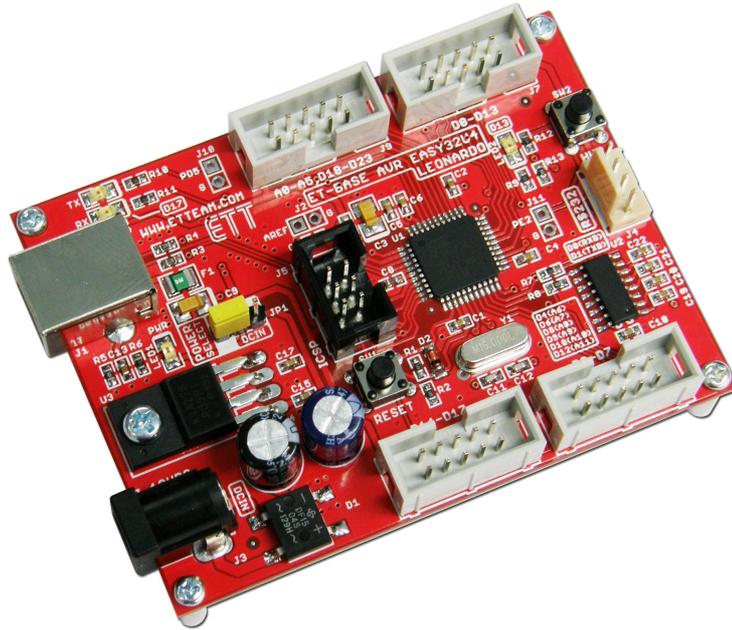


## ET-BASE AVR EASY32U4



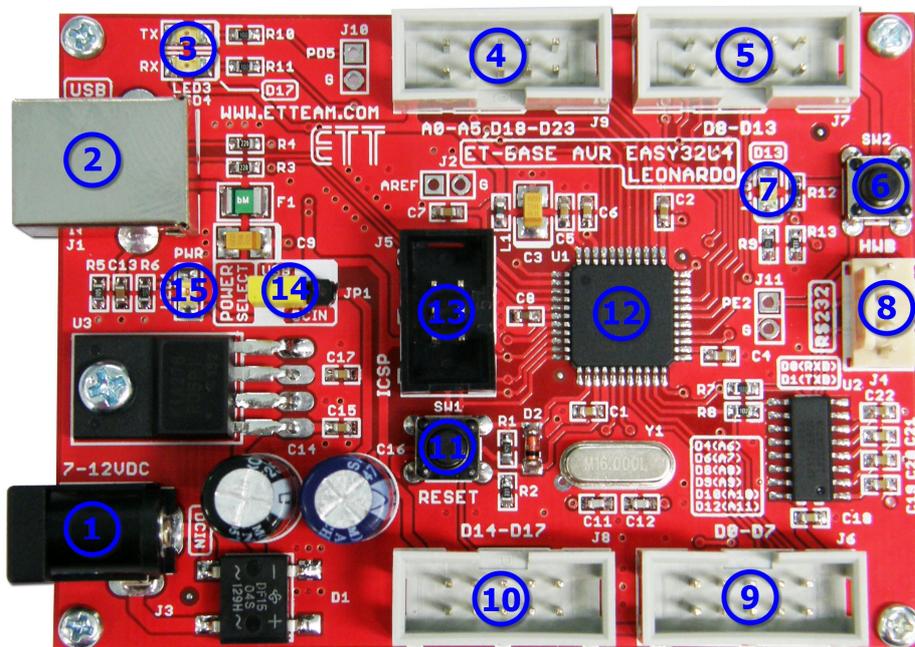
This **Arduino** is Open Source that is the development project of AVR MCU; when it is published publicly, it is widespread rapidly and most people admire this project. It continues developing Software and nowadays (July, 2012) the Program Arduino has been developed to be Version **Arduino 1.0.1**. Moreover, 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.

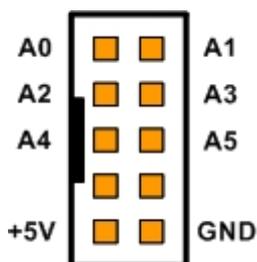
**Specifications of Board ET-BASE AVR EASY32U4**

- 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;

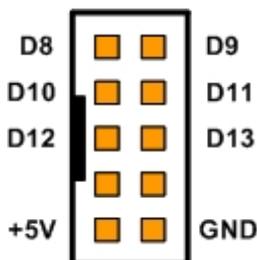


Picture 2 shows pin position of A0-A5.

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

Table 1

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

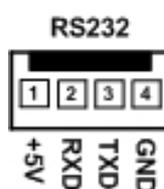


Picture 3 shows pin position of D8-D13.

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

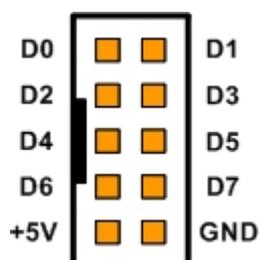
Table 2

- **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.

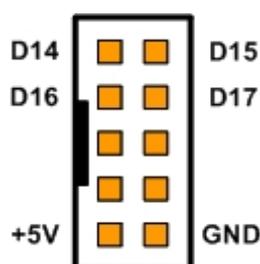


Picture 5 shows pin position of D0-D7.

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

Table 3

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

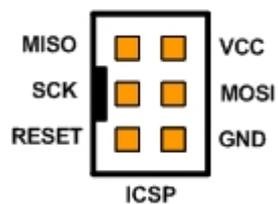


Picture 6 shows pin position of D14-D17.

