# \* AVR JTAGICE mkll를 이용한 Debugwire 사용법

JTAG pin이 나와 있지 않은 AVR 모듈을 디버깅 하기 위해서는 Debugwire를 이용해서 디버깅을 해야 하는데 일반 JTAG emulator는 이 기능을 지원하지 않고 JTAGICE mkll 프로토콜을 지원하는 emulator만이 이 기능을 지원 합니다.

#### 1. Target device와 연결

		7	
😺 AVR Studio	o - [D:₩NuriPen₩NuriPenc]		
: 🖺 Eile Proje	ct <u>B</u> uild <u>E</u> dit <u>V</u> iew <u>T</u> ools <u>D</u> ebug <u>W</u> indow .	Help	_ &×
i 🗋 💕 🖬 🕼	- U 🐰 🖻 🖻 🖪 🕫 🖻 🗟 🥦 🤅 🖊 🔺 % 🖇	\$ % 事事!讀 ¥ ! ▶ □ 및 □ □ ◆ 理 (# 性 1) 殿 !	🖬 🐺 🗉 🖳 😫 🍳 🌢
Trace Disabled	- 🔍 🛠 🖢 🛪 🗰 🗰 👾 🖓	2 RUTO	
Project	<b>▼</b> × {	I/O View	<b>▼</b> ×
⊡~`` <b>≋</b> NuriPen_c	cof while (TRU	E) 🗖 式 🕫 🖽	• 🔿
	i InitS	sTask();	
	I Inithu	(TOUE)	
	while {	(TRUE)	
	Ha	mlimer();	
	Select AVR Programmer		×
	Platform:	Port:	
	STK500 or AVRISP	Auto	Connect
	JTAG ICE	USB	
	JTAGICE mkll	COM1	Cancel
	AVRISP mkli	COM2	
	STK600	COMA Baud	I rate:
	13110000	1152	200 👻
	Tip: To auto-connect to the program	nmer used last time, press the 'Programmer'	Lucha alternation and
Message	button on the toolbar.	Baud	e immediatelu
Loaded pl	Note that a tool cannot be used for	programming as long as it is connected in	e ininediately.
Loaded pa	a debugging session. In that case,	select 'Stop Debugging' first.	
JTAGICE	Discourse start Marks		
	Disconnected Mode		
L			
<		>	
🔳 Build 🕕 Mes	ssage 🔄 🗟 Find in Files 🛛 🏹 Breakpoints and Tracepoir	nts	
		ATmega88 Auto	Ln 56, Col 1 CAP NUM OVR 🛒

"Con" 아이콘 클릭

# 2. Flash program

JTAGICE mkll in ISP mode with ATmega88	X
Main Program Fuses LockBits Advanced HW Settings HW Info Auto	
Erase Device	
Frase device before flash programming     Verify device after programming	
Flash	
Use Current Simulator/Emulator FLASH Memory     Support HEX File	
Input HEX File [D.wnpwnp,nex]	
C Use Current Simulator/Emulator EEPROM Memory	
Input HEX File	
Pr <u>o</u> gram Ver <u>i</u> fy Re <u>a</u> d	
ELF Production File Format	
Input ELF File	
End by	
Detecting on 'USB'	^
JTAGICE mkll found on USB Getting revisions OKI	
Just ing ISP frequency parameters, SD=0X06, OK	$\mathbf{\mathbf{v}}$

[Target device와 연결된 화면 ]

#### 2.1 Flash program

JTAGICE mkll in ISP mode with ATmega88
Main Program Fuses   LockBits   Advanced   HW Settings   HW Info   Auto   Device
Erase Device
Erase device before flash programming Verify device after programming
Flash © Use Current Simulator/Emulator FLASH Memory © Input HEX File D:\WNuriPen\WNuriPen,hex
<u>Program</u> <u>V</u> erify <u>R</u> ead
EEPROM © Use Current Simulator/Emulator EEPROM Memory © Input HEX File
Pr <u>o</u> gram Ver <u>i</u> fy Re <u>a</u> d
ELF Production File Format
Program Save must be specified before saving to ELF
Entering programming mode., OK! Programming FLASH , OK! Reading FLASH , OK! FLASH contents is equal to file., OK Leaving programming mode., OK!
"Program" 버튼 클릭

Program 할 hex파일을 선택하고 Program 버튼을 클릭 하면 Target device에 program됩니다.

