# Debugging with WawiLib

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# 1. Introduction

#### 1.1. Objective of this document.

The objective of this document is to describe how to use WawiLib to debug an Arduino application.

WawiBlinkDebugUsb.ino, a demo sketch supplied with the WawiSerialUsb library, will be used to explain the concept.

The idea to make this demo came when I was making a demo for the WawiLib data recorder functions. The data recorder demo did not work so I used WawiLib to debug the demo. I was very surprised to see how fast I found the bugs with WawiLib.

In this document, I will describe what went wrong and how I used WawiLib to solve the problem. The demo is not an artificial setup but a report of what actually happened.

#### 1.2. Software and hardware requirements

The Arduino IDE (in this example 1.8.15) and WawiLib V2.0.x both need to be installed on your PC. The demo runs with licensed and unlicensed versions of WawiLib. During the grace period of 2 months, you can test and use all functions without registration. After this period registration is required in order to access all functions. At this time registration is free. In the future a small contribution might be required to register in order to support the website.

The hardware you need is an Arduino board, a USB programming cable, 3 Dupont male-male breadboard wires and a Windows PC (32 or 64 bit). In this demo, we will use the Arduino UNO but other boards can be used in a similar or even identical way. For compatibility of boards, go to <u>www.sylvestersolutions.com</u>.

If you want to use another Arduino board instead of the UNO for the demo, you might need to use 3V instead of 5V in order not to damage your board. For more details, look at the specification of your board.

#### 1.3. Required user experience

The concepts of this document build further on the tutorial "*Getting started WawiLib USB*". You should be familiar with the demo as I will not re-explain how to go online with the board over USB.

# 2. THE "WawiBlinkDebugUSB" Demo sketch example

#### 2.1. Concept of "WawiBlinkDebugUSB"

This application builds further on "WawiBlink" from the demo "Getting Started with WawiLib USB". WawiBlinkDebugUSB uses 3 digital inputs. Whenever one of these inputs goes high, the onboard LED will blink during a time interval and then go dark again. The objective of the sketch is to blink a LED multiple times during a time period when one of 3 digital inputs is raised high.

- On digital input 5 high, the LED should blink during 3 seconds (500ms on, 500ms off).
- On digital input 6 high, the LED should blink during 7 seconds (500ms on, 500ms off).
- On digital input 7 high, the LED should blink during 10 seconds (500ms on, 500ms off).

In order to demonstrate how to debug with Wawilib, I added 4 bugs to the code. In this demo I will demonstrate how they can be found in a simple way using WawiLib.

Note: WawiLib does not claim to be a state-of-the-art debugger like dedicated IDE's that use special hardware and dedicated CPU facilities. But, as will be demonstrated in this demo, using WawiLib together with the Arduino IDE will make it much easier to find bugs compared to what you can do with the bare Arduino-IDE.

#### 2.2. Download and execute "WawiBlinkDebugUSB"

- □ Open the example via the menu "File\Examples\WawiSerialUsb\WawiBlinkDebugUsb" in the Arduino IDE.
- $\Rightarrow$  Compile and download the example in your board.

Below you can see the program in detail. This program will not work properly because there is are 4 bugs in it. We will use WawiLib to find the error and then correct it. The bugs are indicated in comment.