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.



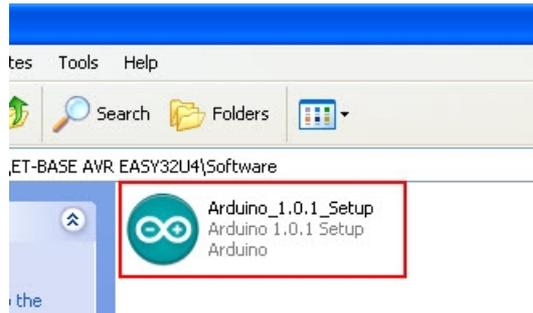
Picture 4 shows pin position of Pin ICSP.

- **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

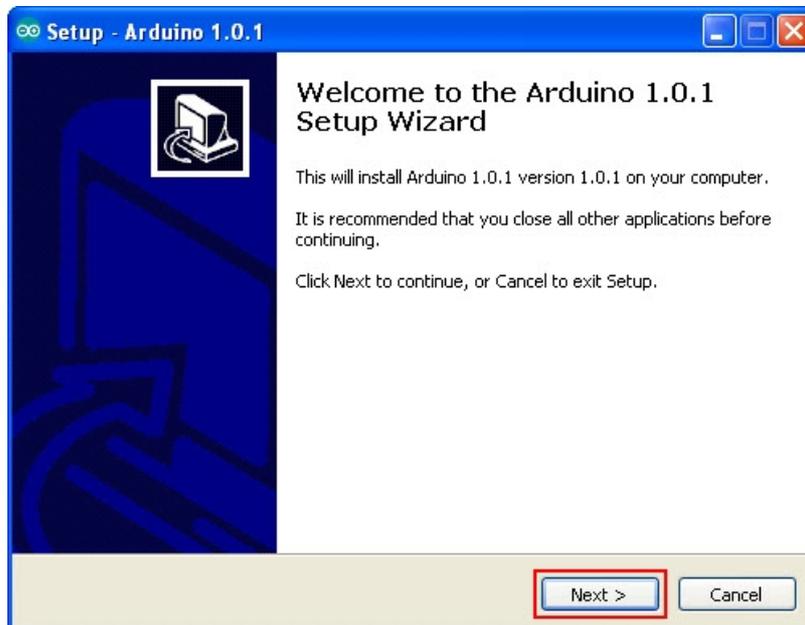
It is more convenient for user because ETT provides CD-ROM that includes Program Arduino as file and it is ready to install completely; it includes examples of Board ET-BASE AVR EASY32U4. In case of Program Arduino, if there is the latest version, customers can download it from website [www.arduino.cc](http://www.arduino.cc).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

1. Install Program; double-click **Arduino\_1.0.1\_Setup.exe** as shown in the picture 8.



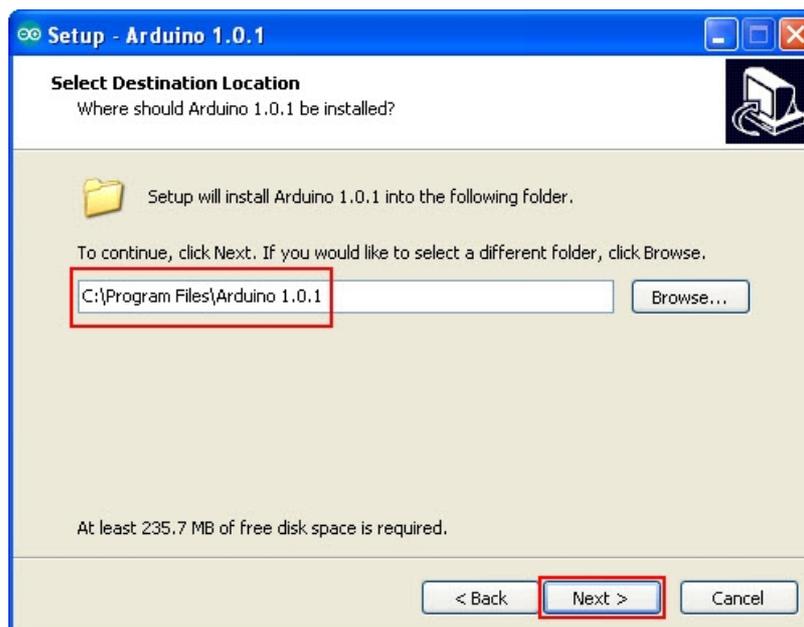
**Picture 8 shows file installation of Program Arduino.**

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



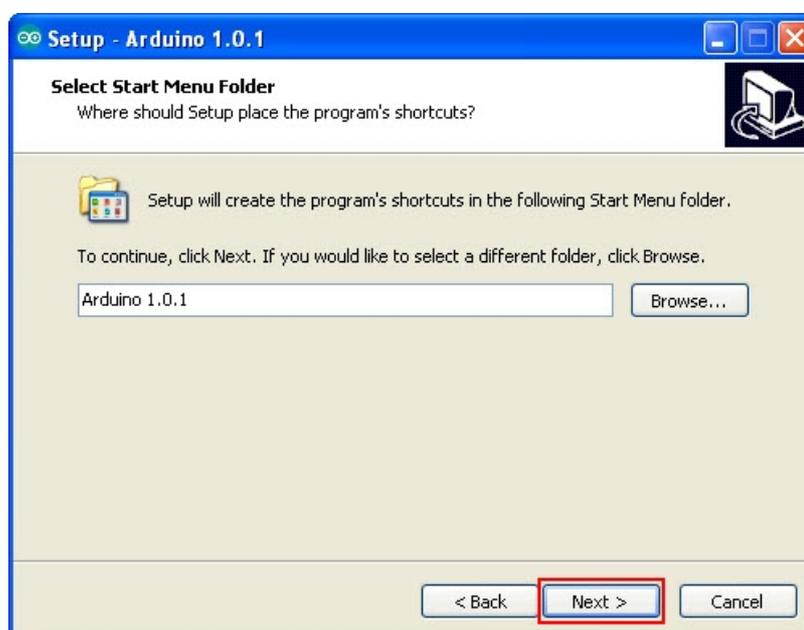
**Picture 9 shows when it starts installing program.**

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.



