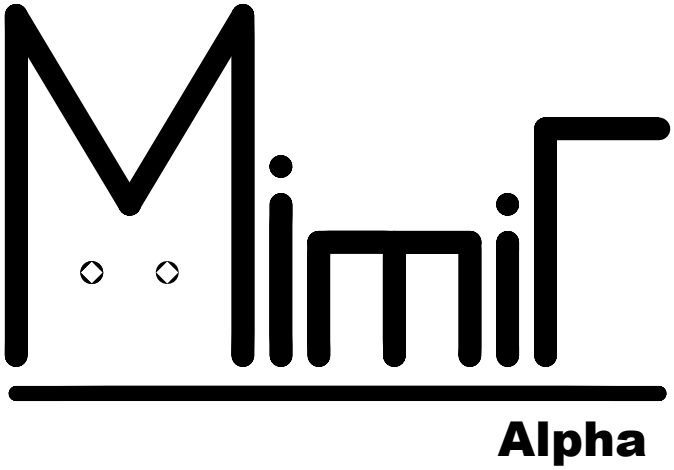
MiMic Getting started.EN for LPCXpresso1769

2011.10.27 nyatla@nyatla.jp



This manual is getting started for “MiMic”. Goal is that you can access LPCXpresso1769 and flush LED2 via web browser.You will get a development environment for "MiMic" when you finished this manual.

Rev	日付	
1	2011/11/01	translate from MiMic_getting_started.odt rev 2
2	1899/12/30	follow the MiMic_getting_started.odt rev 3

Index

1 Required knowledge and skill....3
2 MiMic....4
3 An introductory scenario....5
3.1 Get LPCXpresso1769 board and components....6
3.2 Make minimum Hardware....7
3.3 Get MiMic software....9
3.4 Write firmware to LPCXpresso1769....10
3.5 Set up MiMic network....12
3.6 Run a sample program in your web browser....15
4 How to make MiMic program....16
5 MiMicIL....17
6 How to play MiMic....18
7 Reference....19
8 News and website....19

1 Required knowledge and skill

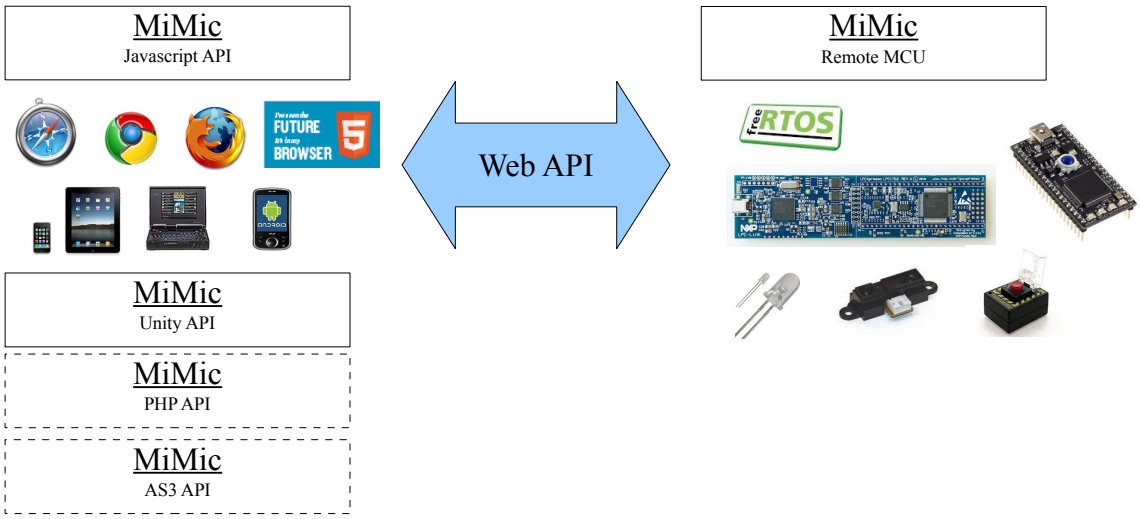
Making MiMic environment requires Knowledge of electronic work and software skill.

- soldering skill (for making hardware.)
- LPCXpressoIDE operation skill (for writing firmware)
- IP network operation knowledge like a home router setting. (for setting MiMic networking.)

For making Mimic application software, small HTML5 and Javascript knowledge are required too.

2 MiMic

MiMic is software system that provides controlling LPCXpresso1769/ mbed from web browser via webAPI.MiMic is constructed with MCU firmware(MiMic RemoteMCU), browser side script library(Javascript API).



