Hack In The Box

开源硬件在安全研究中的应用

Applications of Open Source Hardware in Security Research

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About Me

- Maliang
- Nsfocus　GeWu Lab
- Over 10 years of experience in embedded development in the IoT, telecom and industrial control systems.
- Now a security researcher on industrial IoT security at NSFOCUS.

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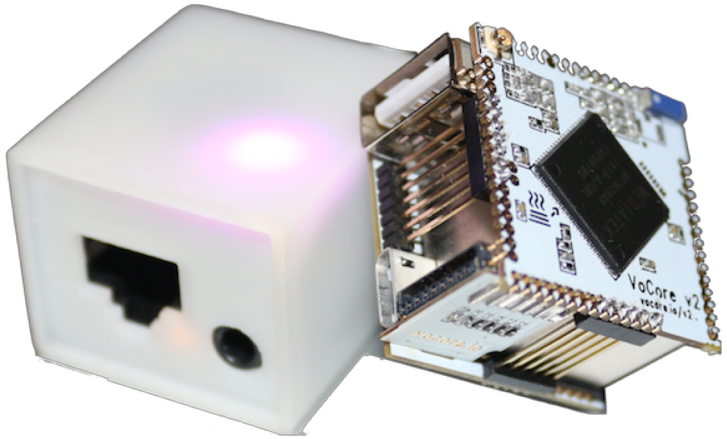
Overview

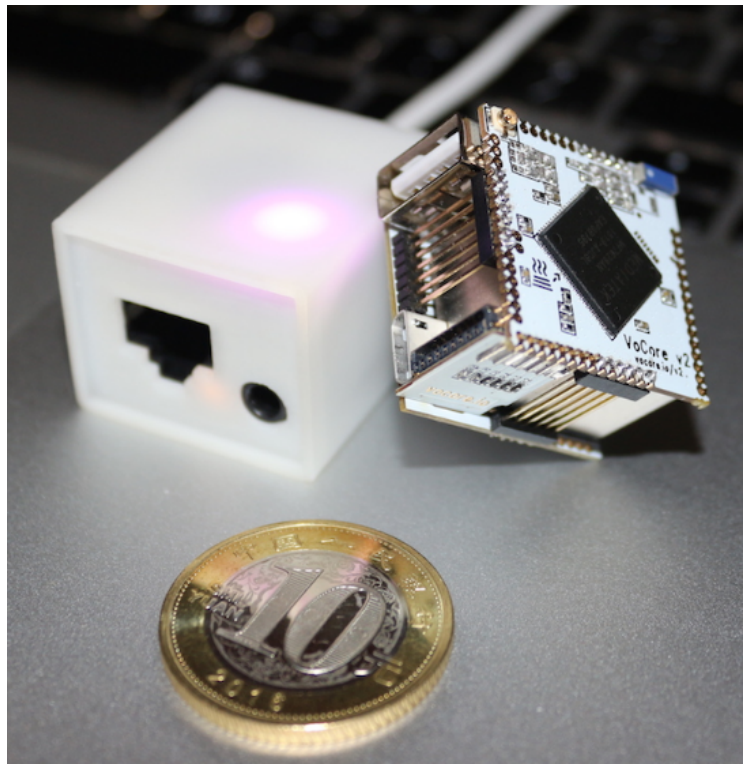
- Introducing a fun open source hardware: VoCore2
- Introduce embedded Linux build process
- Introduce the build process of OpenWRT



- Introduce three application scenarios of VoCore2 in security.
- I hope everyone will have fun from open source hardware projects.

Introduction to VoCore2

- VoCore2is a crowdfunding project (open source)
- http://vocore.io/v2u.html
- Priced at $11.99 (¥250)
- CPU : 580 MHz, MIPS
- RAM : 128MB
- FLASH : 16MB
- 300Mbps Wi-Fi
- Ethernet interface
- USB 2.0 port
- Micro SD slot
- audio port
- GPIO



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Overview

- VoCore2 is open hardware and runs OpenWrt.
- It has WIFI, USB, UART, 20+ GPIOs but is only one inch square.
- You will not only get the VoCore2 but also its full hardware design including schematic, circuit board, bill of materials; full source code (including boot loader), operating system (openwrt) and applications.
- It will help you to make a smart house, study Pwn, study embedded system or even make the tiniest router in the world.