# 3. Debugwire 디버깅 모드 설정

JT/	GICE mkll in I	SP mode with ATmega88
M	ain Program	Fuses LockBits Advanced HW Settings HW Info Auto
	BOOTSZ	Boot Flash size=1024 words Boot address=\$0C00
	BOOTRST	
	RSTDISBL	
	DWEN	
	SPIEN	
	WDTON	
	EESAVE	Drawn, aut data than dia chia d
	BUDLEVEL	Brown-out detection disabled
	CKOUT	
	SUT CKSEL	Ext_Crustal Osc_3 0-8 0 MHz: Start-up time PWBDWN/BESE
	001101022	
		0.50
	HIGH	
	2011	
	<ul> <li>✓ Auto read</li> <li>✓ Smart warning:</li> <li>✓ Verify after pros</li> </ul>	s gramming Program Verify Head
Se En Re Le	tting device param tering programmin ading fuses addre aving programmin	neters., OK! ng mode., OK! ss 0 to 2., 0xCC, 0xDF, 0xF9., OK! g mode., OK!

Debug wire를 이욯 해서 디버깅을 하기 위해서는 먼저 "DWEN" fuse bit를 설정 해야 합니다.

## 3.1 DWEN Fuse bit 설정

JTAGICE mkll in ISP mode with ATmega88
Main       Program       Fuses       LockBits       Advanced       HW Settings       HW Info       Auto         BOOTSZ       Boot Flash size=1024 words       Boot address=\$0C00       ✓         BOOTRST       BOOTRST       Image: Comparison of the set of the se
<ul> <li>✓ Auto read</li> <li>✓ Smart warnings</li> <li>✓ Verify after programming</li> <li>Program</li> <li>Verify</li> <li>Head</li> </ul>
Setting device parameters, OK! Entering programming mode., OK! Reading fuses address 0 to 2,, 0xCC, 0xDF, 0xF9 ,, OK! Leaving programming mode., OK!

#### 3.2 DWEN Fuse bit Program

JTAGICE mkll in l	SP mode with ATmega88 📃 🗖 🗙
Main Program	Fuses LockBits Advanced HW Settings HW Info Auto
BOOTSZ	Boot Flash size=1024 words Boot address=\$0C00
BOOTRST	
RSTDISBL	
EESAVE	
BODLEVEL	Brown-out detection disabled
CKDIV8	
CKOUT	
SUTLCKSEL	Ext, Crystal Usc, 3,0-8,0 MHz; Start-up time PWHDWN/HESE,.
EXTENDED	0xF9
<ul> <li>✓ Auto read</li> <li>✓ Smart warning:</li> <li>✓ Verify after prog</li> </ul>	s gramming Verify Read
Entering programmir Writing fuses addres Beading fuses addre Fuse bits verification Leaving programmin	ng mode., OK! \$ 0 to 2,, 0xCC, 0x9F, 0xF9,, OK! \$\$ 0 to 2., 0xCC, 0x9F, 0xF9,, OK! ., OK g mode., OK!

[DWEN]이 설정되면 debugwire 를 이용해서 디버깅은 할 수 있게 되지만 ISP/JTAG 을 이용해서 Program은 할 수 없는 상태가 됩니다. 다시 Program 가능하게 하려면 DWEN을 설정 해제 해야 합니다. 이 방법에 대해서는 이후 에 다시 설명 하도록 하겠습니다.

# 4. 디버깅 시작

🐱 AVR Studio - [D:₩NuriPen₩NuriPe	n	.c]					
🗄 Eile Project Build Edit View Tools	De	wg <u>Window Uolp</u>		7			- 8×
: 🗋 💕 📕 🖉 U 🐒 🛍 🚉 🖨 M や 🗟		Start <u>D</u> ebugging Ct	rl+Shift+Alt+F5	🔲 🗐 II 🖸 🔿 🗐 (4 🖆 *() 🗐 🌢 🚫 *	ы : <u>д</u>		
: Trace Disabled 🚽 🔍 🗶 📌 🛧	-	Stop Dobugging	Ctrl. chift. ES				
Project • × [		Run	F5			I/O View	<b>▼</b> ×
⊡- 😹 NuriPen_cof	11	Break	Ctrl+F5	000000000000000000000000000000000000000	<b>_</b>	- FE EI	
Source [read only]	5	Rese <u>t</u>	Shift+F5			+* 6-23	
	5=	Step Into	E11				
		Step Over	F10				
	2	Sten Out	Shift+E11				
	*13	Run to Cursor	Ctrl+F10				
		Auto Step	Alt+F5				
		Nevt Breaknoint	CtrluEQ				
		New Breakpoint	cum s	itart.			
		Toggle Breakpoint	F9	CCCCCCCCCCCCCCCCCCCCCCCC+/			
		Remove all Breakpoints					
		Traco	•				
		Stack Monitor					•
						Nome	
		Show Next Statement	Alt+Num *		_	Ivanie	Address
	63	Quickwatch	Shift+F9				
	L L	Select Platform and Device	ə		4 1	]	
		Up/Download Memory			N P	1	
Message				1	▼ ×		
Gcc plugini: No WinAVR installation found, Loaded partfile: C:₩Program Files₩Atmel₩ JTAGICE mkll: Target power has been resto JTAGICE mkll: Target power lost, JTAGICE mkll: Target power has been resto	The A AVR red, red,	VR GCC plug-in can still b Tools₩PartDescriptionFile	e used if you se s₩ATmega88	t up your own build tools.			
	noint	s and Tracenoints			_		
	point	s anu macepuints	0 T		1 - 57		
			AIM	Auto	Ln 57,	COLI CAP	NUMPOVR ;;

