Atmel Studio IDE for RIO-2014PG

User Guide

Version 1.0



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Table of Contents

1.	Inst	all Atmel Studio	1
	1.1	Download Atmel Studio	1
	1.2	Install Artila Example Program, FreeRTOS, IwIP and Device Driver	2
2.	Star	rt Compiling Example Program	3
3.	Inst	all Manager Utility Software	5
4.	Exa	mple	8
	4.1	Example 1 E01_TCPServer Demostrates the TCP Eche Server Application	8
	4.2	Example 04 Web DIO (\RIO-2014\Examples\E04_Web_DIO)	9

1. Install Atmel Studio

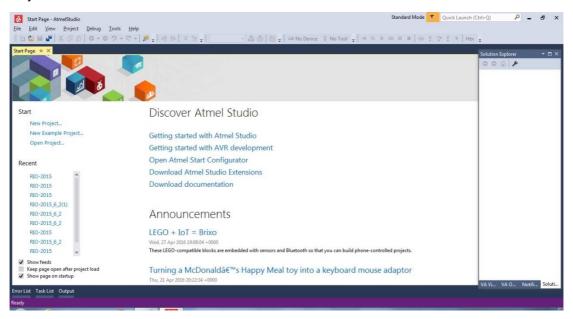
1.1 Download Atmel Studio

Visit <u>http://www.atmel.com</u> and find the Atmel Studio download to install Atmel Studio. Atmel Studio is based on Microsoft Visual Studio therefore it supports Windows system only.

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tinyAVR MCUs Battery Management MCUs Automotive AVR MCUs SMART ARM-based MCUs 8051 Architecture	Overview Devices Documents Applications	Get Started	
Touch Solutions	Atmen	We'll tell you all you need to know	
Automotive	A and the second	to start evaluating and working with this product.	
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Smart Energy	9197 10	* Start Now	
Memory		» Contact Sales ע	
Drivers and Sensors		» Request Samples	
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Programmable Logic			
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Digital Broadcast	Atmel Studio 7 is the integrated development platform (IDP) for developing and debugging Atmel® SMART ARM®-based and Atmel AVR® microcontroller (MCU) applications. Studio 7 supports all AVR and Atmel SMART MCUs. The Atmel Studio 7 IDP	Related Items	
Microcontroller Selector	gives you a seamless and easy-to-use environment to write, build and debug your applications written in C/C++ or assembly code. It also connects seamlessly to Atmel	> Third Party Support	
	debuggers and development kits.	> University Program > AVR Knowledge Base	
	Additionally, Atmel Studio includes Atmel Gallery, an online apps store that allows you to		
	extend your development environment with plug-ins developed by Atmel as well as by	> What's Changed	
	third-party tool and embedded software vendors. Atmel Studio 7 can also able	> Mature Devices	
	seamlessly import your Arduino sketches as C++ projects, providing a simple transition		

Please check minimum system requirements for Atmel Studio and view the readme first before use Atmel Studio.

Test the installation. Click the Atmel Studio icon will start it and Discover Atmel Studio screen will appear. Now you have Atmel Studio (IDE), Atmel Software Framework and Atmel Toolchains correctly installed.



1.2 Install Artila Example Program, FreeRTOS, IwIP and Device Driver

Visit http://www.artila.com and find the Resource button of the product page that you are interested and click and download the library for development. Make sure your products use Atmel Cortex M4 CPU before use Atmel Studio.

Organize 💌 Include	n library 🔹 Share with 💌 New	folder			• EE	0
🚖 Favorites 🖌	Name	Date modified	Туре	Size		
📃 Desktop	🔐 Doc	5/5/2016 3:26 PM	File folder			
🚺 Downloads	🍶 Examples	5/5/2016 3:28 PM	File folder			
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浔 Libraries	🍶 Produce	5/5/2016 3:28 PM	File folder			
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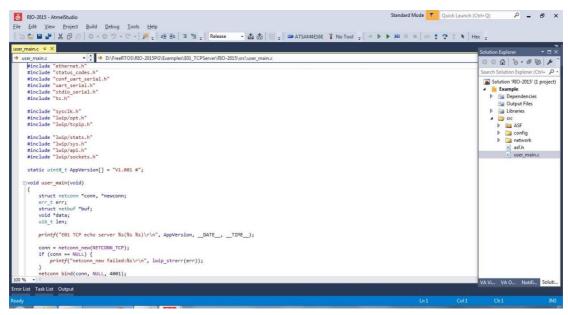
2. Start Compiling Example Program

Find the Atmel Studio Solution File and click it will start the Atmel Studio and load the environment files and C source file *user_main.c*.