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Construction of embedded Linux system

- Create a Linux cross-compilation environment
- Create a bootloader
- Porting the Linux kernel
- Create Rootfs (root file system)
- Write and install drivers
- Write and install software
- Firmware package

Open source hardware overview

Construction of embedded Linux system

Construction of OpenWRT system

Several typical applications of VoCore2 in security

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Introduction to OpenWRT

- The OpenWrt Project is a Linux operating system targeting embedded devices.
- Instead of trying to create a single, static firmware, OpenWrt provides a fully writable filesystem with package management.
- This frees you from the application selection and configuration provided by the vendor and allows you to customize the device through the use of packages to suit any application.
- For developers, OpenWrt is the framework to build an application without having to build a complete firmware around it;
- for users this means the ability for full customization, to use the device in ways never envisioned.

OpenWRT is highly integrated

- Cross compilation tool
- Linux kernel
- BusyBox
- File system
- Firmware driver
- Most used software
- Interface plugin
- …

VoCore2 and security-related compilation options

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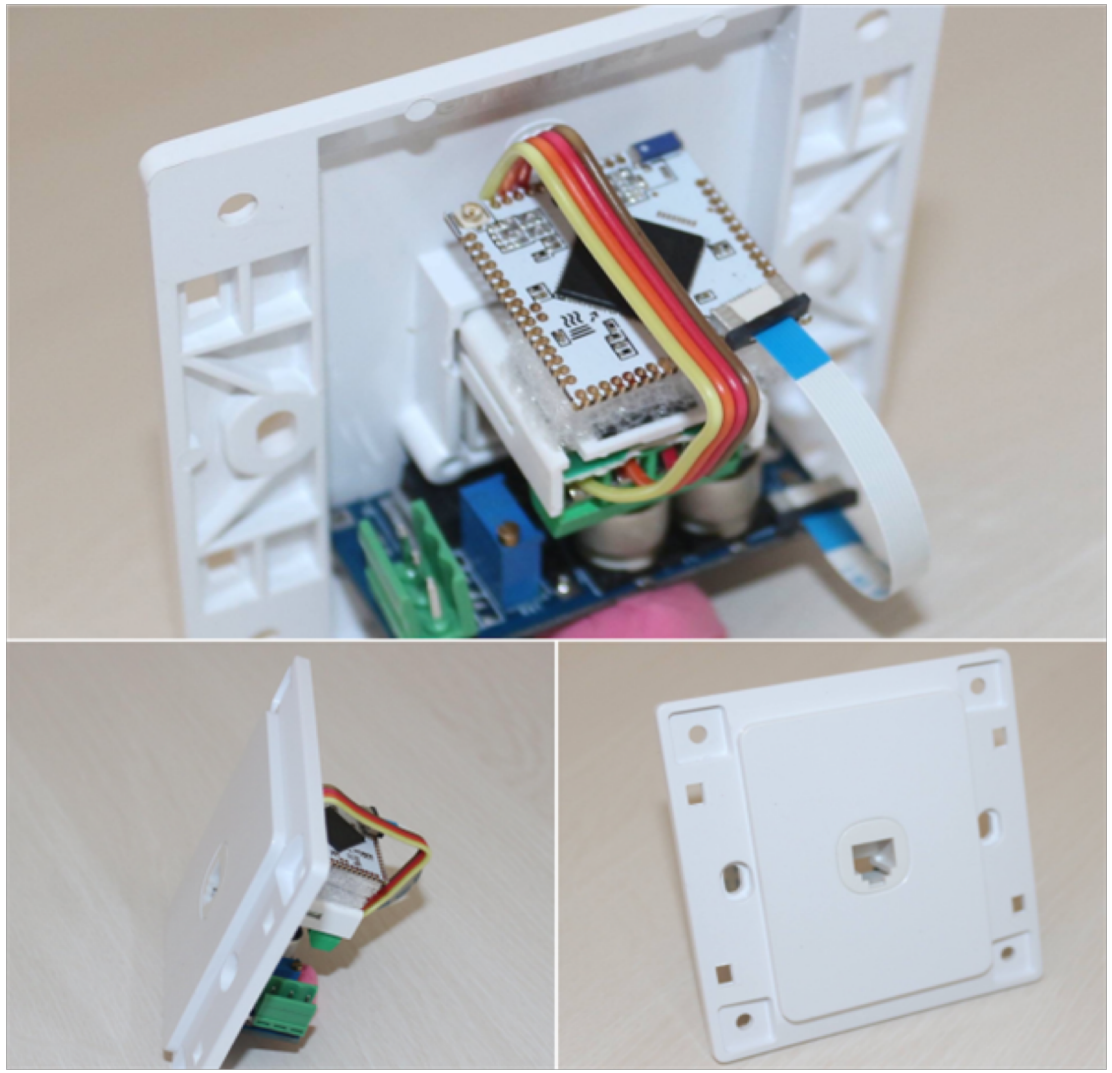
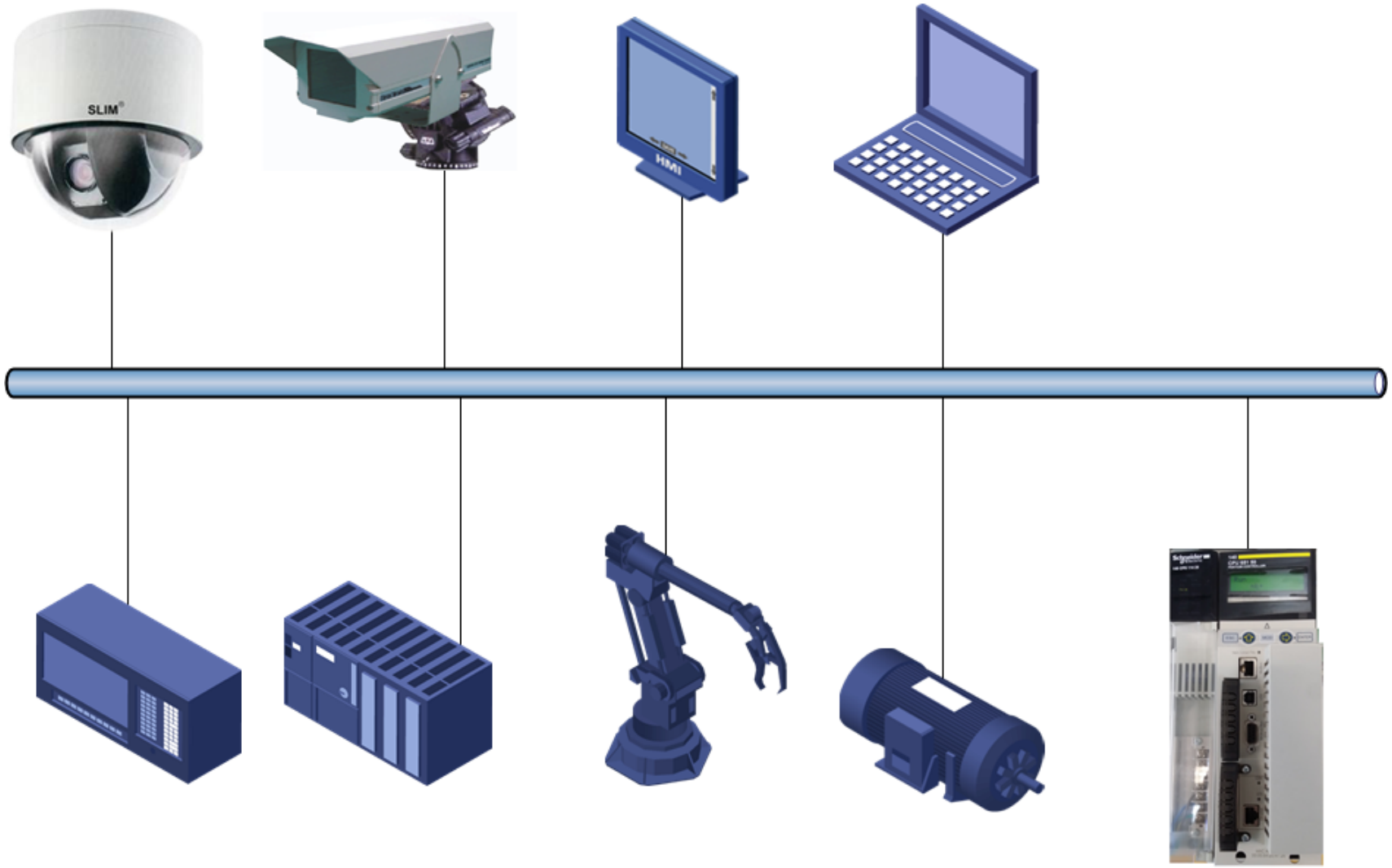
Trial environment for DIY vulnerability debugging

