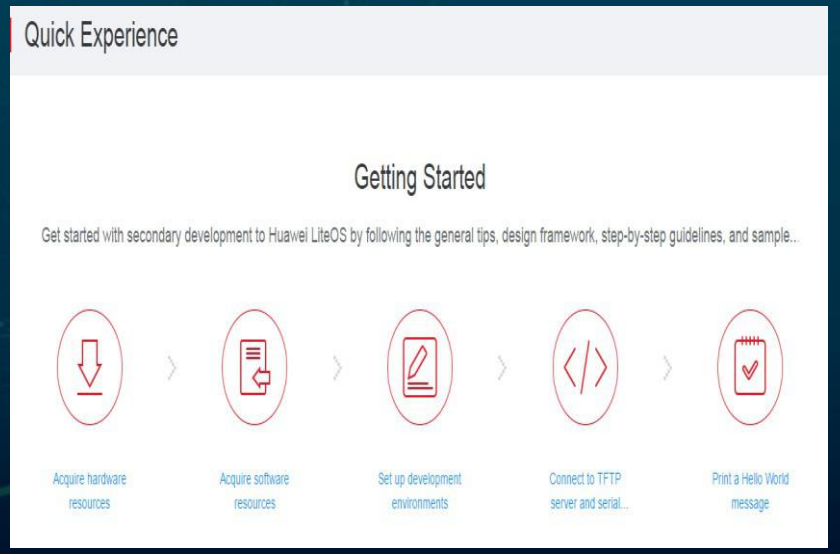
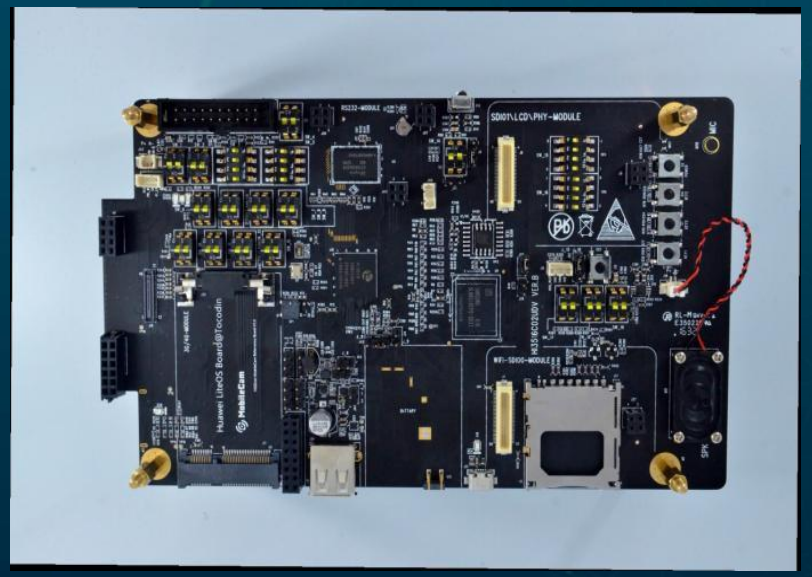
➢Huawei LiteOS developer community
http://developer.huawei.com/ict/en/site-iot/product/liteos

- LiteOS Kernel source code and SDKs
- Developer Guide： video and technical documents
- Evaluation boards introduction

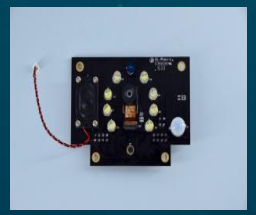




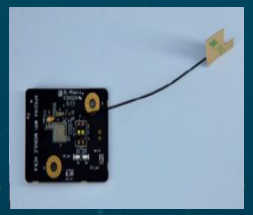
Huawei LiteOS MobileCam board introduction



Mainboard



Sensor Board



WIFI Board

Ethernet Board

LCD Board

UART Board

Contact us

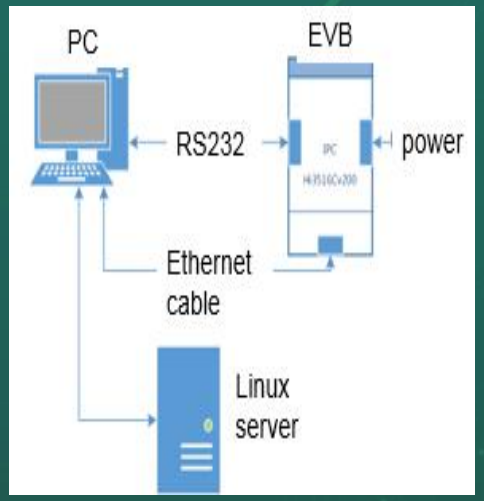
http://developer.huawei.com/ict/cn/events/site-iot-workshop2016-liteos