Irganize 💌 Include ii	n library 🔻 Share with 🔻 New folder			. 335	
🗧 Favorites	Name	Date modified	Туре	Size	
🔜 Desktop	👊 RIO-2015	5/5/2016 3:52 PM	File folder		
👪 Downloads	\delta RIO-2015	7/16/2015 9:10 AM	ATMEL Studio 7.0	1 KB	
🖳 Recent Places	Type: ATMEL Studio 7.0 Solution File Size: 893 bytes Date modified: 7/16/2015 9:10 AM				
Libraries Documents	Date modified: 7/10/2013 9:10 AM				
Music					
Pictures					
Videos					
Homegroup					
Computer					
🟭 Acer (C:)					
DATA (D:)					
🕌 Eclipse					
J FreeRTOS					
🎉 User Guide 📜 Users					

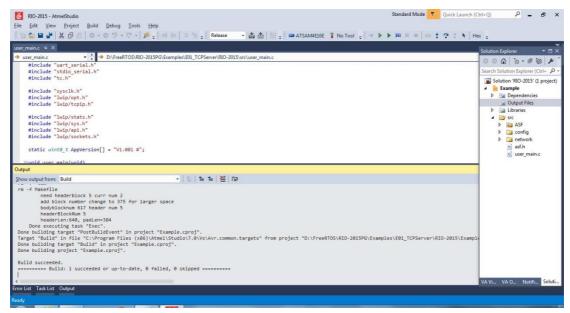
The user_main.c is the application source file in C and It is located at:

\Example\E01_TCPServer\RIO-2014\src.



Use Build Example option to make the application firmware which is named as *Example.aff* and is

located at \Example\E01_TCPServer\RIO-2014\Release.



3. Install Manager Utility Software

Find the Manager installation software at \RIO-2014\Utils\Manager. Click it and install the Manager utility to your windows. Make sure to use Administrator account to run the Manager.

Search device.



Click the search icon to discover the devices.

No	Device_Name	Model_Name	IP	MAC	Password	CommandPor
1	Matrix504	MATRIX504	192.168.1.133	00-13-48-02-74-FE	(2)	5001
2	RIO-2014	RIO-2014	192.168.1.110	00-13-48-00-00-FC	a	5001
	010 2014	010 2014			0	
3	RIO-2014	RIO-2014	192.168.1.10	00-13-48-FF-FF-FB		5001
- Lam	R0-2014	KIO-2014	m	00-13-48-FF-FF-FB	50	
	R0-2014	KIO-2014		00-13-48-FF-FF-FB		

Click the device to configure its settings.

	Basic Settings Advan	ced Options
23	Item	Value
pgrade	Information	
-	Firmware Version	KNL V1.015
彩	Model Name	RIO-2014
-	MAC	00-13-48-00-00-FC
eboot	Basic Settings	
(5	Device Name	RIO-2015
efault	Lan Settings	
ettings	IP Configure	Static
	IP Address	192.168.1.110
	Netmask	255.255.255.0
	Gateway	0.0.0.0

Click Upgrade button to upload the binary file *Example.aff.*



Before upload, a double check window will appear to ensure the kernel version is the right one to upload.



Once completed, the device will reboot.

🥑 Message	ings	X
	Device rebooting now	
	OK	

Connecting the Serial Console.

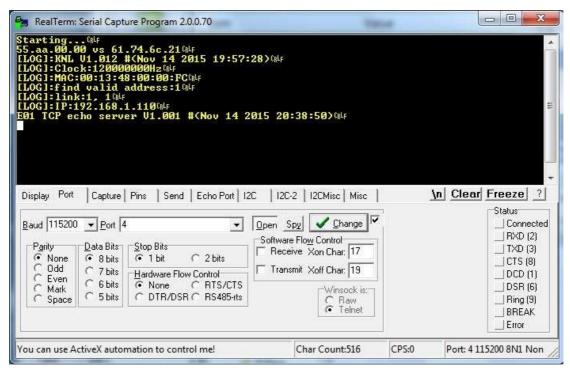
- Serial console is settings is 115200, N81, ANSI (Terminal type).
- The serial console shows system and debug message.
- User can show the debug message by using printf() function.