- VoCore2 is a system built by MIPS architecture
- At compile time, you can choose various debugging tools such as python, GDB, nc, etc.
- Can debug various MIPS vulnerabilities
- Used to practice Pwn topics

DIY hidden camera



Remote wireless penetration spy device case in industrial environment



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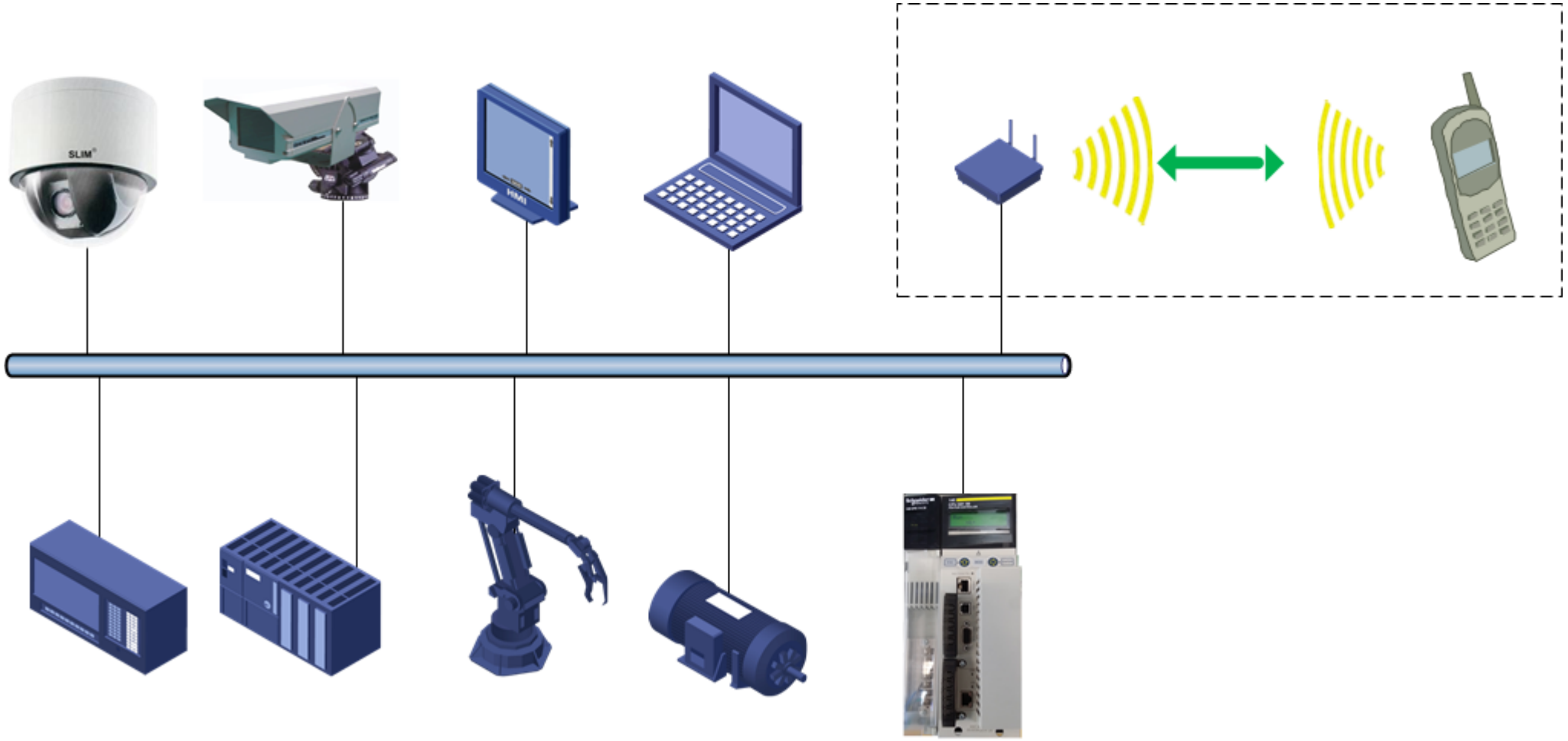

Remote wireless penetration spy device in industrial control environment

- Placing a clipped video

Thank You !

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