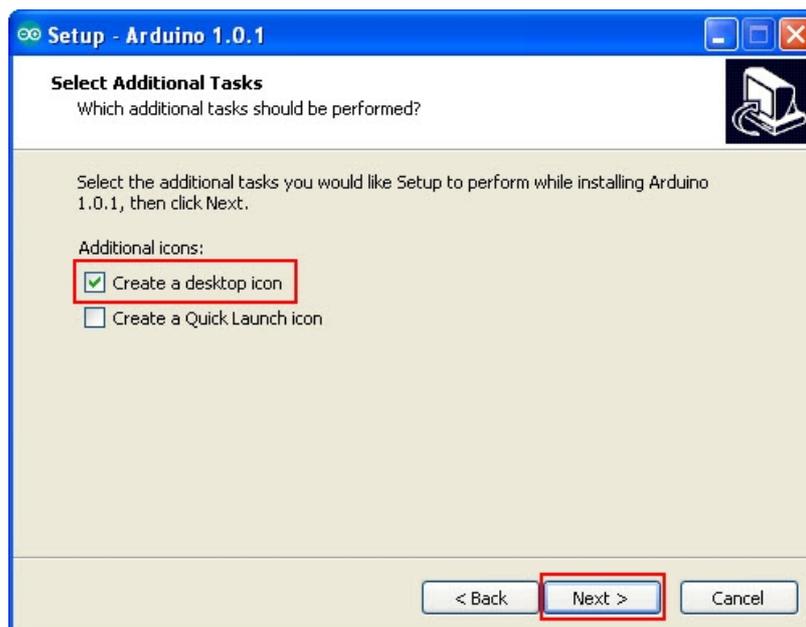
Picture 10 shows how to choose and setup folder location to install the program.

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



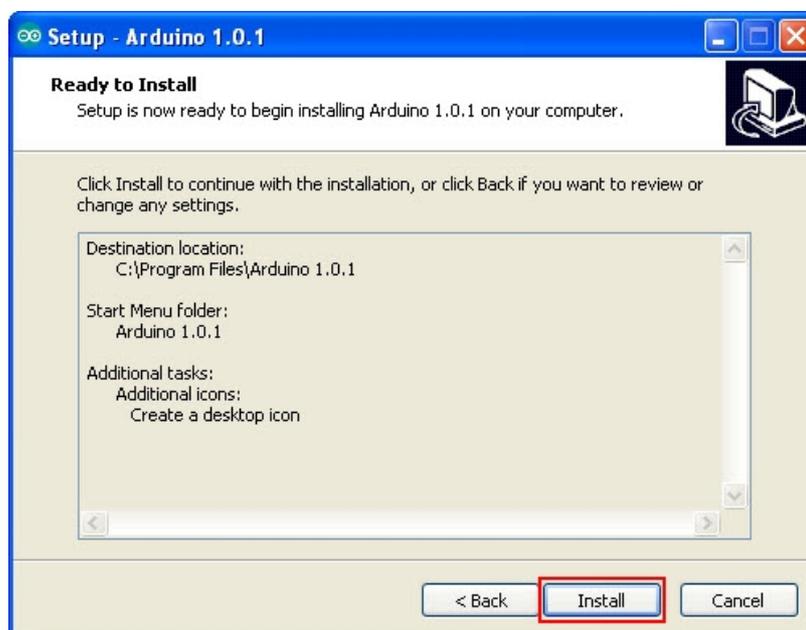
Picture 11 shows how to create Shortcut of Program Arduino.

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



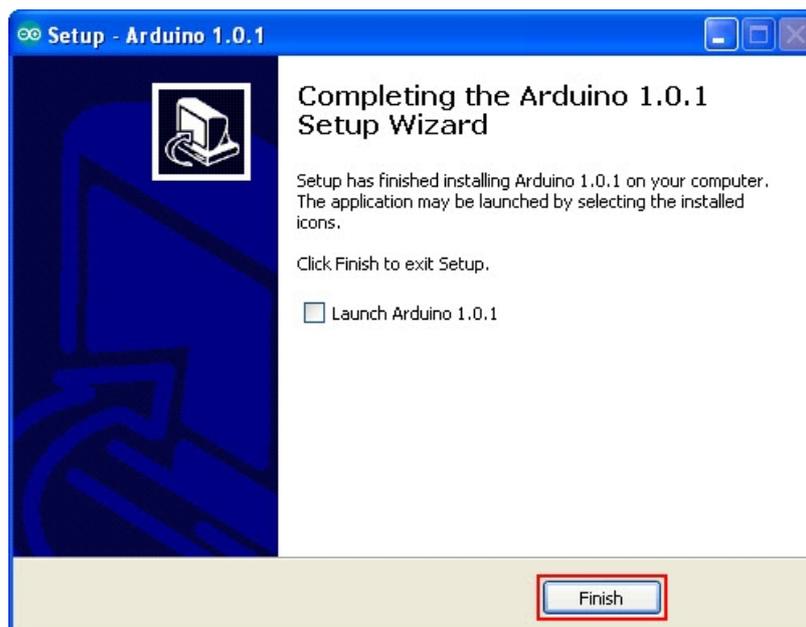
Picture 12

- 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.