Compile and download WawiBlinkDebugUsb to your Arduino board:

```
Project Name: WawiBlinkDebugUsb
  File: WawiBlinkDebugUsb.ino
  Detailed manual:
  www.SylvesterSolutions.com\documentation -> "Debugging with WawiLib.pdf"
  Description: demo file library for WawiSerialUsb libary.
  Demo dedicated to demonstrate a debug concept with WawiLib.
  Lets you monitor and modify variables of different type and sizes.
  Use the programming USB port to make connection with the Arduino board.
  Variables can be checked & modified with the WawiLib-PC software.
  Author: John Gijs.
  Created December 2020
  Technical support: support@sylvestersolutions.com
  Additional info: info@sylvestersolutions.com
*/
#include <WawiSerialUsb.h>
WawiSerialUsb WawiSrv;
#define LED 13 // blinking light
#define IN_5 5 // light start blinking switch 1
```

```
#define IN_6 6 // light start blinking switch 2
#define IN_7 7 // light start blinking switch 3
// variables for demo:
long int blinkTimeActual = 0; // counter blink active (milliseconds)
long int blinkTimeTarget[] = { 3000, 7000, 1000 }; // bug 1: { ..., ..., 10000};
bool digInput5; // state of digital input 5
bool digInput6; // state of digital input 6
bool digInput7; // state of digital input 7
bool led; // state of led
int loopCounter;
// make variables of interest know to WawiLib:
void wawiVarDef()
{
    WawiSrv.wawiVar(digInput5);
    WawiSrv.wawiVar(digInput6);
    WawiSrv.wawiVar(digInput7);
    WawiSrv.wawiVar(led);
    WawiSrv.wawiVar(blinkTimeActual);
    WawiSrv.wawiVar(loopCounter);
    WawiSrv.wawiVarArray(blinkTimeTarget);
}
void setup()
{
    Serial.begin(115200);
    // initialize WawiLib library:
    WawiSrv.begin(wawiVarDef, Serial, "MyArduino");
    pinMode(LED, OUTPUT);
    pinMode(IN_5, INPUT);
    pinMode(IN_6, INPUT);
    pinMode(IN 7, INPUT);
    WawiSrv.wawiBreakDisable();
}
void loop()
{
    digInput5 = digitalRead(IN 5);
    digInput6 = digitalRead(IN_6);
    digInput6 = digitalRead(IN_7); // bug 2: should be digInput7 = ...
    if (digInput5)
        blinkTimeActual = blinkTimeTarget[1]; // bug 3: should blinktimeTarget[0]
    if (digInput6)
        blinkTimeActual = blinkTimeTarget[1];
    if (digInput7)
        blinkTimeActual = blinkTimeTarget[2];
    if (digInput5 || digInput6 || digInput7)
    {
        WawiSrv.wawiBreak(1, "breakpoint after write to activeMsCounter hit");
    }
    while (blinkTimeActual < 0) // bug 4: should be blinkTimeActual > 0
    {
        WawiSrv.wawiBreak(2, "In while loop");
```

```
WawiSrv.print("Counting down:");
WawiSrv.println(blinkTimeActual);
WawiSrv.println("LED is ON.");
led = HIGH;
digitalWrite(LED, led);
WawiSrv.delay(500);
blinkTimeActual = blinkTimeActual - 500;
WawiSrv.println("LED is OFF.");
led = LOW;
digitalWrite(LED, led);
WawiSrv.delay(500);
blinkTimeActual = blinkTimeActual - 500;
}
WawiSrv.loop();
loopCounter++;
```

Fig. 2.1. WawiBlinkDebugUsb.ino including 4 bugs.

 $\Rightarrow$  Using 3 Dupont wires, connect all IO's 5,6, & 7 to the GND of the UNO.



Fig. 2.2. Uno with IO's 5, 6, 7 connected to GND.

# 3. Debug with WawiLib

- 3.1. Visualize all sketch variables in WawiLib.
- ⇒ Start WawiLib on your PC.
- $\Rightarrow$  Go online (press Setup()) on the top toolbar.

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Avail	able variabl	es			1	Interface/Ar	d. ID	Variable na	me A	tual value	Write value	Format	Record	er Variable address and stat
e ser	Single varia			1										
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	blinkTimeActual     loopCounter			6										
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Ē,	HoopCounter     Array     blinkTimeTarget[02]     blinkTimeTarget[02]     blinkTimeTarget[02]     blinkTimeTarget[02]     blinkTimeTarget[02]			8					_					
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Fig. 3.1. WawiLib online on an Uno with WawiBlinkDebugUsb.ino

- ⇒ Drag the variables *digilnput5*, *digilnput6* and *digilnput7* to the grid.
- ⇒ Drag the variable *blinkTimeTarget[0..2]* to the grid (or type in the name of the variable in the table manually).
- ⇒ Note: you can select all of them together and drag all variables at once to the grid.

### 3.2. Bug 1: Faulty initialization of *blinkITemTarget*. (Check initializations)

⇒ Open the the blinkTimeTarget in the tree.

