

ET-BASE AVR EASY32U4



This **Arduino** is Open Source that is the development project of AVR MCU; when it is published publicly, it is widespread rapidly and most people admire this project. It continues developing Software and nowadays (July, 2012) the Program Arduino has been developed to be Version **Arduino 1.0.1**. Moreover, it also continues developing and improving Hardware; it improves efficiency of this program to support the application with CHIP AVR Microcontroller No.ATmega32U4. A distinctive feature of this Board number is **USB Controller** insides; so, user can develop program by downloading through Port USB of Microcontroller ATmega32U4 directly without using any Chip USB TO SERIAL such as No.FT232RL, unlike the previous board version.

Arduino has developed the Hardware Board to support the application; it identifies the code as **Arduino Leonardo**. It distributes and publishes details of Hardware publicly; so, customers can further develop by one self. However, structure of this Chip is DIP SMD, so it is difficult for some customers who require making or creating board for themselves.

ETT has developed this ATmega32U4 to be Board and its structure is similar to Arduino Leonardo called "ET-BASE AVR EASY32U4". In this case, it designs Pin I/O according to the standard of ETT.

- Use ATmega32U4 to be MCU on board; RUN by Frequency 16MHz from Crystal Oscillator
- Has USB Controller insides, USB 2.0 Full Speed/Low Speed
- Has 32 KBytes FLASH Memory (Reserved 4 KBytes for BOOTLOADER), 2.5 KBytes SRAM/1 KBytes EEPROM
- Has 24 PIN Digital I/O in total (D0-D23); it can set Digital I/O to be Analog Input (10Bit ADC) 12-CH (A0-A11), PWM 7-CH, SPI 1-CH, I2C 1-CH, USART 1-CH
- Has Circuit Line Driver for RS232 Serial Port Communication 1-CH
- Can develop program on Program Arduino and program it instantly through Port USB, without any external Programmer.
- Can run under the Operating System of Windows, MAC OS X, Linux
- Support application with External Supply 7-12V that is both AC and DC. Moreover, it can use Power Supply from Port USB if using the current is not higher than 500mA by setting Jumper.
- Board size: 8 x 6 cm.



Components of Board ET-BASE AVR EASY32U4

Picture 1 shows components of board.



- No.1: This is Connector DC-JACK to receive external Power Supply 7-12V. It is free to arrange this connector in any type because ET-BASE AVR EASY32U4 has Circuit that prevents Connector Power Supply from converting.
- No.2: This is Connector USB to interface with computer; it is used to communicate data and develop program.
- No.3: This is LED to show status of receiving data(RX) and transmitting data(TX) for board.
- No.4: This is Port to interface with Analog Input A0-A5 or Digital I/O D18-D23 as shown in the picture 2 and table 1 below;

A0	A1
A2	A3
A4	A5
+5V	GND

Picture 2 shows pin position of A0-A5.

Pin position in the format of Arduino	Pin position in the format of AVR
A0 or D18	PF7
A1 or D19	PF6
A2 or D20	PF5
A3 or D21	PF4
A4 or D22	PF1
A5 or D23	PF0



• No.5: This is Port to interface with **Digital I/O D8-D13** as shown in the picture 3 and table 2 below;

D9
D11
D13
GND

Picture 3 shows pin position of D8-D13.



Pin position in the format of Arduino	Pin position in the format of AVR
D8 or A8	PB4
D9 (PWM) or A9	PB5
D10 (PWM) or A10	PB6
D11 (PWM)	PB7
D12 or A11	PD6
D13 (PWM)	PC7

Table 2

- No.6: This is Switch HWB that is interfaced with Pin PE2; it is used to test the operation of Board.
- No.7: This is LED that is interfaced with Pin D13(PC7); it is used to test the operation of Board.
- No.8: This is Connector RS232 4PIN (under the standard of ETT); it is used to interface with device for sending-receiving data by RS232 such as computer or Microcontrollers. Pin D0 (PD2) is interfaced with Pin RXD and Pin D1 (PD3) is interfaced with Pin TXD as shown in the picture 4 below;



Picture 4 shows pin position of Signal RS232.

• No.9: This is Port to interface with **Digital I/O D0-D7**; please read details in the picture 5 and table 3.

D0	D1
D2	D3
D4	D5
D6	D7
+5V	GND

Picture 5 shows pin position of D0-D7.



Pin position in the format of Arduino	Pin position in the format of AVR
D0 (RX)	PD2
D1 (TX)	PD3
D2 (SDA)	PD1
D3 (SCL,PWM)	PD0
D4 or A6	PD4
D5 (PWM)	PC6
D6 (PWM) or A7	PD7
D7	PE6



• No.10: This is Port to interface with Digital I/O D14-D17; please read details in the picture 6 and table 4 below.