RealTerm: Serial Capture Program 2.0.0.70	-		
Starting ^{084F} 55.aa.00.00 vs 61.74.6c.21 ^{084F} [LOG]:KNL V1.012 #(Nov 14 2015 19:57 [LOG]:Clock:12000000H2 ^{084F} [LOG]:MAC:00:13:48:00:00:FC ^{084F} [LOG]:find valid address:1 ^{084F} [LOG]:link:1.1 ^{084F}	* :28) €8LF		<u></u>
ILOGJ:IP:192.168.1.1100#F E01 TCP echo server V1.001 #(Nov 14 Display Port Capture Pins Send Echo Port			₹ \n Clear Freeze ?
		· · · · · · · · · · · · · · · · · · ·	Status
Baud 115200 - Port 4 -	Open Spy 🗸 Change 🔽	J.	
Parity Data Bits Stop Bits None 8 Bits 1 bit 2 bits	Software Flow Control		R×D (2) T×D (3) CTS (8)
C Odd C 7 bits Even C 6 bits C Mark C 5 bits C Space C 5 bits C DTR/DSR C RS485-rts	L WHDSOCK IS		DCD (1) DSR (6) Ring (9) BREAK Error
You can use ActiveX automation to control me!	Char Count:516	CPS:0	Port: 4 115200 8N1 Non

4. Example

4.1 Example 1 E01_TCPServer Demostrates the TCP Eche Server Application

Once power up, loader will boot and load FreeRTOS and performed system initialization.



The application C program, user_main() is a single-tasking program and it will run endless e.g. for (;;) or while(1) and cannot return any value i.e. void user_main(void).

👸 RIO-2015 - AtmelStudio Standard Mod	le 🔻 Quick Launch (Ctrl+Q) 🔑 🗕 🗗 🗙
Eile Edit View Project Build Debug Iools Help	
🗄 🖆 🏜 📽 🐇 🗗 🙆 ロ・ロ フ・マ・ 声 👳 亜 🏝 🏝 🔍 🦉 🛫 Kelesse 🔹 🏙 📩 🕅 🛫 🗰 ATSAMAEL6E 🦹 No Tool 🛫 ラ 🕨 🕨 🗉 =	60 1 7 1 k Hex -
user_main.c -> X	Solution Explorer 🛛 🛪
→ user_main.c → D:\FreeRTOS\RIO-2015PG\Examples\E01_TCPServer\RIO-2015\src\user_main.c	000 0-00 %
#include "ethernet.h"	
<pre>#include "status_codes.h"</pre>	Search Solution Explorer (Ctrl+ 🔑 -
<pre>#include "conf_uart_serial.h"</pre>	Solution 'RIO-2015' (1 project)
#include "uart_serial.h"	A Example
#include "stdio_serial.h"	Dependencies
#include "tc.h"	Qutput Files
#include "sysclk.h"	District Control Co
<pre>#include "lwip/opt.h" #include "lwip/tcpip.h"</pre>	🔺 🤷 src
#include iwip/tcpip.n	ASF
#include "lwip/stats.h"	Config
<pre>#include "lwp/sys.h"</pre>	Image: A state of the state
=include "lwp/spi.h"	h) asf.h
<pre>#include "hup/spin" #include "hup/sockets.h"</pre>	c) user_main.c
*Include Imp/successin	
<pre>static uint8_t AppVersion[] = "V1.001 #";</pre>	
Proid user main(void)	
struct netconn *conn, *newconn;	
err terr:	
struct netbuf "buf;	
void *data:	
ul6_t len;	
<pre>printf("E01 TCP echo server %s(%s %s)\r\n", AppVersion,DATE,TIME);</pre>	
<pre>conn = netconn_new(NETCONN_TCP);</pre>	
if (con = NULL) {	
<pre>printf("netcon_new failed:%s\r\n", lwip_strerr(err));</pre>	
netconn bind(conn, NULL, 4001);	
	VA Vi VA O Notifi Soluti
Error List Task List Output	
Ready	n1 Col1 Ch1 INS

Once complete building the Example project, Example.aff will be generated to: *Example**E01_TCPServer**RIO-2014**Release.*

4.2 Example 04 Web DIO (\RIO-2014\Examples\E04_Web_DIO)

This example demonstrates how to write a Web browser to control digital I/O. User can write a *web_ajax.c* program to talk to the Web page Javascript (JQuery). The demo web page is located at *\Examples\E04_WebDIO\WEB\01*. Users need to use Manager Utility to convert the Web page source to binary *.anf to update to the web server of RIO-2014PG.

The default Web port is 5003 and it can be changed by the advanced options of Manager.