 $\Rightarrow$  Add *blinkTimeTarget*[2] to the grid table.

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e ser	ingle varia	hle		1		ser1/MyArc	luino	digli	nput5		0				@digInpu	t5=0x02B	5 [1 byt	e] x 1
T d	dialnput	5		2		ser1/MyArc	luino	digli	nput6		0				@digInpu	t6=0x02B	5 [1 byt	e] x 1
	diaInput	6		3		ser1/MyArc	luino	digli	nput7		0				@digInpu	t7=0x02B	0 [1 byt	e] x 1
e e	dialnput	7		4		ser1/MyArc	luino	blinkTime	Target[02]	300	0;7000;1000				@blinkTim	eTarget=(	0x0100	[4 by
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Fig. 3.2. Actual values of variable real time displayed by WawiLib.

- ⇒ Look at the values of *blinkTimeTarget* [2]
- $\, \Rightarrow \,$  You see that they do not have the right value, 1000 instead of 10000.
- ✓ Look at the code in the Arduino IDE: the initialization value is faulty:
- ⇒ long int blinkTimeTarget[] = { 3000, 7000, 1000 }; // bug 1: { ..., ..., 10000};

#### Fig. 3.3. Bug 1.

- $\checkmark$  Correct the bug in the code (replace 1000 by 10000).
- ✓ Fill in 10.000 for the new value of *blinkTimeTarget[2]* in the "Write value" column.
- ✓ Press "write all".

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Single variable	1	ser	1/MyArdu	lino	digli	nput5		0				@digInput5=0x02B6	[1 byte] x 1 ·
	2	ser	1/MyArdu	ino	digli	nput6		0				@digInput6=0x02B5	[1 byte] x 1 ·
# digInput6	3	ser	1/MyArdu	ino	digli	nput7		0				@digInput7=0x02B0	[1 byte] x 1 ·
	4	ser	1/MyArdu	lino	blinkTime	Target[02]	3000	);7000;10000				@blinkTimeTarget=0	x0100 [4 byte
⊞ led	5	ser	1/MyArdu	lino	blinkTim	eTarget[2]		10000	10	0000		@blinkTimeTarget=0	x0100 [4 byte
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<ul> <li>blinkTimeTarget[0]</li> <li>blinkTimeTarget[1]</li> <li>blinkTimeTarget[2]</li> </ul>	11												
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dex Time	Node		N	lessage									

Fig. 3.4. Actual values after correcting the value of *blinkTimeTarget[2]* to 10000.

#### 3.3. Bug 2: Use of *digilnput6*. Instead of *digilnput7*. (The IO test.)

- $\Rightarrow$  Connect Digital io 5 to +5V on the Uno.
- $\Rightarrow$  Look at the table.

실 Wa	awiLib-PC [C	:\Users\Jo	hi∖Docum	ents\NoNa	me.Wif*]	-[C:\Users\	Johi\Docu	iments\Nol	Name.Wvf*	]						-		Х
New	Open	Save	😕 Print	Copy	Ж Cut	Daste	Offline	Setup()	Ta Loop()	Write all	▶ Continue	• brkpt	⊠ brkpt					
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⊟ se	er1\MyArdui	no		1	s	er1/MyArd	luino	digl	nput5		1				@digInput5	=0x02B6	[1 byte] x	1 \
T		5		2	s	er1/MyArd	luino	digli	nput6		0				@digInput6	=0x02B5	[1 byte] x	1 \
	H dialoput	5		3	s	er1/MyArd	luino	digl	nput7		0				@digInput7	=0x02B0	[1 byte] x	1 \
	H dialnout	7		4	s	er1/MyArd	luino	blinkTime	Target[02]	3000	;7000;10000				@blinkTime	Target=0x	0100 [4 b	oyte] >
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	H blinkTime	Actual		6														
	HoopCou	nter		7														
6	Array		~	<														>
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000	28/07/202	1 20:12:51	1.245	ser1/COM	18/MyAr	rduino	[Row 5] W	/riting varia	ble blinkTir	neTarget[2	2]=10000 () c	omplete	ed.					
<																		>
					Loop	o() Auto	write on	No recor	ders active	ser1=N	/vArduino=	OM18/	/115200,8	N, 1, NONE	[ITF LOOP] n	nsg.ok/tot	: 10845/1	10845

Fig. 3.5. Actual values after DI5 connected to 5V.