D14	D15
D16	D17
+5V	GND

Picture 6 shows pin position of D14-D17.

Pin position in the format of Arduino	Pin position in the format of AVR
D14 (MISO)	PB3
D15 (SCK)	PB1
D16 (MOSI)	PB2
D17 (RXLED)	PB0

Picture 4

- No.11: This is Switch RESET to start the operation of MCU.
- No.12: This is MCU No.ATmega32U4 that is AVR MCU from ATMEL.
- No.13: This is Port ICSP(6PIN); it is used to download HEX File into MCU by external Programmer as shown in the picture 7.





Picture 4 shows pin position of Pin ICSP.

- No.14: This is **Jumper** to choose Power Supply either from Port USB or External Power Supply.
- No.15: This is LED POWER to show the status while it is providing power into board.



How to install Program Arduino

It is more convenient for user because ETT provides CD-ROM that includes Program Arduino as file and it is ready to install completely; it includes examples of Board ET-BASE AVR EASY32U4. In case of Program Arduino, if there is the latest version, customers can download it from website <u>www.arduino.cc</u>. The method to install Program Arduino is described below;

 Install Program; double-click Arduino_1.0.1_Setup.exe as shown in the picture 8.



Picture 8 shows file installation of Program Arduino.

2. Click Button **Next** to start installation as shown in the picture 9.



Picture 9 shows when it starts installing program.

3. Now, user has to setup folder location to install Program Arduino; user can choose any preferable location or install program according to the Default Value that is C:\Program Files\Arduino 1.0.1. Then, click Next as shown in the picture 10.

∞ Setup - Arduino 1.0.1
Select Destination Location Where should Arduino 1.0.1 be installed?
Setup will install Arduino 1.0.1 into the following folder.
To continue, click Next. If you would like to select a different folder, click Browse.
C:\Program Files\Arduino 1.0.1 Browse
At least 235.7 MB of free disk space is required.
< Back Next > Cancel

Picture 10 shows how to choose and setup folder location to install the program.

4. Then, the program creates Shortcut of Program Arduino; click **Next** as shown in the picture 11.

∞ Setup - Arduino 1.0.1
Select Start Menu Folder Where should Setup place the program's shortcuts?
Setup will create the program's shortcuts in the following Start Menu folder. To continue, click Next. If you would like to select a different folder, click Browse.
Arduino 1.0.1 Browse
< Back Next > Cancel

Picture 11 shows how to create Shortcut of Program Arduino.

5. Click **Create a desktop icon** to create ICON on the desktop, and then click **Next** as shown in the picture 12.



∞ Setup - Arduino 1.0.1
Select Additional Tasks Which additional tasks should be performed?
Select the additional tasks you would like Setup to perform while installing Arduino 1.0.1, then click Next. Additional icons:
< Back Next > Cancel

Picture 12

6. Now, the program is ready to install file and it also shows values that user have already set in the previous step as shown in picture 13. When everything is correct, click **Install** and the program starts installing instantly.

∞ Setup - Arduino 1.0.1	<
Ready to Install Setup is now ready to begin installing Arduino 1.0.1 on your computer.	5
Click Install to continue with the installation, or click Back if you want to review or change any settings.	
Destination location: C:\Program Files\Arduino 1.0.1 Start Menu folder:	
Arduino 1.0.1 Additional tasks: Additional icons: Create a desktop icon	
< Back Install Cancel	

Picture 13

7. Please wait for a while until the process of installing is complete; and then click **Finish** as shown in the picture 14.





Picture 14 shows the feature of the program when the installation is complete.

How to install Driver of Board ET-BASE AVR EASY32U4

 Interface USB Cable of Board ET-BASE AVR EASY32U4 with Port USB of computer PC; Windows found new device called "Arduino Leonardo" as shown in the picture 15.



Picture 15 shows the feature when computer found new Hardware.

2. Now, it shows the window "Found New Hardware Wizard"; choose "No, not this time" and then click Next as shown in the picture 16



Found New Hardware Wizard			
	Ard Welcome to the Found New Hardware Wizard Windows will search for current and updated software by looking on your computer, on the hardware installation CD, or on the Windows Update Web site (with your permission). Read our privacy policy Can Windows connect to Windows Update to search for software? Yes, this time only Yes, now and every time I connect a device No, not this time		
	< Back Next > Cancel		
	< Back Next > Cancel		

3. Now, Window "Found New Hardware Wizard" appears; choose "Install from a list or specific location (Advanced)", and then click Next as shown in the picture 17.