Picture 13

- 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

1. 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.



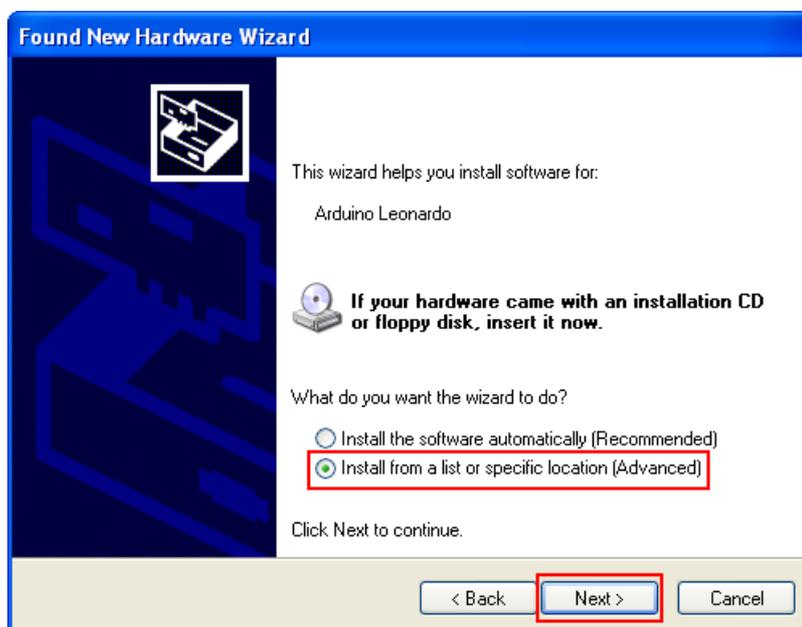
Picture 15 shows the feature when computer found new Hardware.

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



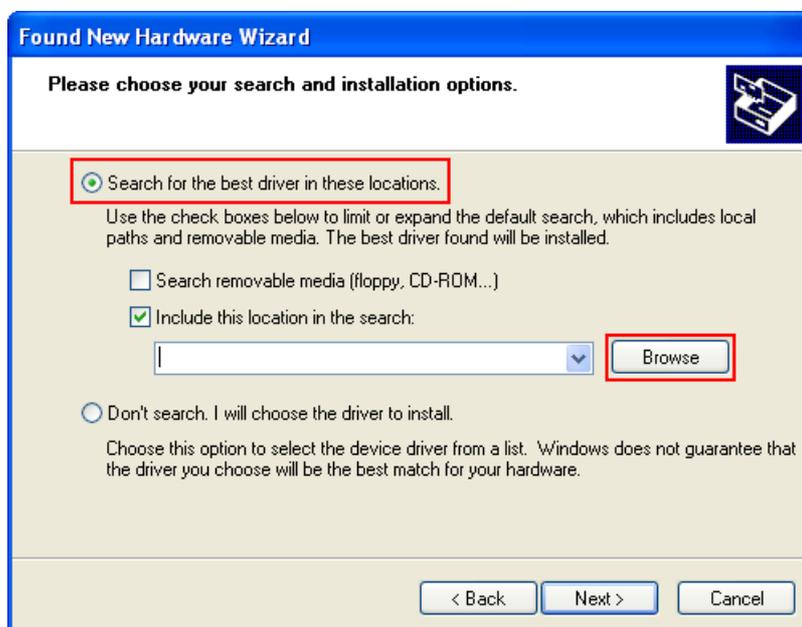
Picture 16

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.



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**.

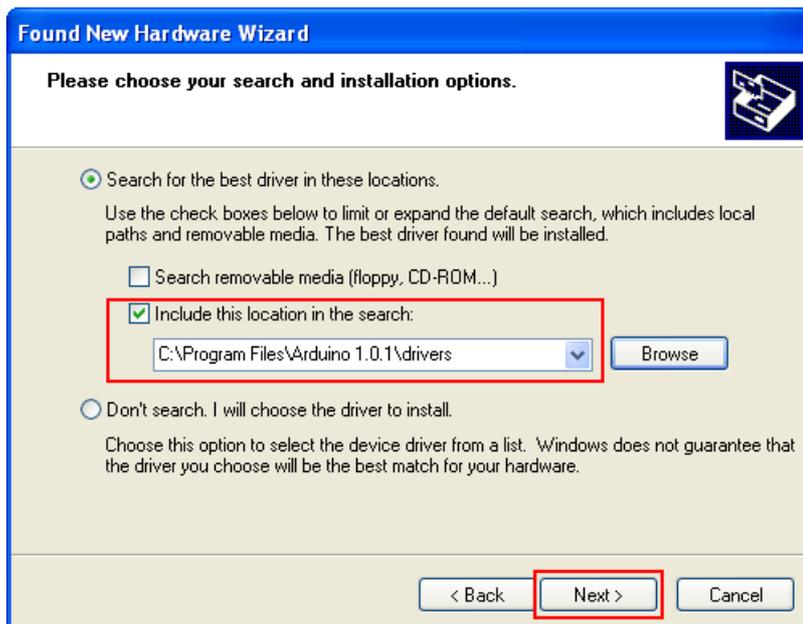


Picture 18



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.