메뉴에서 Start Debugging 선택해서 디버깅 모드 진입

### 4.1 디버깅



디버깅이 시작되면 일반 JTAG 디버깅 방법과 동일한 절차에 의해서 디버깅 하시면 됩니다.

### 4.2 디버깅 화면



#### 5. Program 모드로 전환



디버깅이 끝나고 다시 Flash program을 하기 위한 모드로 전환하기 위해서는 Fuse bit에서 DWEN을 설정 해제해야 하는데 "JTAGICE mkll Options" 메뉴에서 간단하게 설정 할 수 있습니다.

# 5.1 Program 모드로 전환

Connection Debug Status PWM
JTAG connection
Target clock frequency
Accura AVRStudio
To disable the debugWIRE fuse, the SPI lines must be connected
Daisy
Would you like to disable debugWIRE?
COM Port-
Baud rate: 19200 (default)
화이 최소
"Disable debugWIRE" 버튼을 클릭하고 획
인 경에서 에 들 신덕 입니다.
$\downarrow$
AVHStudio
Platform has been disconnected, leaving debug mode
•••

# 5.2 Program 모드로 전환 완료

🛊 AVR Studio - [D:₩NuriPen₩N	NuriPenc]	
🗄 🖺 Eile Project Build Edit View	<u>T</u> ools <u>D</u> ebug <u>W</u> indow <u>H</u> elp	- 8×
i 🗋 🖂 🖉 🙂 X 🖻 🖺 🖨 🦘	▶ 🖻 🙀 !  🔺 % % 疼 卓 卓 !  🖌 ! ▶ □ 国 🗉 🖬 ♦ 領 [# 領 19 國 ④ 🛇 4 ! 頁 🗉 团 🗐	
Trace Disabled 🔹 💐 🕀 .	本 オ : 📾 📾 🕌 が が 💷	
Project	▼ × ↓ I/O View	▼ ×
⊡- Se NuriPen_cof	* Note :	
NuriPen,cof	Transformation Converse Match	
🗈 🔄 Source [read only]	JTAGICE mkli II ALOG_COMPA	
include [read only]	Connection   Debug   Status   PWM   PROM	
	-JTAG connection BTB	
	Target clock frequency	
	RTD	
	Accurate specification of the target device's clock frequency is necessary in order to correctly set the JTAG port clock frequency. Over-specifying this parameter will cause JTAG <b>IER_COUNTER_0</b>	
	communications failure.	
	Daisy chain	
	Target device is part of a JTAG daisy chain	
	Devices before: Instruction bits before:	
	Devices after: Instruction bits after:	
	Address Value Bits	
	COM Port	
	Baud rate: 19200 (default)	
Message		
JTAGICE mkll: Target power has b JTAGICE mkll: Target power lost	확인 취소	
JTAGICE mkll: Target power has b		
JTAGICE mkll: Target power has by		
JTAGICE mkll: Target power lost, JTAGICE mkll: Target power has b		
Loaded objectfile: D:\NuriPen\Nuri	Pen.cof	
<		
🗉 Build 🕕 Message 🛛 🖼 Find in Files 🗌	Breakpoints and Tracepoints	
	ATmega88 JTAGICE mkII Auto 🕘 Ln 531, Col 1 CAP N	IUM OVR 🔐