- ⇒ *digInput5* goes to 1 as it should, this is OK.
- ✓ Connect Digital input 5 to GND on the Uno.
- ✓ Connect Digital input 6 to 5V on the Uno.
- ⇒ Look at the table

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				3	s	er1/MyArd	luino	digIr	nput7		0				@digInput7=0x02	B0 [1 byte] x	(1 )
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6	digInput7 led blinkTimeActual		5	s	er1/MyArd	uino	blinkTime	eTarget[2]		10000	10	0000		@blinkTimeTarget	=0x0100 [4 ]	byte] >	
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ndex 1 )00 2	blinkTimeActual     loopCounter     Array      Array      Z8/07/2021 20:12:51.24			Node ser1/COM1	8/MyAı	rduino	Message [Row 5] W	/riting varia	ble blinkTir	neTarget[2	!]=10000 () co	mplete	ed.				

Fig. 3.6. Actual values after DI6 connected to 5V.

- ⇒ digInput6 remains at 0, this is not OK, this is a bug. It seems that digInput6 is overwritten by the statement digInput6 = digitalRead(IN\_7);
- $\checkmark$  Correct the bug in the code (fig. 3.7.).

```
digInput5 = digitalRead(IN_5);
digInput6 = digitalRead(IN_6);
digInput<mark>7</mark> = digitalRead(IN_7); <u>// bug 2: should be digInput7 = ...</u>
```

```
Fig. 3.7. Bug 2.
```

✓ Press "Offline"

- ✓ Compile and download the corrected code.
- ✓ Press "Setup".

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l d	dialnout <sup>c</sup>	5		2	ser1/My	Arduino	digl	nput6		1			INT	@digInput6=0	x029B [	1 byte] x	1 \
8	diaInput	5		3	ser1/My	Arduino	digli	nput7		0			INT	@digInput7=0	x029A [	1 byte] x	1 ۱
8	digInput7	7		4	ser1/My	Arduino	blinkTime	Target[02]	3000	7000;10000			INT	@blinkTimeTar	get=0x0	0100 [4 b	yte] >
0	led			5	ser1/My	Arduino	blinkTim	eTarget[2]		10000	10	0000	INT	<pre>@blinkTimeTar</pre>	get=0x0	0100 [4 b	yte] >
8	blinkTime	Actual		6													
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Fig. 3.8. DI 6 at 5V makes digInput6 = 1 (OK).

- ✓ Connect Digital input 5 to GND.
- ✓ Connect Digital input 7 to 5V.
- ✓ Check the table:

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le se	Single variab	0		1		ser1/MyArd	uino	diglr	nput5		0			INT	@digInpu
Ť	dialonut5			2		ser1/MyArd	uino	diglr	nput6		0			INT	@digInpu
	E diaInput6			3		ser1/MyArd	uino	diglr	nput7		1			INT	@digInpu
	digInput7			4		ser1/MyArd	uino	blinkTime	Target[02]	3000	;7000;1000	0		INT	@blinkTin
	Bled   5     BlinkTimeActual   6				uino	blinkTim	eTarget[2]		10000	10	0000	INT	@blinkTin		
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Fig. 3.9. DI 7 at 5V makes digInput7 = 1 (OK).

#### 3.4. Bug 3 blinkTimeTarget[1] should be blinktimeTarget[0].

- $\checkmark$  Add *blinkTimeActual* to the table.
- ✓ Connect Digital input 5 to GND.
- ✓ Connect Digital input 6 to GND.
- ✓ Connect Digital input 7 to 5V.
- ✓ Check the value of blinkTimeActual (should be 10.000)