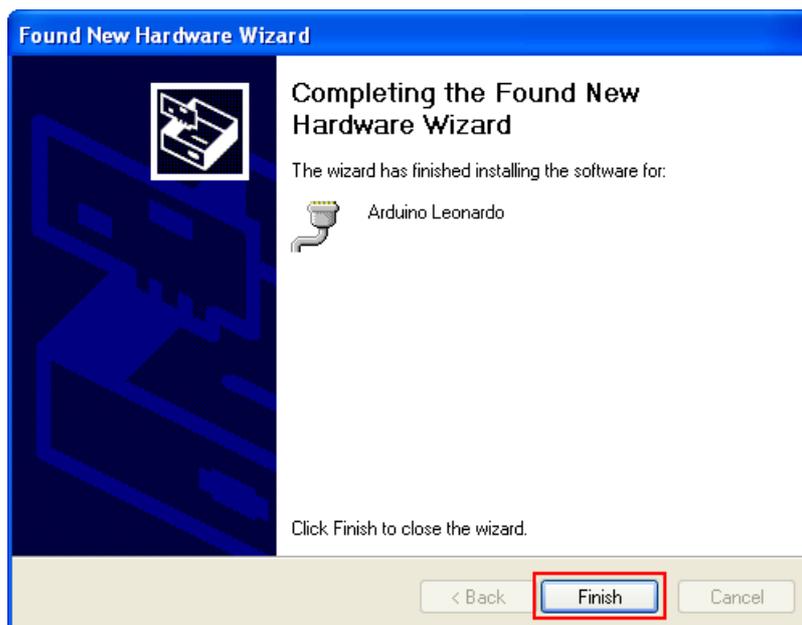


Picture 20



Picture 21

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



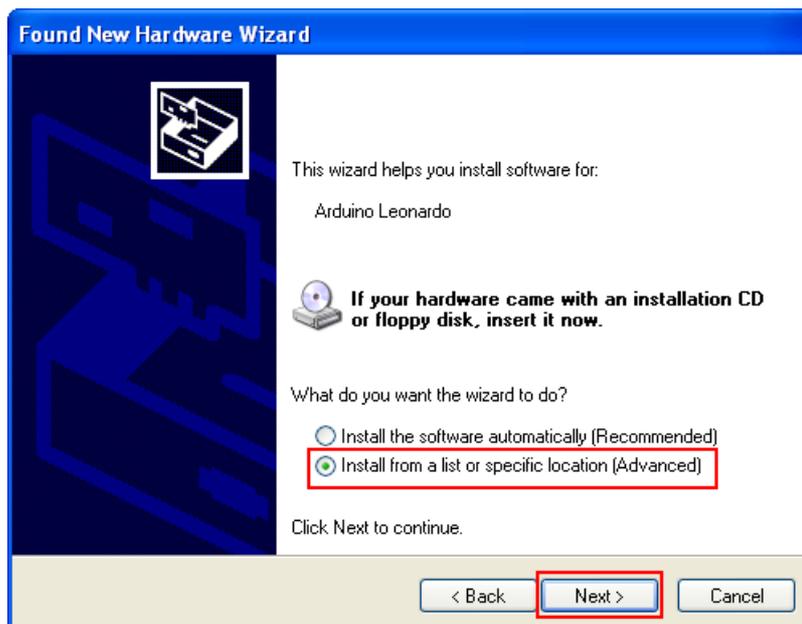
Picture 22

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



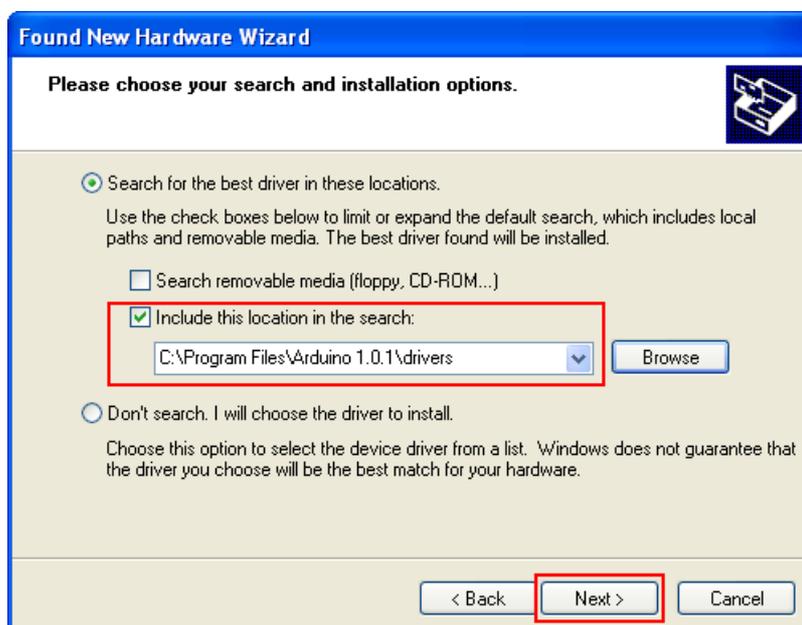
Picture 23

- 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.



