Visionics



# 8051 Microcontroller in EDWinXP

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### 8051 Microcontroller in EDWinXP

The 8051 microcontrollers in EDWinXP help the users to build real-time circuits. The 8051 can be interfaced with external devices like seven segment displays, interrupt generator, serial/pattern generator etc.

Using the 8051 microcontroller in EDWinXP

1. Open EDWinXP Main from Start  $\rightarrow$  Programs  $\rightarrow$  EDWinXP  $\rightarrow$ Ver x.xx  $\rightarrow$  EDWinXP Main.

Open the Schematic Page (Mixed-Mode Simulator) by double clicking on the
 Page {MAIN PAGE} under Project→ Circuit [MAINHIER] →Diagram→ Page
 {MAIN PAGE}.

3. Load 8051 microcontroller and Preprocess it.

4. The necessary timing for the controller is given by connecting a crystal across the pins XTAL1 and XTAL2. The timing can be provided manually by applying a clock of the desired frequency of the crystal to the pin XTAL1/XTAL2. This is done by selecting **Tools** $\rightarrow$  **Instruments**  $\rightarrow$  **Preset Logic**  $\rightarrow$  **Clock Generator** 

5. Connect nodes on XTAL1/XTAL2

6. Now by clicking on either of the two nodes **XTAL1/XTAL2** the following window appears

77 Clock	Editor	×
Select Clo	ock Pattern	
Unit:	Single Pattern:	Repeatable Pattern:
ms 🔻	Pattern	Pattern
·	State	State
	Time	Time
	Clear Add	Clear Add
	Help Accept	Set Pattern Cancel

7. Provide the desired frequency,

Eg: if the crystal frequency is 6MHz, then the time period will be  $(1)/(6x10^6)$  i.e. 0.1667  $x10^{-6}$ 

The clock fed to the XTAL pin is {L1us, H1us} as **Repeatable Pattern** 

8. Click on Add  $\rightarrow$  **Set Pattern**  $\rightarrow$  **Accept** 

Writing code for 8051 microcontroller

1. Select **Components** from the **Tool** Menu.

2. Choose **Component Properties** (second Function tool)  $\rightarrow$  **Change Simulation parameters** (second option tool) and **Click** on the **8051** microcontroller. A new window pops up.

Component Parameter Setup							
Assign Paran	neters Borr	ow Spice Parar	rameters Load Component Parameters Save to Library				
Component :	MICR	90xxx13/1		Sim. Functio	on : 15062		
Description :	AT90	S2313 (MMI)			,		
Parameter	Values	Description				<b></b>	
Project	D:\EDWIN>	Project path					
Output	Intel	tel Output format { Intel, Motorola }					
Position	Yes	Store current position of model interface window? { Yes, No }					
CLCL	0	Clock Period (	Clock Period (Minimum)				
Vol	30 mV	Port PB0/PB1 as digital output - Low-level min. output voltage [V]					
lol	20 mA	Port PB0/PB1 as digital output - Low-level max, output current [A]					
Voh	4.8 V	Port PB0/PB1 as digital output - High-level output voltage [V]					
	Help Setup Accept Cancel						

3. **Click Setup** tab, the code editor window pops up. Code can be written in this window. Code can be written either in C language or assembly language.

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#### 8051 Microcontroller in EDWinXP

<b>Ж МІСК90жж13/1</b>		×I				
	isting View Hex Editor (ROM) Hex Editor (EEPROM) Disassembler Output File Errors & Warnings					
省 🔯 🖯 🗊 😫 🕨	x 🕆 3	$\ $				
<u>ــــــــــــــــــــــــــــــــــــ</u>						
Line Message	Hex:					
	Bim:					
	. Registers					
Column: 1, Line: 1	E BAM	-				
The tool bar in the c	ode editor window is shown below					
Cle	ear Text ' Step into					
	nport Step over					
	Save Stop Debug					
E	Export to disk Start Debug					
	Build					
Clear text	- Clears the source code in the code editor window.					
Import from disk	<ul> <li>Displays the 'Open' dialog box and allows loading a new te</li> </ul>	×+				
file	- Displays the Open dialog box and allows loading a new te					
Save	Allows to solve the solution code					
	- Allows to save the source code.					
Export to disk	- Displays the 'Save' dialog box and allow to save the sour	ce				
Duild	code.					
Build						
_	Start Debug - Enters the Debug mode.					
Stop Debug	- Terminates debug mode.					
Step over	- Generates an event to notify model to step over the current	tly				
	debugged part of the code.					
Step into	- Enables to view the line by line execution of the source co	de				
in debug mode.						