Basic Settings Ad	
Item	Value
rade Web Server Settin	gs
Enable	Enable
Listen Port	5003
Idle Timeout sec	1
Alive Timeout sec	0
TCP Command Se	ttings
It Enable	Enable
s Listen Port	5001
Idle Timeout sec	15
Alive Timeout sec	300
Accessible IP Setti	ngs
[0] IP Address	0.0.0.0
[0] Netmask	0.0.00
[1] IP Address	0.0.00
[1] Netmask	0.0.00
[2] IP Address	0.0.00
[2] Netmask	0.0.00
DHCP Options	
LinkDown Renew	sec 0
Continue Discover	OFF

No	Device_Name	Model_Name	1P	MAC	Password	CommandPort
1	Matrix504	MATRIX504	192.168.1.133	00-13-48-02-74-FE	(2)	5001
2	RIO-2014	RIO-2014	192.168.1.110	00-13-48-00-00-FC		5001
3	RIO-2014	RIO-2014	192.168.1.10	00-13-48-FF-FF-FB	3	5001
					-	
-			10			

Save all Web page related files e.g. html, css, js to a folder and use convert function to covert the Source directory to output file with extension of .anf

Convert	Upload		
Base Address: 0x4A0000	Target device		
Source directory:	IP Address:	192.168.1.110	
s\E04_Web_DIO\WEB\01 Browse	MAC:	00-13-48-00-00-FC	
Output .anf file:	.anf file:		
b_DIO\WEB\mnt_ctrl.anf Browse	D:\FreeRTOS\RIO-2014PG Browse		
Convert		Upload	

Then use Upload function to upload the web file to RIO-2014PG

Open <u>http://192.168.1.110:5003</u>.

1/0 Mo	nitoring / Control >				
← ⇒ 0	* 192.1	58.1.110:5003			☆ 🔳
I/O	Monitori	ng / Contr	ol		
Monito	ring				
DI1	DI2	O DI3	O DI4	•	
Contro	I				
DO1	D 02	•			
HIGH					

Open Web developer tool that can show you how the AJAX works.

← → C ↑ □ 192.168.1.110:5003	<u></u>	2					
	🕞 🔂 Elements Console Sources Network Timeline » 🚳 🗛 🕯 🗛	3					
I/O Monitoring / Control	🕚 🛇 🛛 🖿 🖓 🛛 View: 🎞 🛬 🗍 💷 Preserve log 💷 Disable cache 🛛 No throttling						
1/O Monitoring / Control	Filter III Hide data URLs						
Monitoring	10000 ms 20000 ms 30000 ms 40000 ms						
lonitoring							
DI1 🔵 DI2 🔵 DI3 🔵 DI4							
Control	Name Stat Typ Initiator Size Time Timeline – Start DI?_=1463035207983 200 xhr jguery 195 5 ms	în					
-	DO?_=1463035207965 200 xhr <u>iquery</u> 195 5 ms						
01 🔵 D02 🔵	DI?_=1463035207985 200 xhr j <u>query-</u> 195 4 ms						
HIGH	DO?_=1463035207986 200 xhr jguery 141 37						
LOW	DI?_=1463035207987 200 xhr jguery 195 5 ms						
	DO?_=1463035207988 200 xhr jguery 141 4 ms						
	DI?_=1463035207989 200 xhr j <u>query-</u> 195 4 ms						
	DO?_=1463035207990 200 xhr jquery 141 4 ms						
	DI?_=1463035207991 200 xhr jquery 195 6 ms						
	DO?_=1463035207992 200 xhr jquery 141 4 ms						
	DOSet?DO1=L&_=1463035207993 200 xhr jquery 141 4 ms	1					
	DI?_=1463035207994 200 xhr j <u>query-</u> 195 4 ms DO?_=1463035207995 200 xhr j <u>query-</u> 141 4 ms	-					
	DO?_=1463035207995 200 xhr jguery 141 4 ms DOSet?DO2=L& =1463035207996 200 xhr jguery 141 4 ms	1					
	DI? =1463035207997 200 xhr jguery 195 4 ms						
	DO?_=1463035207998 200 xhr <u>iquery</u> 141 4 ms						
	DI?_=1463035207999 200 xhr iguery 195 4 ms						
	DO?_=1463035208000 200 xhr iguery 141 4 ms						

5. Enter bootloader

In case to firmware bug which hangsRIO-2014PG, user can enter the bootloader mode by using serial console, reboot the RIO-2014PG and right after system booting, key "@" (Shift+2) to enter the bootloader function. Then you can use serial console to update the firmware of RIO-2014PG