MiMic firmware(MiMicRemoteMCU) provides all LPC1769 function(except for any interruption function) to web browser and web interface via WebAPI. Application designer can develop and experience physical computing like Web content.

For example, you can control LED2 on LPCXpresso1769 board by the following HTML.

```
<html>
<head>
<meta http-equiv="Content-Type" content="text/html; charset=UTF-8">
<script src="MiMicCore.js"></script>
<script src="LPCXpresso1769.All.js"></script>
<script type="text/javascript">
function init(){
      var mcu=new LPCXpresso1769.Mcu("192.168.0.39");
      var pin=mcu.getPin(LPCXpresso1769.P0[22],"GPIO");
      pin.setOpt({dir:1,pin:{mode:1,od:0}});
      var i=0;// blink LED2 every 1 second.
      setInterval(function(){pin.setValue((i++)%2);},1000);
}
</script>
</head>
<body onload="init();">
<h1>LED flash</h1>
</body>
```

3 An introductory scenario

1. Get LPCXpresso1769 board and components
2. Make minimul Hardware
3. Get MiMic software
4. Write firmware to LPCXpresso1769
5. Set up MiMic network.
6. Run a sample program in your web browser.

3.1 Get LPCXpresso1769 board and components

Minimal Mimic hardware components are in a following.

1. LPCXpresso1769 board
2. PULSEJACK RJ-45 CONNECTOR 10/100BASE-TX CONTROL
3. Push switch (for reset operation)

A thing required for others that a main board or a bread board, and wires for connecting those components.

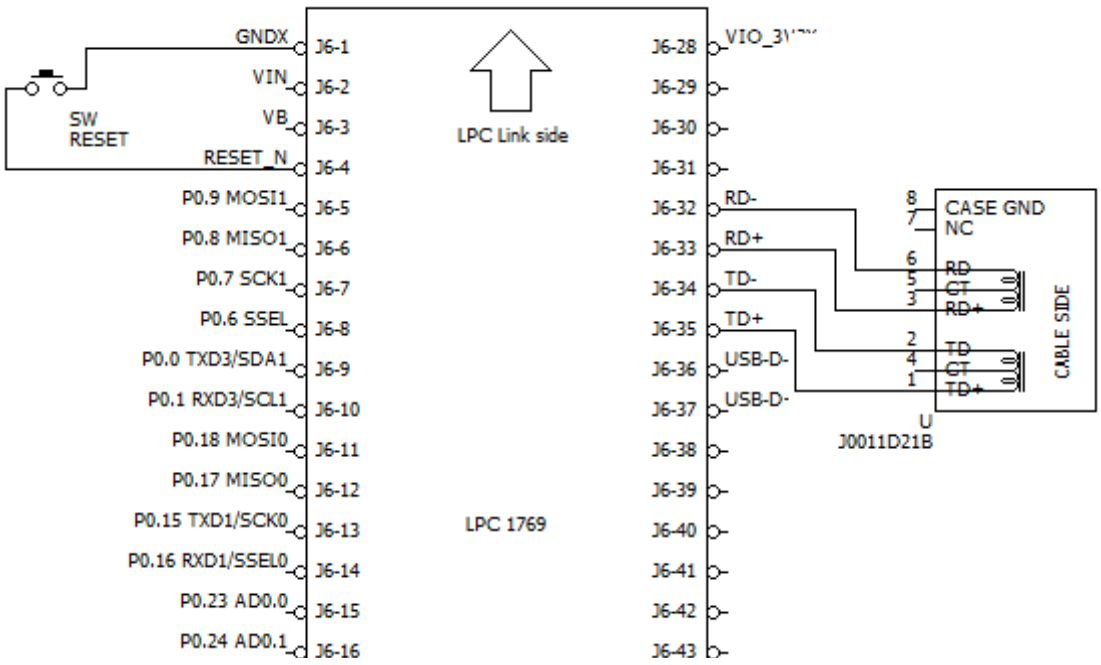
If you already have main board with LAN connector, the board can be used as it is.

※Be attention of bread board pin size when you will buy the breadboard. LPCXpresso has 27 pins.

3.2 Make minimum Hardware

The minimum circuit diagram is as follows.

