REMOTE CONTROL NACELLE FOR AERIAL PHTOTGRAPH

Industrial computing and instrumentation

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Introduction & Objective

The laboratory Archéorient has a technical center “SIG & Cartographie”. This technical center regularly uses aerial balloon and photography to take aerial photographs of archaeological site.

A camera is fixed in a nacelle, which is connected under a balloon in the air.

This nacelle supports 2-3 servo motors for rotation around the axes X, Y, as well as for triggering pictures.

Object: Design a system to remote control the servo motors and camera via Wi-Fi.

The key of this project is to analyze feasibility for remote control of an USB camera using materials given.

1-Remote USB by using standard product

Hardware:

- NetModule NB1600 – Programmable industrial mobile router for remote management
- OLYMPUS C770UZ – Digital camera which can be controlled through USB
- PC with windows OS

Software:

- Cam2com – Software to control C770UZ through USB cable installed in PC
- USBIP service – USB device sharing system over IP network integrated in NB1600
- USBIP client – Virtual USB bus driver installed in PC

NetModule NB1600

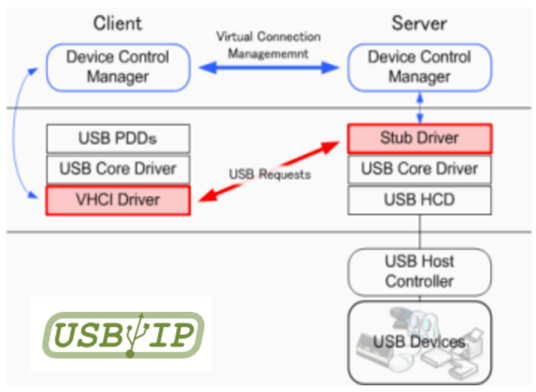
OLYMPUS C770UZ

USB

TCP/IP

PC with windows OS

USB/IP Design Overview



USBIP Supported Devices

Device	Support
USB Flash Driver	Yes
Hard-Disk	Yes
Webcam	No
Digital Camera	No
HID Device (Mouse, Keyboard)	Yes
Wireless network card	Yes
CDC Device (PIC18F4550)	No

Conclusion:

- USBIP service support limited USB devices, not including digital camera provided
- In this case, a new system should be developed to realize our goal

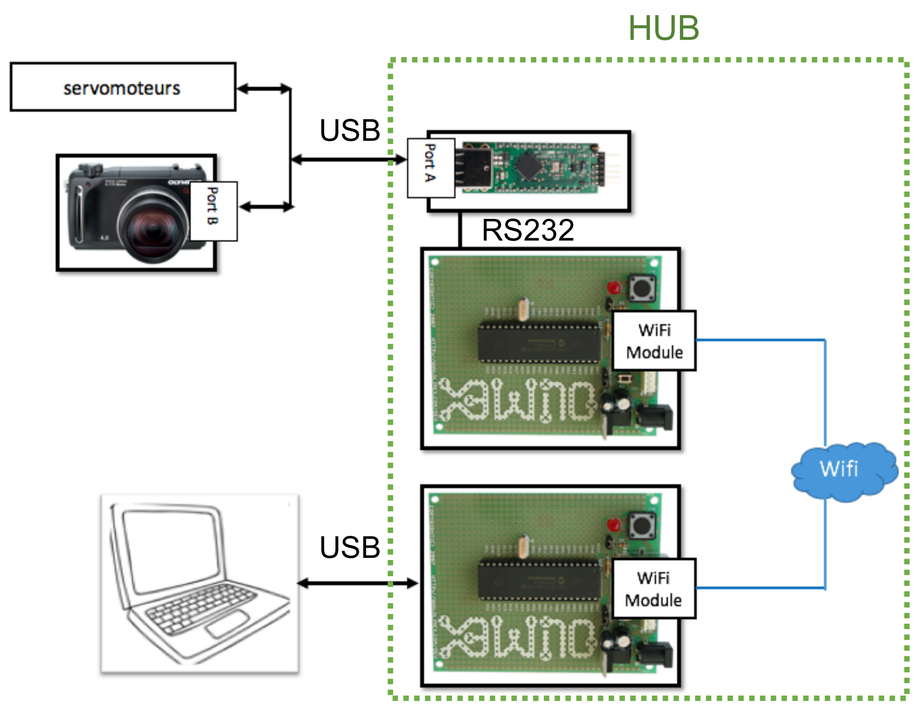
2-Design of communication card

Hardware:

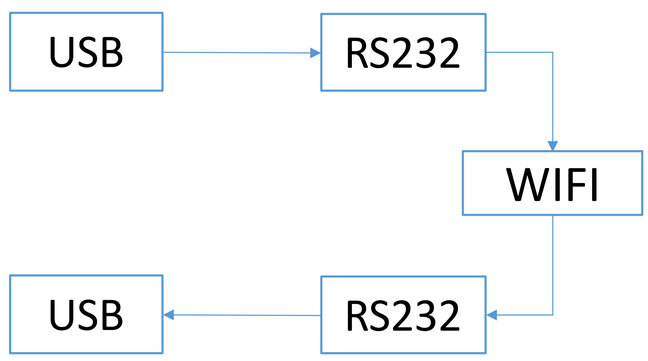
- Microchip PIC18F4550 – USB application development board
- Microchip Pickit3 – Provide USB connectivity to MAPLAB for PIC18F4550
- FTDI V2DIP2 – USB host/Slave controller
- FTDI VNC2 debug module – Provide USB connectivity to Vinculum IDE for V2DIP2

Software:

- MAPLAB
- Vinculum-2 IDE



To verify possibility of this communication, the problem is simplified as follow:



To realize the communication between USB and RS232:

Realized work:

- PIC18F4550 works as a USB CDC device (CDC - communications device class)
- Develop a “transparent mode” to connect USB and RS232

Problems:

- How to make PC recognize other USB class through PIC18F4550 ?

3-Proposed solutions and conclusion

Proposed solutions:

- PIC18F4550 works as a USB HUB which can transfer the enumeration information between PC(USB host) and Camera (USB device)
- Try to learn Wireless USB protocol

Conclusion:

In this project, we try two ways to realize USB remote control:

- Using standard product NB1600.

  Result : This product can not support all USB class device.
- Develop communication card

  Result : A “transparent mode” is developed using USB CDC class

  Two solutions are proposed for the future work

Achieved abilities:

- Communication protocol (USB)
- Analyze feasibility by engineer ways
- Development skill in PIC card