Any questions or suggestions, please fell freely to contact us:

- From Huawei LiteOS development community “Development Queries”
- Or sent email to “liteos@huawei.com”

Q & A

Create a “hello word” task with MobileCam board



Set up hardware environments

```
build                2016/8/23 10:33
compat               2016/8/23 10:33
doc                  2016/8/23 10:33
drivers              2016/8/23 10:33
fs                   2016/8/23 10:33
kernel               2016/8/23 10:33
lib                  2016/8/23 10:34
net                  2016/8/23 10:33
out                  2016/8/23 10:33
platform             2016/8/23 10:33
sample               2016/8/23 10:33
shell                2016/8/23 10:33
test                 2016/8/23 10:33
tools                2016/8/23 10:33
.config              2016/8/17 17:50
config.mk            2016/8/17 17:35
liteos.ld            2016/8/17 17:35
Makefile             2016/8/17 17:54
```

Download LiteOS code from community

```
ifeq ($(LOSCFG_COMPAT_POSIX), y)
    LITEOS_SCATERLIB += -lposix
    LIB_SUBDIRS      += compat/posix
    LITEOS_INCLUDE   += \
        -I $(LITEOSTOPDIR)/compat/posix/include \
        -I $(LITEOSTOPDIR)/compat/posix/src
    LITEOS_CFLAGS    += -DLOSCFG_COMPAT_POSIX
    LITEOS_MACRO     += -DLOSCFG_COMPAT_POSIX
endif

ifeq ($(LOSCFG_COMPAT_LINUX), y)
    LITEOS_SCATERLIB += -llinuxadp
    LIB_SUBDIRS      += compat/linux
    LITEOS_INCLUDE   += -I $(LITEOSTOPDIR)/compat/linux/include
    LITEOS_CFLAGS    += -DLOSCFG_COMPAT_LINUX
    LITEOS_MACRO     += -DLOSCFG_COMPAT_LINUX
endif
```

Config compiler like arm- huaweiliteos-linux-gcc on Linux server

Set up software environments

```
__attribute__((weak)) void app_init(void)
{
    dprintf("proc fs init ...\n");
#ifdef LOSCFG_FS_PROC
    proc_fs_init();
#endif
#ifdef LOSCFG_SHELL
#ifndef UART_WITHOUTVFS
    hi_uartdev_init();
    system_console_init(TTY_DEVICE);
#endif
#ifdef LOSCFG_SHELL
    extern unsigned int osShellInit(void);
    extern void shell_cmd_register(void);
    osShellInit();
    shell_cmd_register();
#endif
```

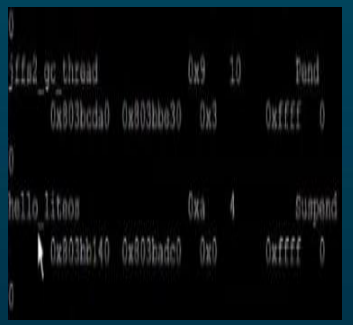
Find “app_Init,” and begin your journey with LiteOS

```
/*Demo interface, create your task there*/
UINT32 user_myhello(VOID)
{
    UINT32 uwRet;
    TSK_INIT_PARAM_S stInitParam;

    stInitParam.pfnTaskEntry = (TSK_ENTRY_FUNC)Example_Task;
    stInitParam.usTaskPrio = TSK_PRIOR_HI;
    stInitParam.pcName = "hello_liteos";
    stInitParam.uwStackSize = 0x400;
    stInitParam.uwResved  = OS_TSK_DETACHED;
    /*Create a task*/
    uwRet = LOS_TaskCreate(&g_uwTskHiID, &stInitParam);
    if (uwRet != LOS_OK)
```