Found New Hardware Wizard				
	This wizard helps you install software for: Arduino Leonardo If your hardware came with an installation CD or floppy disk, insert it now.			
	What do you want the wizard to do? Install the software automatically (Recommended) Install from a list or specific location (Advanced) Click Next to continue.			
	<pre></pre>			

Picture 17



4. Setup value as shown in the picture 18 and then click Browse to specify the location that stores Driver. User can search in Folder Drivers of Program Arduino according to the location that has installed program; in this case, it is C:\Program Files\Arduino 1.0.1\drivers as shown in the picture 19; and finally, click OK.

Found New Hardware Wizard			
Please choose your search and installation options.			
 Search for the best driver in these locations. Use the check boxes below to limit or expand the default search, which includes local paths and removable media. The best driver found will be installed. Search removable media (floppy, CD-ROM) Include this location in the search: Include this location in the search: Don't search. I will choose the driver to install. Choose this option to select the device driver from a list. Windows does not guarantee that the driver you choose will be the best match for your hardware. 			
< Back Next > Cancel			

Picture 18

Br	owse For Folder 🛛 ? 🔀
2	Select the folder that contains drivers for your hardware.
	🖃 🚞 Arduino 1.0.1 📃
	🕀 🧰 drivers
	🗄 🚞 examples 📃
	표 🚞 hardware
	🗄 🧰 java
	🕀 🧰 lib
	🗉 🚞 libraries 🤍 🥃
	< · · · · · · · · · · · · · · · · · · ·
1	Fo view any subfolders, click a plus sign above.
	OK Cancel

Picture 19

5. When user has chosen values completely, click **Next** as shown in the picture 20. Then, the Windows searches the Hardware to install Driver as shown in the picture 21.



Found New Hardware Wizard				
Please choose your search and installation options.				
 Search for the best driver in these locations. 				
Use the check boxes below to limit or expand the default search, which includes local paths and removable media. The best driver found will be installed.				
Search removable media (floppy, CD-ROM)				
Include this location in the search:				
C:\Program Files\Arduino 1.0.1\drivers Variante Browse				
Don't search. I will choose the driver to install.				
Choose this option to select the device driver from a list. Windows does not guarantee that the driver you choose will be the best match for your hardware.				
<pre></pre>				

Picture 20

Found New Hardware Wizard			
Please wait while the wizard installs the software			
Arduino Leonardo			
i i i i i i i i i i i i i i i i i i i			
	< Back Next > Cancel		

6. When the window shows that the installation is complete, click **Finish** as shown in the picture 22.





Picture 22

7. Next, the window "Found New Hardware Wizard" appears again, choose "No, not this time"; and then, click Next as shown in the picture 23.





8. The Window "Found New Hardware Wizard" appears, choose "Install from a list or specific location (Advanced)"; and then, click Next as shown in the picture 24.



Found New Hardware Wizard				
	This wizard helps you install software for: Arduino Leonardo If your hardware came with an installation CD or floppy disk, insert it now.			
	 Install the software automatically (Recommended) Install from a list or specific location (Advanced) Click Next to continue. 			
	< Back Next > Cancel			

9. Choose the Driver location; it normally remembers the old value, click **Next** as shown in the picture 25.

Found New Hardware Wizard				
Please choose your search and installation options.				
 Search for the best driver in these locations. 				
Use the check boxes below to limit or expand the default search, which includes local paths and removable media. The best driver found will be installed.				
Search removable media (floppy, CD-ROM)				
Include this location in the search:				
C:\Program Files\Arduino 1.0.1\drivers Srowse				
O Don't search. I will choose the driver to install.				
Choose this option to select the device driver from a list. Windows does not guarantee that the driver you choose will be the best match for your hardware.				
< Back Next > Cancel				

Picture 25

10.When the window shows that the installation is complete, click **Finish** as shown in the picture 26.





11. User can check if the installation of Driver of ET-BASE AVR EASY32U4 is complete; click "Control Panel → System", choose Hardware and Device Manager. In this case, user can see the additional lists of Hardware Arduino Leonardo and USB Human Interface Device as shown in the picture 27.

📙 Device Manager	
File Action View Help	
Display adapters DVD/CD-ROM drives DVD/CD-ROM drives Floppy disk controllers Bush drives Dush drives	~
Jungo Keyboards Mice and other pointing devices Monitors Monitors Ports (COM & LPT) COM & LPT) ECP Printer Port (LPT1) ECP Printer Port (LPT1) FT-USB to R5232 (COM3) SCSI and RAID controllers	
E 🔮 Sound, video and game controllers	~

Picture 27 shows the feature when it installs the Driver completely.