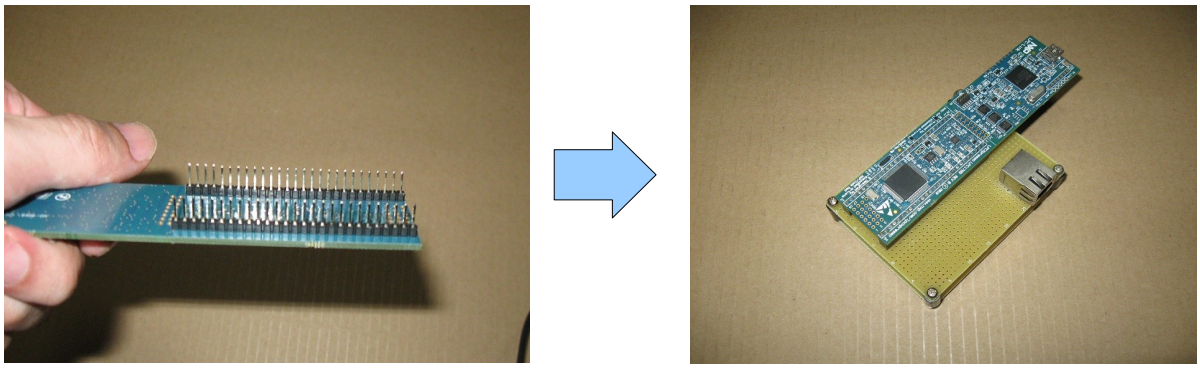
Connect to the reset switch and LAN connector with LPCXpresso1769 directly.



See data sheet of connector for the LAN connector pin assignment. If you be using the bread board, conversion board is useful.

- Breakout Board for RJ45
  http://www.sparkfun.com/products/716

First, solder pins to LPCXpresso1769 board. It is made to be attached to main board or bread board.



Next, please wire a mainboard or bread board as a circuit diagram.

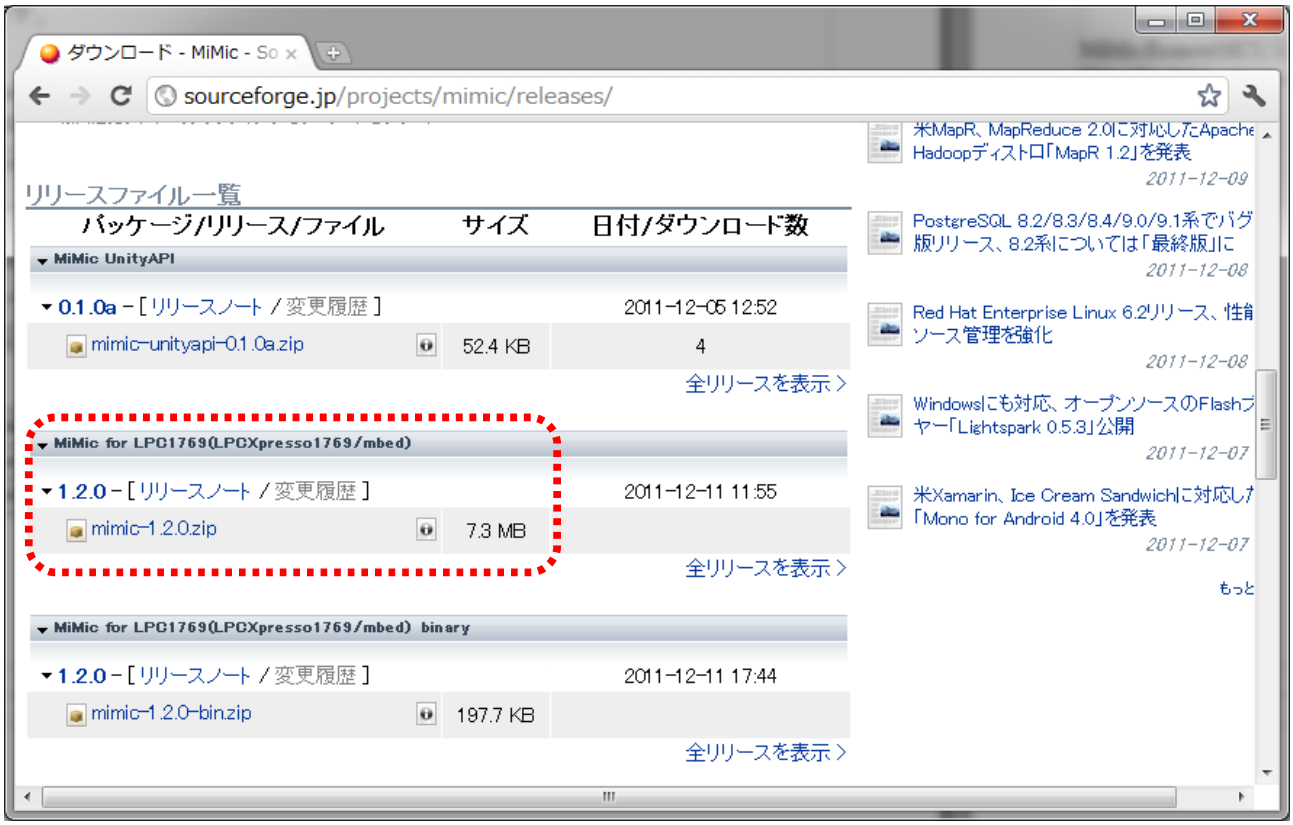
A following URL is details of a simple mainbord(In photograph).