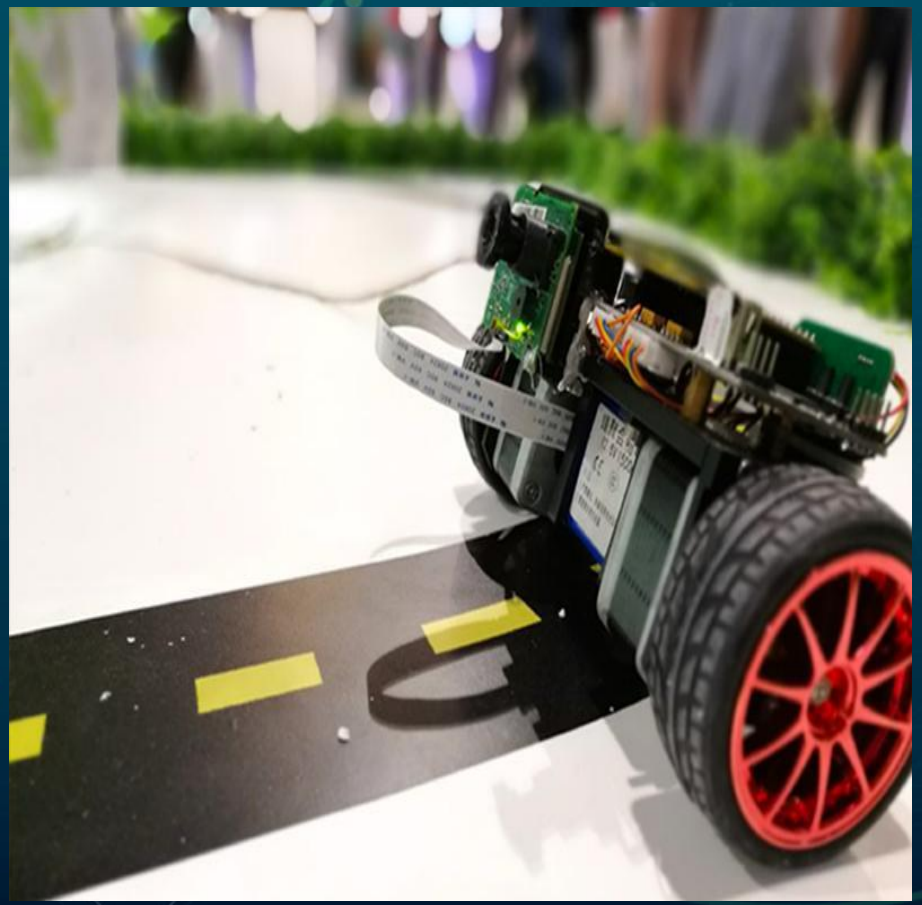
Create a new task, compile the project and porting the Bin file to the board.

Realize your idea with LiteOS



Run the board and you can find the “hello word” task is created.

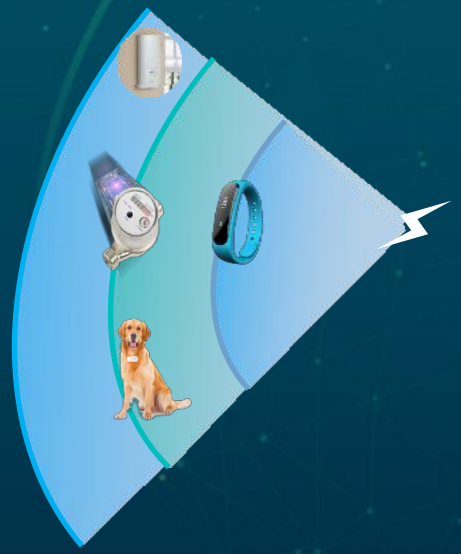
LiteOS Demo: Balanced car for video surveillance



With LiteOS and it's connection SDKs, we can see:

- Seamless connecting(Zero-configuration) to gateway and controller(phone) via WIFI.
- Fast response to the control command.
- Fast development(<2 weeks, 2 people).

Better Connecting, Multi-Protocols Supported



Huawei
LiteOS+NB-IoT

- ✓ Metering app
- ✓ Tracking
- ✓ Lighting
- ✓ ...

IoT Gatway

Wifi，BT，
802.15.4，
PLC，
Zigbee...

Simple control

Huawei LiteOS
intelligent
control