#### Writing source code in C language

Basic structure for writing code in **C** language is

```
#include<8051.h>
void main ()
{
```

}

The code is written within the **main ()** function. For better understanding, the case of 8051\_Counter is taken. Load **8051\_Counter** and the steps mentioned till now in **Writing code for 8051 microcontroller** are executed.

The code for **8051\_Counter** is as follows:

	itor   Assembler Editor   Listing View   Hex Editor   Disassembler   Output File   Er 生 🔉 🗐 🌍 🤮 🕨 🗽 🍞 🍹
#	include<8051.h>
v v	<pre>roid Delay(int Time);</pre>
V V	void main()
(	
	int a,b,c,p,q;
	int i;
r	cepeat:
	a = PO;
	for (i = a; i <= 255;i++)
	( 72 - 0-01 -
	P3 = 0x01;
	b = i /100;
	c= i % 100; p = c / 10;
	q = p << 4;
	y = p << 4; p = c % 10;
	P1 = q + p;
	P2 = b;
	Delay(50);
	P3 = 0x00;
<b>—</b>	
Colum	nn: 32, Line: 12

By compiling (using the **Build** button) the basic structure in the **C Editor**, the default structure in the **Assembly Editor** will be obtained.

The code is written within the **\_main function**. The location to write the code is shown in the figure below.

<mark>≝</mark> i8051/1	
C Editor Assembler Editor Listing View Hex Editor Disassembler Output File Errors & Warnin	gs
😬 🗔 🗐 😰 🕨 🕨 🍞 🍹	
; function main	
$\frac{\text{main:}}{\text{ar2} = 0 \times 02}$	
ar3 = 0x03	
ar4 = 0x04	
ar5 = 0x05 $ar6 = 0x06$	
ar7 = 0x07	
ar0 = 0x00	
ar1 = 0x01	
SOURCE CODE CAN BE WRITTEN FROM HERE IN THE ASSEMBLY	
EDITOR;	
001010	
00101\$:	
Line Message	
Line Message	
- ACC - Bir	
Column: 14, Line: 235	
<u></u>	

The code in **Assembly Editor** is also compiled by using the **Build** button in the code editor Window.

Compilation messages will be shown under the Line Message column.

After successful compilation **click** the **Save** button and close the code editor window.

Click Accept in the Component Parameter Setup window.

After completing the schematic the circuit is **Preprocessed** and **Analysis** is **Run**.

#### **Debugging the code**

Place breakpoints to keep track of program execution.

**Breakpoints** can be placed by clicking on the gray space on left of the code statements.

<mark>≝</mark> 8051,1		
C Editor Assemble	ler Editor 🛛 Listing View 🗍 Hex Editor 🗍 Disassembler 🗍 Output File 🖡 E	Frrors & Warnings
*1 🖏 🗐 🇊	) 🐏 🕨 🕼 🐨 🚡	
ar2 =		-
ar3 = ar4 =		
ar5 =		
ar6 =		
ar7 =	0.007	
Line Mess	sage PC	
Line meas	sage	Hex: Dec:
	ACC	■ Bin:
Column: 1, Line: 1		

Note: To remove Breakpoints right click on them.

**Click** on **Start Debug** button in the code editor window. This will turn on the debug mode.

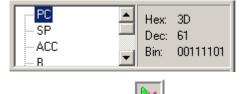
Close the **Code Editor** window and click **Accept** in **Component Parameter Setup**. Go to **Schematic Editor** and **Run Analysis**, the code editor window pops up.

The	program	can	be	debugged	using	the	Step	Over	0	(switching	between

1000

breakpoints) and **Step Into** (step by step execution) buttons.

By clicking on the required ports and registers the changes in them can be viewed during the process.



After debugging the **Stop debug button** kis clicked to exit the Debug mode. The Analysis continues till simulation time ends.