- MiMic on NXP LPCXpresso 1769 評価ボード(ハードウェア編) (Japanese)
  http://nyatla.jp/mimic/wp/?p=59

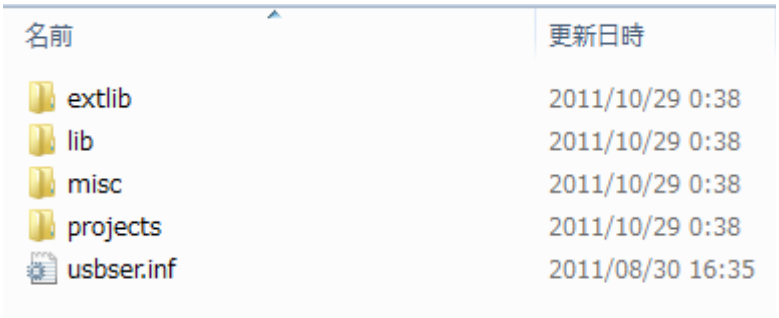
3.3 Get MiMic software

You can download MiMic software from sorceforge.jp. Browse following url and download newest zip file.

http://sourceforge.jp/projects/mimic/releases/



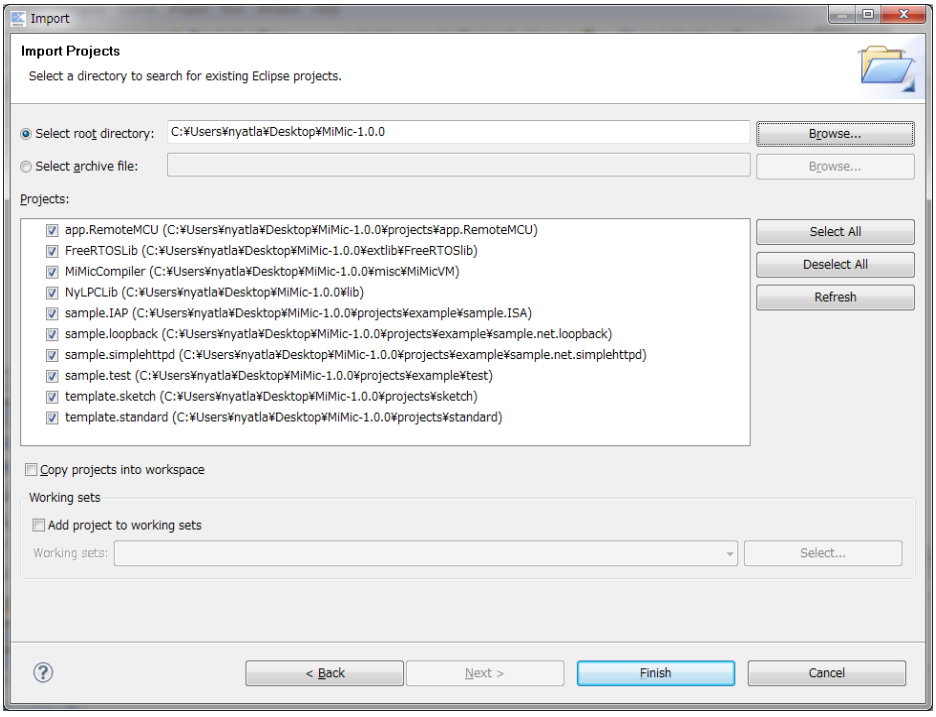
Unfreeze zip file to working directory.