Picture 24

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



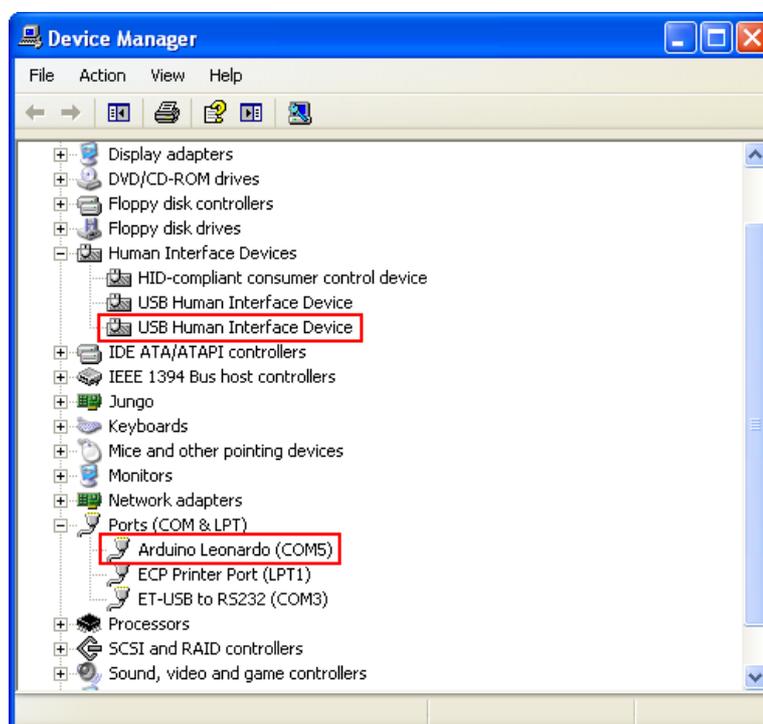
Picture 25

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



Picture 26

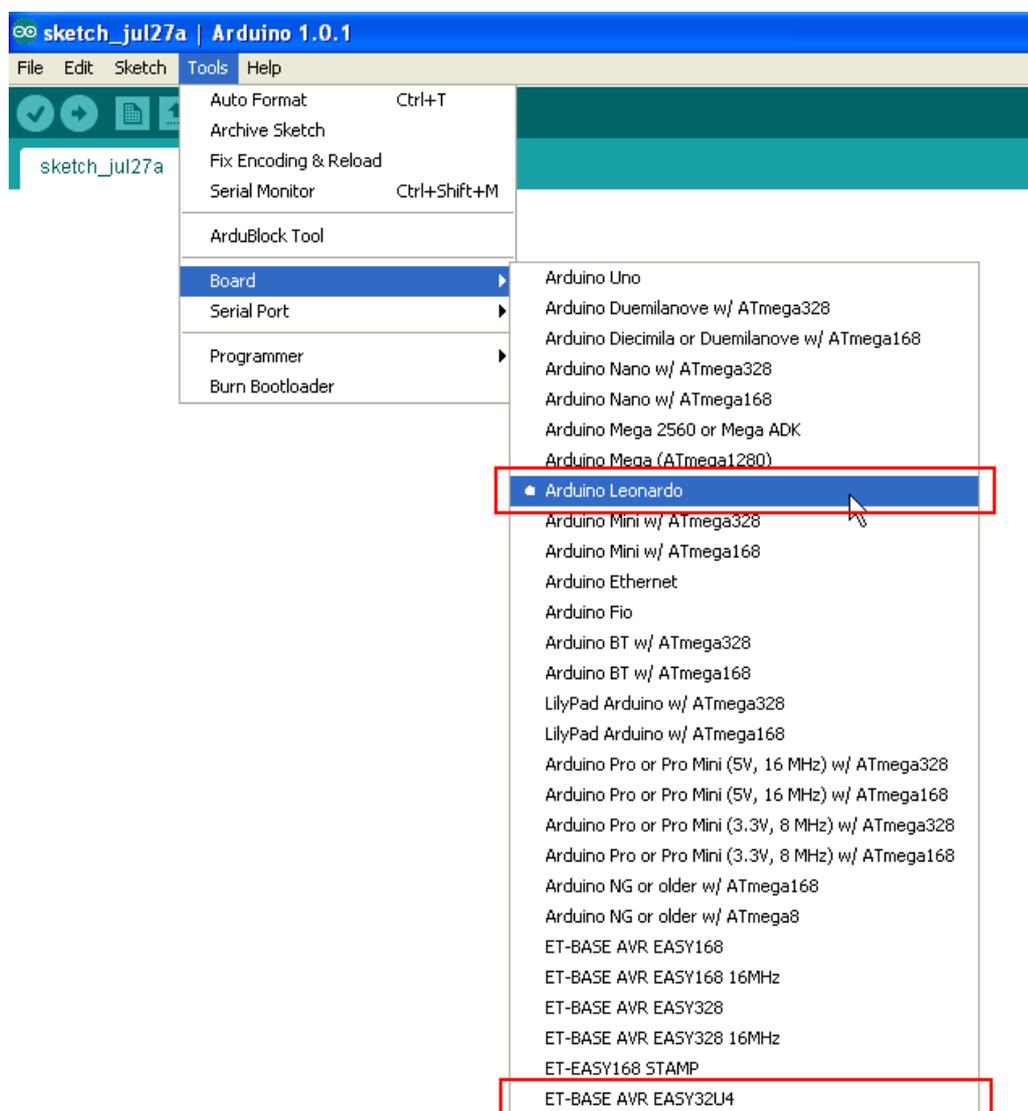
11. User can check if the installation of Driver of ET-BASE AVR EASY32U4 is complete; click "**Control Panel** → **System**", choose **Hardware** and **Device Manager**. In this case, user can see the additional lists of Hardware **Arduino Leonardo** and **USB Human Interface Device** as shown in the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