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	digInput	5		3		ser1/MyArd	uino	diglr	nput7		1			INT	@digInpu
	E dialnput	7		4		ser1/MyArd	uino	blinkTime	Target[02]	3000	;7000;1000	)		INT	@blinkTin
	⊞ led			5		ser1/MyArd	uino	blinkTim	eTarget[2]		10000	10	0000	INT	@blinkTin
	🕀 blinkTime	Actual		6		ser1/MyArd	uino	blinkTin	neActual		10000				@blinkTin
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005	28/07/202	1 20:53:27	.506	ser1/COM1	B/MyA	rduino	Arduino li	brary version	on 02.01, A	rduino bu	ffer size: (R)	(,TX)=(64	,64) byte:	s, Commur	nication link
006	28/07/2021 20:53:27.506         ser1/COM18/MyArduino         Arduino library version 02.01, Ardui           28/07/2021 21:00:02.140         ser1/COM18/MyArduino         [Row 6] Illegal variable name '•' spe								specified						
/															



- ⇒ Check the value of blinkTimeActual is and should be 10.000 (= OK)
- ✓ Connect Digital input 5 to GND.
- ✓ Connect Digital input 6 to 5V.
- ✓ Connect Digital input 7 to GND.
- ✓ Check the value of blinkTimeActual (should be 7.000)

Mew	🖻 Open	<b>⊡</b> Save	Print	Сору	Ж Cut	Paste	Offline	Contraction Setup()	Loop()	Write all	► Continue	• brkpt	⊠ brkpt		
⊟ Avai	ilable variables		^			Interface/A	rd. ID	Variab	le name	Ac	tual value	Write	e value	Format	
le se	Single variable			1		ser1/MyArc	luino	digli	put5		0			INT	@digInpt
1	dialoput5	-		2		ser1/MyArc	luino	digl	put6		1			INT	@digInpt
	+ diaInput6			3		ser1/MyArc	luino	digli	nput7		0			INT	@digInpt
	🗄 digInput7			4		ser1/MyArc	luino	blinkTime	Target[02]	3000	);7000;10000	)		INT	@blinkTin
	⊞ led			5		ser1/MyArc	luino	blinkTim	eTarget[2]		10000	10	0000	INT	@blinkTin
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006	28/07/2021 2	21:00:02.1	40	ser1/COM1	8/My	Arduino	[Row 6] III	legal variab	le name '•'	specified					
006	28/07/2021 2	21:00:02.1	40	ser1/COM1	18/My	Arduino	[Row 6] III	legal variab	le name '•'	specified					

Fig. 3.10. DI 6 at 5V makes blinkTimeActual 7.000 (OK).

⇒ Check the value of blinkTimeActual is and should be 7.000 (= OK)

- ✓ Connect Digital input 5 to 5V.
- ✓ Connect Digital input 6 to GND.
- ✓ Connect Digital input 7 to GND.
- ✓ Check the value of blinkTimeActual (should be 3.000)

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⊫ se	Single variable	2		1		ser1/MyArd	uino	diglr	nput5		1			INT	@digInpu
	dialnput5	-		2		ser1/MyArd	uino	digIr	nput6		0			INT	@digInpu
	+ dialnput6			3		ser1/MyArd	uino	digIr	nput7		0			INT	@digInpu
	digInput7			4		ser1/MyArd	uino	blinkTime	Target[02]	3000	);7000;10000	1		INT	@blinkTin
	⊞ led			5		ser1/MyArd	uino	blinkTime	eTarget[2]		10000	1(	0000	INT	@blinkTin
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		10	000	utowrite on	No	recorders a	tivo so	r1-MyArd	uino-CON	110/11520				ak/tat: 1/	101/1110

Fig. 3.10. DI 6 at 5V makes blinkTimeActual 7.000 (OK).

⇔ Check the value of blinkTimeActual is and should be 5.000 (= Not OK), bug identified.

<pre>if (digInput5)</pre>	
blinkTimeActual = blinkTimeTarget <mark>[1]</mark> ;	<pre>// bug 3: should blinktimeTarget[0]</pre>

Fig. 3.11. DI 5 at 5V does not make blinkTimeActual 3.000 (Not OK).

- ✓ Press "Offline"
- ✓ Correct the code compile and download.
- ✓ Press "Setup()".
- ✓ Check the result.