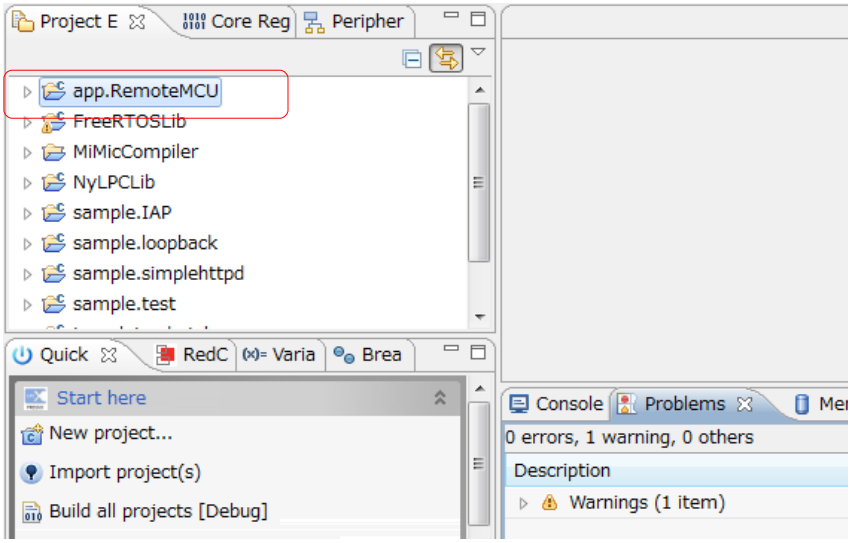
3.4 Write firmware to LPCXpresso1769

Build the firmware from source code and write to LPCXpresso1769. As preparation, connect LPCXpresso1769 with your PC by USB cable.

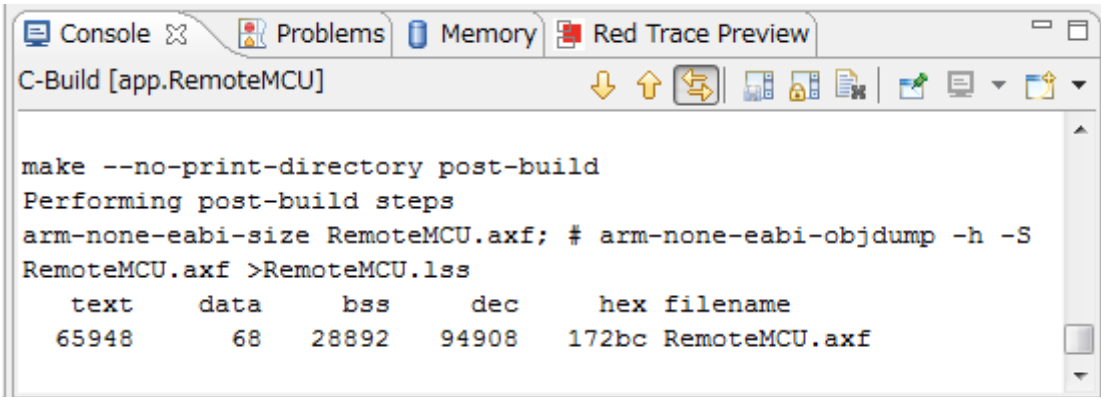
1. Launch LPCXpressoIDE and Import Mimic top directory.