## 6. Flash program 테스트

		_	"Con" 0	이콘 클릭			
			1				
AVR Studio - [D:1	₩NuriPen₩NuriPen	c]					
🗄 🖹 Eile Project Build	<u>E</u> dit <u>V</u> iew <u>T</u> ools <u>D</u> e	bug Window <u>H</u> e	lp				- 8×
ê 🗋 💕 层 🖉 🙂 🐒	🖻 🖹 🖪 🤊 🖻 🔁 🙀	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	8 薛 章 1 🚟 🖌 🕩	🔲 🗐 🗉 🔿 원	I ("I 🖆 *() 🔡 🥥 🚕 60	: 🗛 🖂 🖃 🖉 🖼	
Trace Disabled	- % % .C ± T 🛙	1 🕼 🗰 🏂 🏷 AUTO					
Project	▼ X [ *				I/O View		<b>▼</b> ×
⊡-🐲 NuriPen_cof		Note :		-		COMPARATOF -	
🖻 🔄 Object	÷.	/7.1 /0			AD_CONVERTER		
· ···· ● Nun Pen, con ······ ● Source [read o	nly] (	/limer/CounterU ( nterrupt [TIMO_C	Compare Match OMPA] void TimerO(vo	oid) -	I I ANALOG_COMPA.		
🔤 Include [read					IIIIICPU		
	Select AVR Pro	ogrammer				<	
	Platform:		Port:				
	STK500 or AVRISP		Auto	~	Connect		
	JTAG ICE		USB				
	JTAGICE mkli		COM1		Cancel		
	AVRISP mkli		LOM2				
	STK600		COM5	~	Baud rate:		
			122:12		115200 👻		
	<ul> <li>Lip: Lo auto-connect button on the toolbait</li> </ul>	t to the programm	ier used last time, pre	ss the 'Programmer'	Baud rate changes are		
	button on the toolba				active immediately.	Value Bits	
	Note that a tool can	not be used for pr	ogramming as long a	s it is connected in			
	a debugging session	. In that case, sel	ect Stop Debugging	first.			
	Disconnected Mo	de					
Message							
JTAGICE mkll: Target	power has been restored,			4	~		
JTAGICE mkll: Target	: power lost,						
JTAGICE mkll: Target	power has been restored,						
JTAGICE mkli: Target	: power has been restored, : nower lost						
JTAGICE mkll: Target	power has been restored,						
Loaded objectfile: D:∀	∀NuriPen₩NuriPen,cof						
<				>			
🔄 Build 🕕 Message 🗔	Find in Files   🔂 Breakpoin	ts and Tracepoints					
			ATm	eqa88 JTAGICE mk	II Auto	n 531. Col 1 GAP 1	JUM OVR .:
				Strates in			

#### 6.1 DWEN Fuse bit 확인

JTAGICE mkll in IS	SP mode with ATmega88	
Main Program F BOOTSZ BOOTRST BSTDISBL DWEN SPIEN WDTON EESAVE BODLEVEL CKDIV8 CKOUT SUT_CKSEL	Fuses LockBits Advanced HW Settings HW Info Auto Boot Flash size=1024 words Boot address=\$0C00 [DWEN] bit 가 set 되어 있으면 Program 이 도지 않습니다. Brown-out detection disabled Ext, Crystal Osc, 3,0-8,0 MHz; Start-up time PWRDWN/RESE,.▼	
EXTENDED HIGH LOW	0xF9 0xDF 0xCC	
<ul> <li>✓ Auto read</li> <li>✓ Smart warnings</li> <li>✓ Verify after prog</li> </ul>	s gramming Program Verify [H	ead
Setting device param Entering programmin Reading fuses addre Leaving programmin	neters., OK! ig mode., OK! iss 0 to 2,, 0xCC, 0xDF, 0xF9., OK! g mode., OK!	

#### 6.2 Flash program

JTAGICE mkll in ISP mode with ATmega88
Main Program Fuses   LockBits   Advanced   HW Settings   HW Info   Auto
Erase Device
Erase device before flash programming 🔽 Verify device after programming
Flash C Use Current Simulator/Emulator FLASH Memory ● Input HEX File D:₩NuriPen₩NuriPen bex
Program     Verify     Read
EEPROM
Input HEX File
Pr <u>o</u> gram Ver <u>i</u> fy Re <u>a</u> d
ELF Production File Format
Input ELF File
Erogram       Save       Fuses and lockbits settings         Program       Save       must be specified before         saving to ELF       Saving to ELF
Getting ISP frequency parameters,, SD=0x06,, OKOK Reading FLASH input file., OK Setting device parameters,, OK! Entering programming mode., OK! Programming FLASH,,

Flash program 완료

# http://cafe.naver.com/avrstudio