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		5		2		ser1/MyArc	duino	diglr	nput6		0			INT	@digInpu
	digInput	6		3		ser1/MyAre	duino	no digInput7 no blinkTimeTarget[02]			0			INT	@digInpu
	digInput	7		4		ser1/MyArd	duino				0;7000;1000	0		INT	@blinkTin
	⊞ led			5		ser1/MyAre	duino	blinkTime	Target[2]		10000		10000		@blinkTin
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002	28/07/202	1 21:13:40	.038	ser1/COM	/18/M	Arduino	Reading s	ettings from	n Arduino						
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Fig. 3.12 DI 5 at 5V makes blinkTimeActual 3000 (OK).

## 3.5. Bug 4: (blinkTimeActual < 0) should be blinkTimeActual > 0

#### ✓ Press "Setup()".

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	🖶 digInput6			4		ser1/MyAr	duino blinkTimeTarget[02]			3000	;7000;10000	)	1		@blinkTi	n
	⊞ led			5		ser1/MyAr	duino	blinkTimeTarget[2]			10000	10000		INT	@blinkTi	n
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006	28/07/202	1 21:00:02	.140	ser1/COM18/MvArduino [Row 6] Illegal variable name ' ' specified												
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<															>	

Fig. 3.13. WawiBlinkDebugUsb sketch with previous bugs corrected.

- ✓ Connect Digital input 5 to +5V.
- ✓ Connect Digital input 6 to GND.
- ✓ Connect Digital input 7 to GND.
- ✓ Check the value of *blinkTimeActual* (should be decreasing)
- ⇒ *blinkTimeActual* is not decreasing and should be. And LED is not blinking ?
- ✓ Activate the breakpoints by pressing on the button brkpt with the full red dot.

Þ		Ø
Continue	brkpt	brkpt

Fig. 3.	.14. Ac	tivate	breal	<i>cpoints</i>
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				5		ser1/MyAr	duino	blinkTimeTarget[2]			10000			INT	@blinkTim	ieTa				
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002	28/07/202	21:46:01	.048	ser1/COM18/MyArduino function: loop, line: 81																

Fig. 3.15.Breakpoint hit at source code line 81.

- $\checkmark$ Look at the WawiLib status bar in fig 3.15. status of code execution is ITF\_LOOP\_BRK (breakpoint hit)
- $\checkmark$  Look at line 81: so the execution of the code reaches this point of the source code.



Fig. 3.16. Source code with 2 breakpoint locations.

- ✓ And the values of blinkTimeActual at that spot is 3000.
- ✓ Hit the continue button.



-				Fig.	3.17	7. Cont	inue e	executi	on aft	er bre	akpoin	t.				
<b>₩</b>	awiLib-PC [C: <sup>\</sup>	\Users\Joh	ni∖Docun	nents\NoNan	ne.Wif*]	-[C:\Users\	Johi\Docu	ments\No	Name.Wvf*	*]				_		×
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	digInput5			3	s	ser1/MyArc	luino	digli	nput7		0			INT	@digInpu	ut7=1
				4	5	ser1/MyArc	luino	blinkTime	Target[02]	] 3000	;7000;1000	00		INT	@blinkTir	neTa
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002	28/07/2021	21:46:01.	048	ser1/COM1	8/MyA	rduino	function: I	oop, line: 8	81							
003	28/07/2021	21:50:25.	847	ser1/COM1	8/MyA	rduino	Breakpoin	t 1 hit: brea	akpoint aft	er write to	activeMsCo	ounter hit				
004	28/07/2021	21:50:25.	847	ser1/COM1	8/MyA	rduino	file: C:\VcF	Projects201	9\WawiLib	LibSerial	Jsb\example	es\WawiB	linkDebu	gUsb\none	\none.ino	
005	28/07/2021	21:50:25.	847	ser1/COM1	8/MyA	rduino	function: I	oop, line: 8	81							
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Fig. 3.18. Breakpoint at line 81 is hit twice, the one in 86 is not and it should.

- A break again at 81 and not at 86, so we are not entering the loop in spite of a correct value for blinkTimeActual at this location.
- $\Rightarrow$  Bug found, seems < needs to be >.