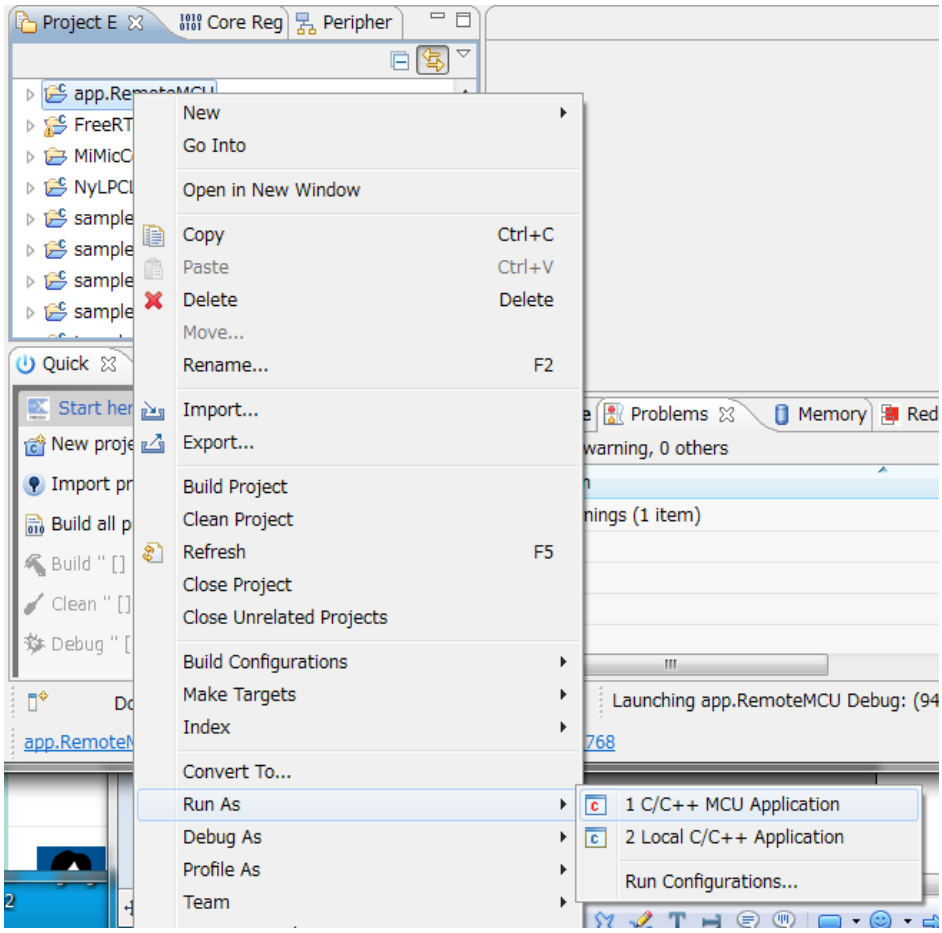
2. Select "app.RemoteMCU" project for making RemoteMCU.afx, and built it.



3. MiMicRemoteMCU firmware is built.



4. Finally, select a command "Run As" in order to write firmware.



The writing of farmware is above. You can end LPCXpressoIDE.

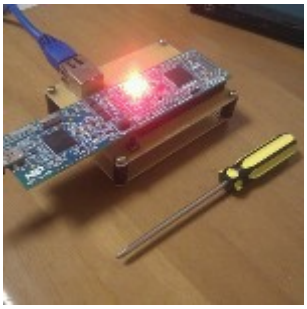
More detail installation guide for LPCXpressoIDE is following URL.(In Japanese)

- MiMic on NXP LPCXpresso 1769 評価ボード(開発環境編)
  http://nyatla.jp/mimic/wp/?p=77
- MiMic のソースコードを LPCXpressoIDE へインポートする
  http://nyatla.jp/mimic/wp/?p=154

3.5 Set up MiMic network

Connect LPCXpresso1769 which has written firmware to Ethernet.

A several seconds, MiMicRemoteMUC starts, and indicator LEDs will be flashing.

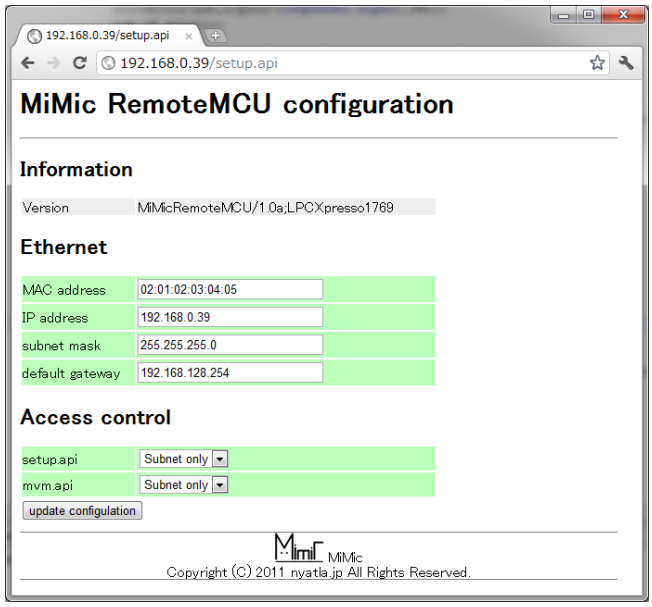


If MiMicRemoteMUC starts, set up MiMicRemoteMUC network configuration via web browser.

MiMicRemoteMCU initial IP address is 192.168.0.39. For setting, change your PC's IP address to 192.168.0.x temporary.

After changed your PC's IP address, access http://192.168.0.39/ . If you can browse following page, MiMicRemoteMCU is ready.(please use Firefox chrome,safari,webkit. Internet Explorer does not work.)

Next, Change the MiMicRemoteMCU IP address. Click RemoteMCU configulation , MiMic RemoteMCU configuration page open.