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

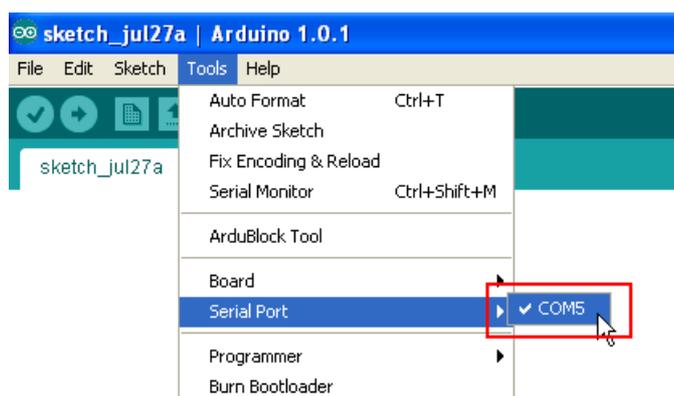
## How to start using Board ET-BASE AVR EASY32U4

1. 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.



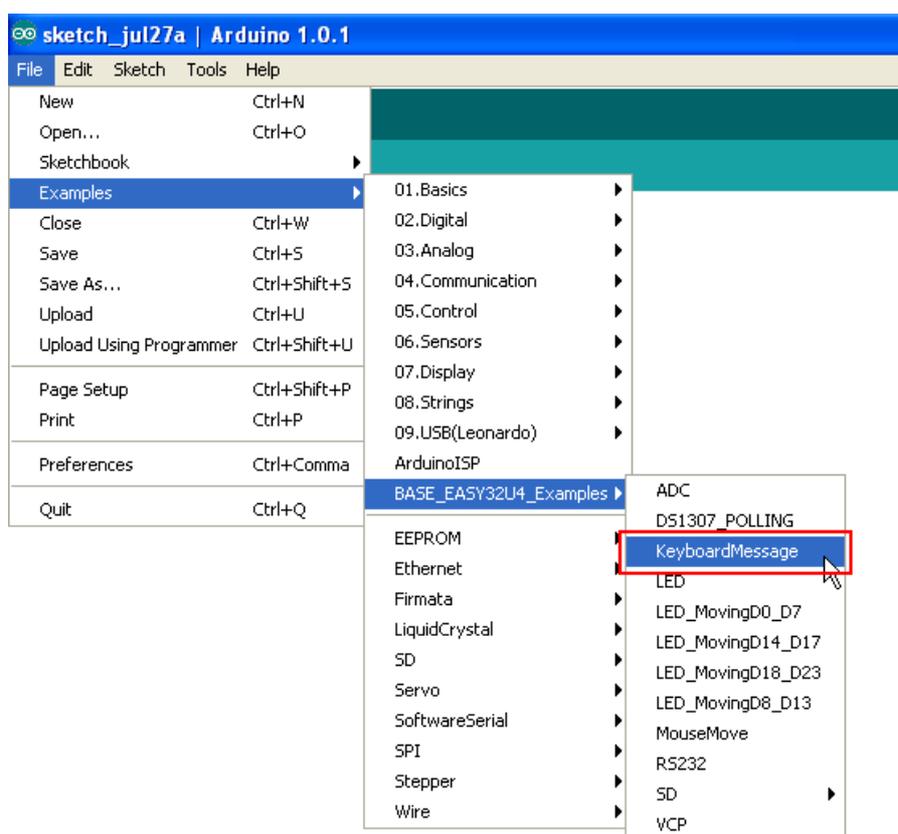
Picture 28 shows how to choose the preferable board to develop.

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.

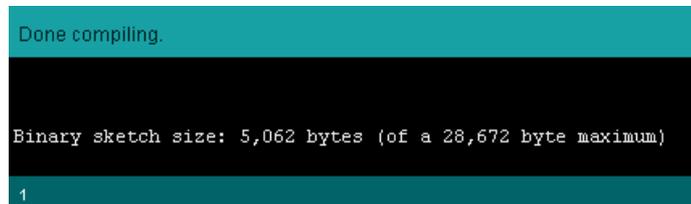


Picture 30 shows an example program of board.

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.

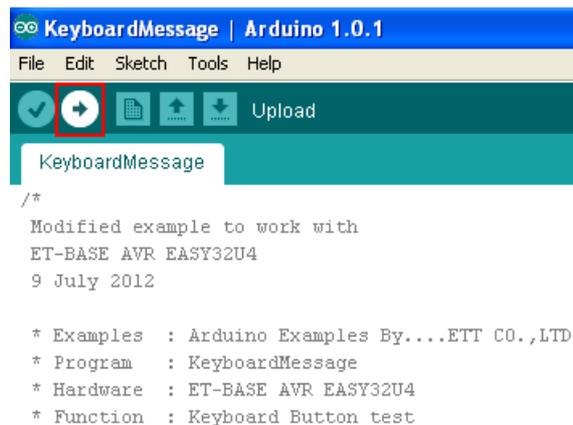


Picture 31 shows how to check program.

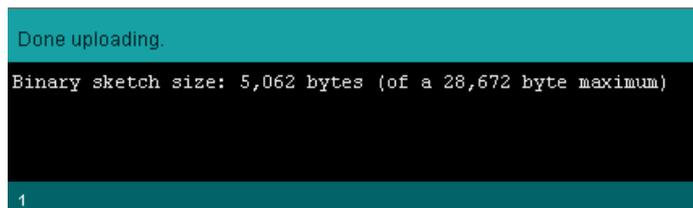


Picture 32 shows the result of checking program and there is no any error.