- ✓ Correct the bug.
- ✓ Press "offline"
- ✓ Compile e Download the corrected code.
- ✓ Press "Setup()"
- ✓ Add the variable *led* to the grid with variables.
- ✓ Connect Digital input 5 to GND.
- ✓ Connect Digital input 6 to GND.
- ✓ Connect Digital input 7 to GND.
- ⇒ Now *blinkTimeActual* is counting down and the LED is blinking.
- ⇒ Enable Display .print() messages in the output window. (right mouse click)





- $\Rightarrow$  The output window shows the output of the .print() statements
- $\Rightarrow$  LED blinks on and off
- $\Rightarrow$  The variable led alternates between 1 and 0.
- ⇒ The status of MyArduino (status bar) is now ITF\_LOOP: code in Loop() is executing.

New	🖻 🛃 Open Sav	e Print	Copy	K Docut Paste	e Offline	Setup()	Toop()	Write all	► Continue	e brkpt	⊠ brkpt		
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-			2	ser1/My/	Arduino	diglr	put6		0			INT	@digInp
	digInput6		3	ser1/My/	Arduino	diglr	put7		0			INT	@digInpu @blinkTir @blinkTir @blinkTir
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	⊞ led		5	ser1/My/	Arduino	blinkTim	Target[2]		10000			INT	@blinkTin
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2  3  4	28/07/2021 22:0 28/07/2021 22:0 28/07/2021 22:0	5:44.661 5:44.661 5:45.175	ser1/COM18 ser1/COM18 ser1/COM18	3/MyArduino 3/MyArduino 3/MyArduino	Counting LED is ON LED is OF	down:1000 I. F.							
12 13 14	28/07/2021 22:0 28/07/2021 22:0 28/07/2021 22:0 28/07/2021 22:0	5:44.661 5:44.661 5:45.175 5:45.676	ser1/COM18 ser1/COM18 ser1/COM18 ser1/COM18	3/MyArduino 3/MyArduino 3/MyArduino 3/MyArduino	Counting LED is ON LED is OF Counting	down:1000 I. F. down:3000							
12 13 14 15 16	28/07/2021 22:0 28/07/2021 22:0 28/07/2021 22:0 28/07/2021 22:0 28/07/2021 22:0	5:44.661 5:44.661 5:45.175 5:45.676 5:45.676	ser1/COM18 ser1/COM18 ser1/COM18 ser1/COM18 ser1/COM18	8/MyArduino 8/MyArduino 8/MyArduino 8/MyArduino 8/MyArduino	Counting LED is ON LED is OF Counting LED is ON	down:1000 I. F. down:3000 I.							
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Fig 3.21. Program with code running as it should and debug output in the bottom window.

- ✓ Enable the breakpoints (press "brkpt").
- ✓ Press "continue" when a breakpoint is hit.

- ✓ Press "continue" again when a breakpoint is hit.
- ⇒ In Fig. 3.22. You can see that both breakpoints are used. Bug is indeed corrected.

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82	28/07/2021 2	2:06:57.	.954	ser1/COM18	8/MyAre	duino	Breakpoint	t 2 hit: In w	hile loop									
82 83		2.06.57	954	ser1/COM18	B/MyAro	duino	file: C:\VcP	rojects201	9\WawiLib	\LibSerialU	Jsb\example	s\WawiB	linkDebu	gUsb\none	\none.inc	0		
82 83 84	28/07/2021 2	2.00.57.																



# 4. Further Thoughts

This this demonstration of the capabilities of WawiLib shows that it really contains added value when debugging code. The novice and experienced user can use it to improve and correct code. I used it for multiple programs even in a professional environment.

What is also very hand is that WawiLib can be used by the customers to get real time insight in the operation of the code. For example tuning a PID loop of a process that cannot be interrupted (you cannot use the console window to input a new parameter because the process needs to remain controlled) this approach is really adding value to the Arduino experience.

# 5. Further Reading

This demo demonstrates how to debug an Arduino sketch with WawiLib. The way to go is to visualize all variables of interest on the screen and observe what your application is doing. Debugging goes much faster and is easier because you see real time values of your variables. You can also change values to check if your analysis is correct without recompiling and downloading your program.

Another idea to debug is to record all variables with the WawiLib data recorder and then analyze what happened with Excel or another program of your choice.

I hope you enjoyed this demo. Visit us on <u>www.sylvestersolutions.com</u> for the other demos.