How to start using Board ET-BASE AVR EASY32U4

 Open Program Arduino and choose the preferable board to develop; in this case, it chooses Arduino Leonardo or ET-BASE AVR EASY32U4 as shown in the picture 28.

🥺 sketch_jul27a	a Arduino 1.0.1		
File Edit Sketch	Tools Help		
sketch_jul27a	Auto Format Archive Sketch Fix Encoding & Reload Serial Monitor	Ctrl+T Ctrl+Shift+M	
	ArduBlock Tool		
	Ardubiock roor Board Serial Port Programmer Burn Bootloader		Arduino Uno Arduino Duemilanove w/ ATmega328 Arduino Diecimila or Duemilanove w/ ATmega168 Arduino Nano w/ ATmega328 Arduino Nano w/ ATmega168 Arduino Mega 2560 or Mega ADK Arduino Mega 2560 or Mega ADK Arduino Mega (ATmega1280) Arduino Mini w/ ATmega328 Arduino Mini w/ ATmega328 Arduino Mini w/ ATmega328 Arduino Ethernet Arduino Ethernet Arduino BT w/ ATmega328 Arduino BT w/ ATmega328 LilyPad Arduino w/ ATmega168 LilyPad Arduino w/ ATmega168 Arduino Pro or Pro Mini (5V, 16 MHz) w/ ATmega328 Arduino Pro or Pro Mini (5V, 16 MHz) w/ ATmega328 Arduino Pro or Pro Mini (5V, 16 MHz) w/ ATmega328 Arduino Pro or Pro Mini (3.3V, 8 MHz) w/ ATmega328 Arduino Pro or Pro Mini (3.3V, 8 MHz) w/ ATmega168 Arduino NG or older w/ ATmega168 Arduino NG or older w/ ATmega168 ET-BASE AVR EASY168 ET-BASE AVR EASY328 ET-BASE AVR EASY328 16MHz ET-BASE AVR EASY328 16MHz
			ET-BASE AVR EASY32U4

Picture 28 shows how to choose the preferable board to develop.

2. Choose **Serial Port** that is interfaced with board as shown in the picture 29; in this case, it is **COM5**. This value is from the step of installing Driver of board.





Picture 29 shows how to choose Serial Port.

3. Open the example program of Board ET-BASE AVR EASY32U4 that is provided by ETT as shown in the picture 30. In this case, we would like to illustrate the example of **KeyboardMessage**; the operation of this program is to set Board ET-BASE AVR EASY32U4 to be Keyboard of computer.

🥯 sketch_jul27a Ard	uino 1.0.1		
File Edit Sketch Tools	Help		
New Open Sketchbook	Ctrl+N Ctrl+O		
Examples Close Save Save As Upload Upload Using Programmer Page Setup	Ctrl+W Ctrl+S Ctrl+Shift+S Ctrl+U Ctrl+Shift+U Ctrl+Shift+P	01.Basics 02.Digital 03.Analog 04.Communication 05.Control 06.Sensors 07.Display 08.Strings	
Preferences	Ctrl+Comma	09.USB(Leonardo) ArduinoISP BASE_EASY32U4_Examples	ADC
Qui		EEPROM Ethernet Firmata LiquidCrystal SD Servo SoftwareSerial SPI Stepper Wire	DS1307_POLLING KeyboardMessage LED LED_MovingD0_D7 LED_MovingD14_D17 LED_MovingD18_D23 LED_MovingD8_D13 MouseMove RS232 SD VCP

Picture 30 shows an example program of board.

4. Click Button Verify to check and compile the program as shown in the picture 31. If the written program has not any error, it shows the message "Done compiling" as shown in the picture 32.





Picture 31 shows how to check program.



Picture 32 shows the result of checking program and there is no any error.

5. Click Button **Upload** to program data into board as shown in the picture 33. If there is no any error after programmed data, it shows the message "**Done Uploading**" as shown in the picture 34.



Picture 33 shows how to program data into board.





Picture 34 shows the result when it programs data completely.

6. Next, open Program Text Editor such as Notepad and press Switch SW2(SWB) on Board ET-BASE AVR EASY32U4, it shows message on the window of Program Notepad as shows in the picture 35.

📕 Untitled - Notepad	
File Edit Format View Help	
You pressed the button 1 times.	~
	~
<	>

Picture 35 shows the operating result of program.