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.

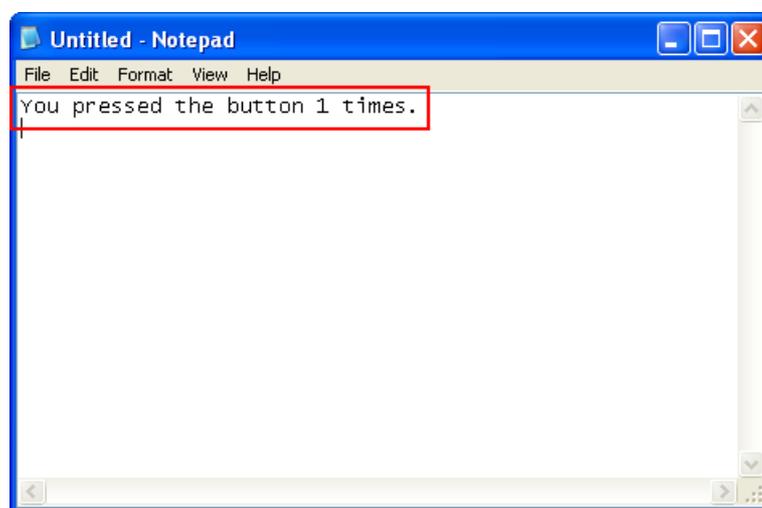


Picture 33 shows how to program data into board.



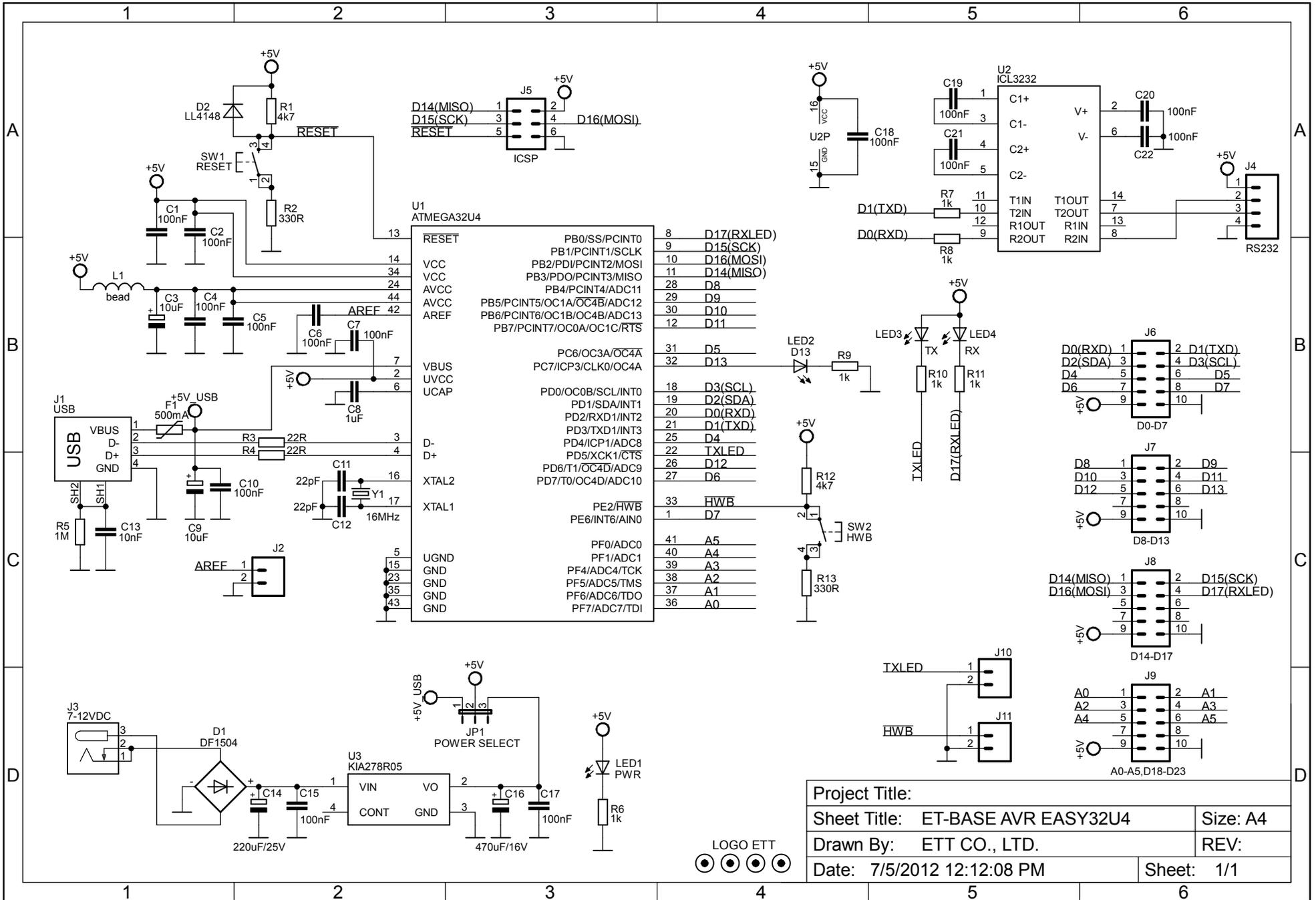
Picture 34 shows the result when it programs data completely.

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.



Picture 35 shows the operating result of program.





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