Configuration menu details are next list. When you connect one MiMic that installed LPCXpresso1769 to network, required thing is only a setup of an IP address.

- Information
  MiMicRemoteMCU information.

Version	version number of MiMicRemoteMCU

- Ethernet

  Ethernet and TCP/IP setting

MAC address	Ethernet address. 6 digit 8bit hex value. A delimiter is ":". Please set a removed MAC Address from an unnecessary LAN card etc.
IP address	IP address of MiMicRemoteMCU on LPCXpresso1769.
subnet mask	subnet mask value.
default gatewau	IP address of default gateway.

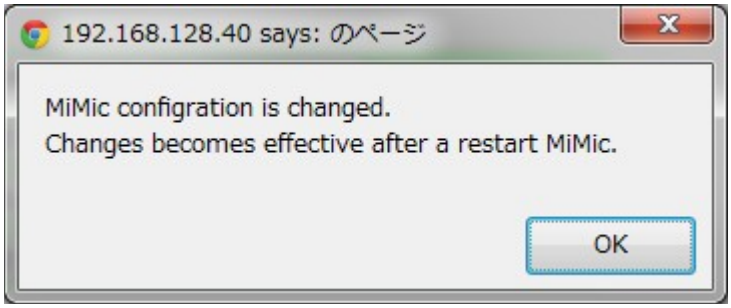
- Access control

  permission of access to MiMicRemoteMCU service.

setup.api	access zone of configration page(this web page) Subnet means accessable host is subnet zone only. All means accessable host is any zone.
mvm.api	access zone of MiMicVM service. MiMicVM service provide any MCU control operations.

Click "update configulation" button after a setup is completed. When the following dialogs were indicated, a configuration was written to on chip flash on LPCXpresso1769.

Reboot LPCXpresso1769 by reset switch or power off-on. New configuration becomes effective from the next booting.



WARNING

MiMicRemoteMCU has not a hardware initialization(factory default) switch. If you forget setting of MiMicRemoteMCU, rewriting firmware is needed.

3.6 Run a sample program in your web browser

When rebooted MiMicRemoteMCU on LPCXpresso1769, Please check whether the MiMicRemoteMCU is running. (If you can see top page, MiMicremoteMCU is running.)

Next, change a sample program. Open "misc/MiMicVM/api.js/demo" directory at MiMic package, and open “led_blink.html” by notepad.exe etc.

Edit an IP-address to your MiMicRemoteMCU IP address.(indicated following source code.)

```
<html>
<head>
<meta http-equiv="Content-Type" content="text/html; charset=UTF-8">
<script src="../MiMicCore.js"></script>
<script src="../LPCXpresso1769.All.js"></script>
<script type="text/javascript">
function init(){
      var mcu=new LPCXpresso1769.Mcu("192.168.0.39");
      var pin=mcu.getPin(LPCXpresso1769.P0[22],"GPIO");
      pin.setOpt({dir:1,pin:{mode:1,od:0}});
      var i=0;
      setInterval(function(){pin.setValue((i++)%2);},1000);
}
</script>
</head>
<body onload="init();">
<h1>LED flash</h1>
</body>
```

Save edited html, open it by web browser *1, LPCXpresso1769 LED2 will be blinking.

Thank you for installing MiMic.

Preparation which controls LPCXpresso1769 from a web browser was completed.

*1 Internet Explorer does not work.

*2 If a program is mistaken (especially, low level API operation), MiMicRemoteMCU will be stop easily.How to check whether the Mimic stopped is to load MiMicRemoteMCU top page again.If reloading failed then MiMicRemoteMCU was stopped. it requires reset switch.

4 How to make MiMic program

MiMic program is made by HTML and javascript. You can use any development tool for making.

HTML of source file should include two Javascript files.

ファイル名	機能
MiMicCore.js	Low level MiMic javascript API definitions. Low level API provides some function to access MiMicRemoteMCU virtual machine. it is remote procedure call, connection management, etc...
LPCXpresso1769.All.js	High level MiMic javascript API definitions. This is joined file that includes all LPCXpresso1769.*.js High level provides peripheral and pin accessor. Those are hardware driver. It can control device easily.

For High Level API, see document MiMic_javascript_API_specification.

http://mimic.sourceforge.jp/doc/current/

For Low level API of MiMicBC, see document MiMicVM.

Basic structure of program is below.

```
<html>
<head>
<meta http-equiv="Content-Type" content="text/html; charset=UTF-8">
<script src="../MiMicCore.js"></script>
<script src="../LPCXpresso1769.All.js"></script>
<script type="text/javascript">
function init(){
	//LPCXpressoとの接続
	var mcu=new LPCXpresso1769.Mcu("192.168.0.39");
	//初期化処理
	var pin=mcu.getPin(LPCXpresso1769.P0[22],"GPIO");
	pin.setOpt({dir:1,pin:{mode:1,od:0}});
	var i=0;
	//メイン処理
	pin.setValue(1);
}
</script>
</head>
<body onload="init();">
<h1>LED flash</h1>
</body>
```

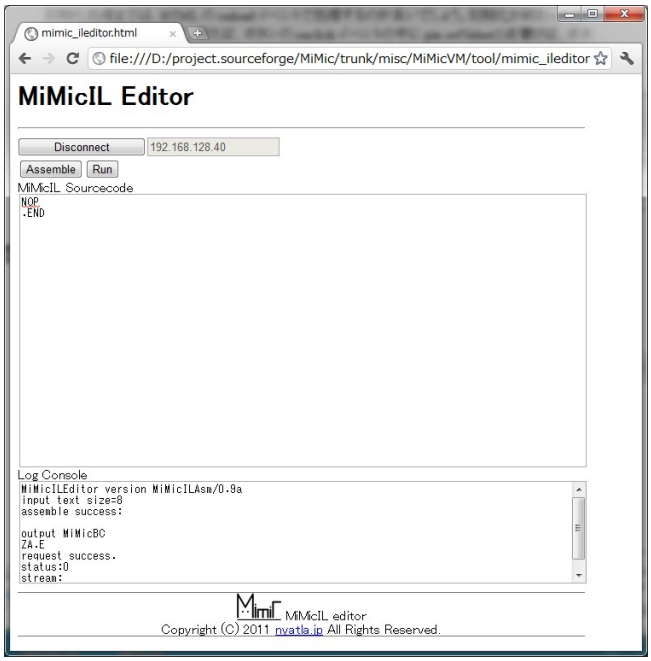
Initialization is written in onload event. After initialization, implementation is free structure.
If "pin.setValue(1);" is written into button's onclick event, it will be switch.

5 MiMicIL

MiMicIL is virtual machine Intermediate Language.MiMicIL is virtual machine Intermediate Language. This bytecode is sent to MiMicRemoteMCU by MiMic low level API.

For making bytecode, MiMicIL editor is useful. This is HTML5 application work on Web browser(Internet exploror does not work.)

This tool can compile MiMicIL, and run it at MiMicRemoteMCU.



This tool can operate memory access directly. For example, following code read memory address 0 and puts result.

```
MGET #0,#0x0 ;get address 0 to work register #0
SPUT #0 ;put #0 value to stream
EXIT   ;end of bytecode
.END   ;end of section
```

MiMicIL Editor is misc/MiMicVM/tool/mimic_ileditor.html.

6 How to play MiMic

Mimic system does not work in a stand-alone. Mimic system needs to connect with a network with operation interfaces, such as a browser, and a control device.

Connected MiMic system has various application.

In the case of the browser base system, it can cooperate easily with the multimedia function which a browser has, and the Web Service connected to the Internet. For Example, it can control MCU from rich user interface on web browser. And a sound effect could also be attached to operation of an electronic device by the multimedia function of a browser. You can make the Web contents which operate some devices.

Moreover, the data on a Internet Web Service can also be sent to a device via browser.

MiMic application is HTML. it works on web browser after downloaded. You can place applicaion

You can install application anywhere. local disk, web server, etc.

If you want to share program,

Please add the setting form of IP address of a connection place to a MiMic, and upload to the public webserver.

Visitor may control their LPCXpresso1769 with MiMic via it.

The MiMic is very vulnerable when you operate MiMic from the direct Internet. A proxy server is needed between the MiMic and the Internet if you want to operate the Mimic via Internet.

All messages of the MiMic are on HTTP protocol. A proxy will be made by PHP or JSP.

7 Reference

- MiMicVM.pdf (Japanese)
- MiMic_javascript_API_specification
  http://mimic.sourceforge.jp/doc/current/
- lpcxpresso.lpc1769.schematic.pdf
  http://ics.nxp.com/support/documents/microcontrollers/pdf/lpcxpresso.lpc1769.schematic.pdf
- UM10360.pdf
  http://www.nxp.com/documents/user_manual/UM10360.pdf

8 News and website

MiMic website is http://nyatla.jp/mimic/wp/ . If you interest in MiMic please visit here.

Thank you for reading.