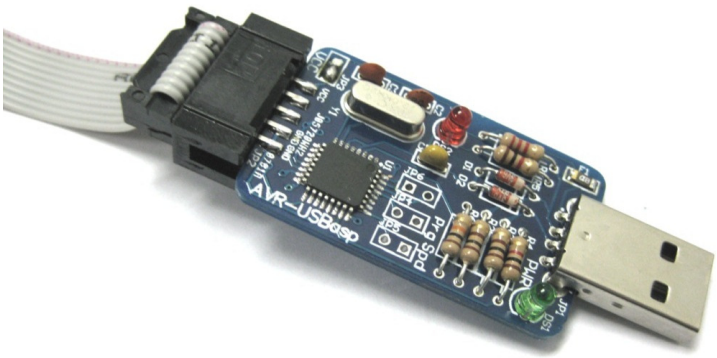
Cytron USBASP Programmer

AVR USBASP



User's Manual

V1.0

October 2011

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1. Introduction

AVR USBasp is a USB in-circuit programmer and it can use to program most of the Atmel AVR controllers. It simply consists of an ATMega8 and a couple of passive components such as resistors, capacitors, LEDs and ect. The programmer uses a firmware-only USB driver and there is no special USB controller is needed. By using AVR USBasp, it is easier and simpler, it just needs one step to finish the process which is to connect the AVR USBasp with computer and with microcontroller, then program it. AVR USBasp has been designed with capabilities and features of:

- USBasp works under mulltiple platforms. Linux, Mac OS X and Windows are tested.
- Its speed for the programming is up to 5kBytes/sec.
- Its SCK option is supported to the targets with low clock speed (<1.5Mhz).

USBasp Method

Table below shows some of the microcontrollers that are supported by the AVR USBasp Programmer, other than the list provided below, there is also having others series of microcontrollers which are also supported by AVR USBasp Programmer.

Mega Series				
ATMEGA48	ATMEGA8	ATMEGA88	ATMEGA8515	ATMEGA8535
ATMEGA16	ATMEGA162	ATMEGA163	ATMEGA164	ATMEGA165
ATMEGA168	ATMEGA169	ATMEGA169P	ATMEGA32	ATMEGA324
ATMEGA325	ATMEGA3250	ATMEGA328P	ATMEGA329	ATMEGA3290
ATMEGA64	ATMEGA640	ATMEGA644	ATMEGA645	ATMEGA6450
ATMEGA649	ATMEGA6490	ATMEGA128	ATMEGA1280	ATMEGA1281
ATMEGA2560	ATMEGA2561			

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Tiny Series				
ATTiny12	ATTiny13	ATTiny15	ATTiny24	ATTiny25
ATTiny26	ATTiny2313	ATTiny44	ATTiny45	ATTiny84
ATTiny85				
Classic Series				
AT90S2313	AT90S2323	AT90S2343	AT90S1200	AT90S8515
Can Series				
AT90CAN32	AT90CAN64	AT90CAN128		
PWM Series				
AT90PWM2	AT90PWM3			

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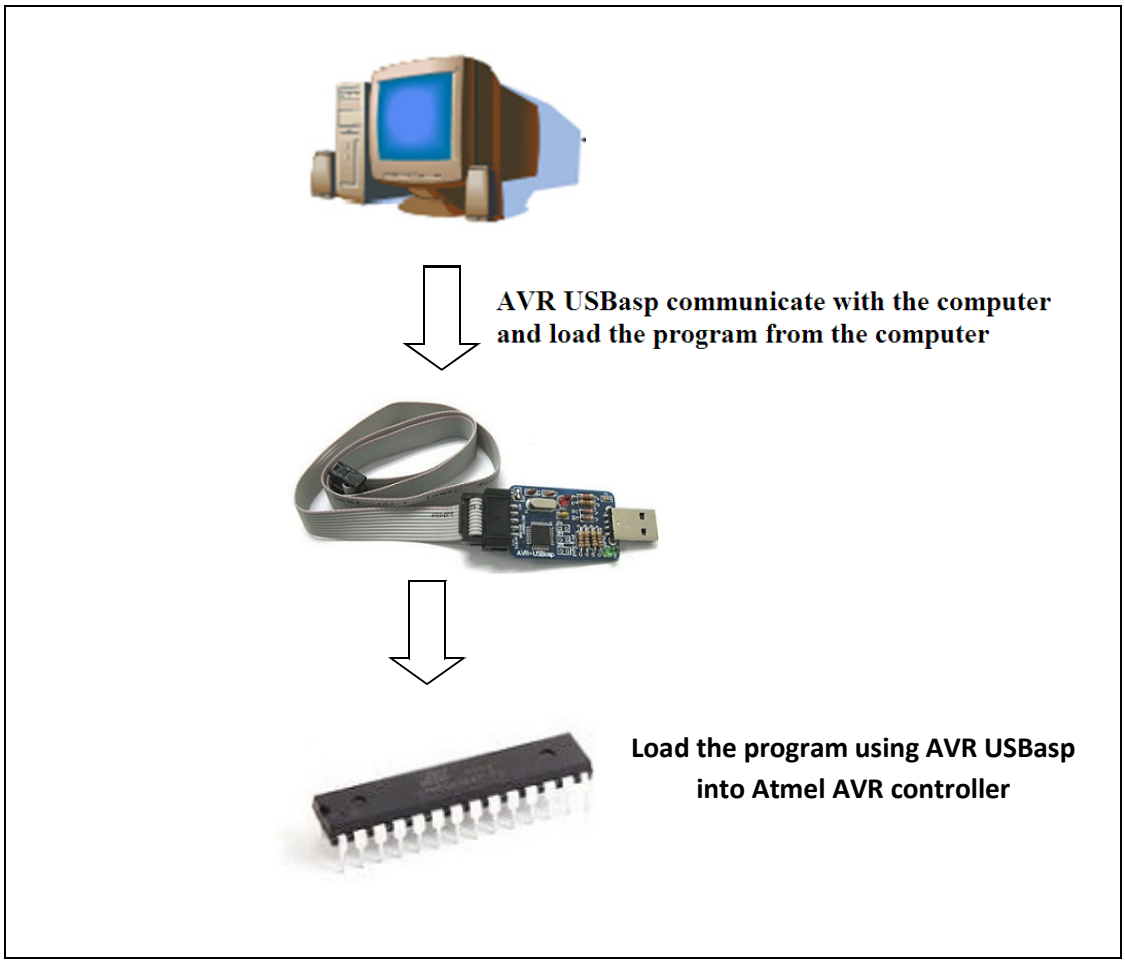
2. System Overview



Cautions: There is a 5V which supply directly from USB port of computer to AVR USBasp; it is advised not to use this power source to power application circuit or device. Wrong connection such as wrong polarity, wrong voltage, shorted might permanently damage computer.

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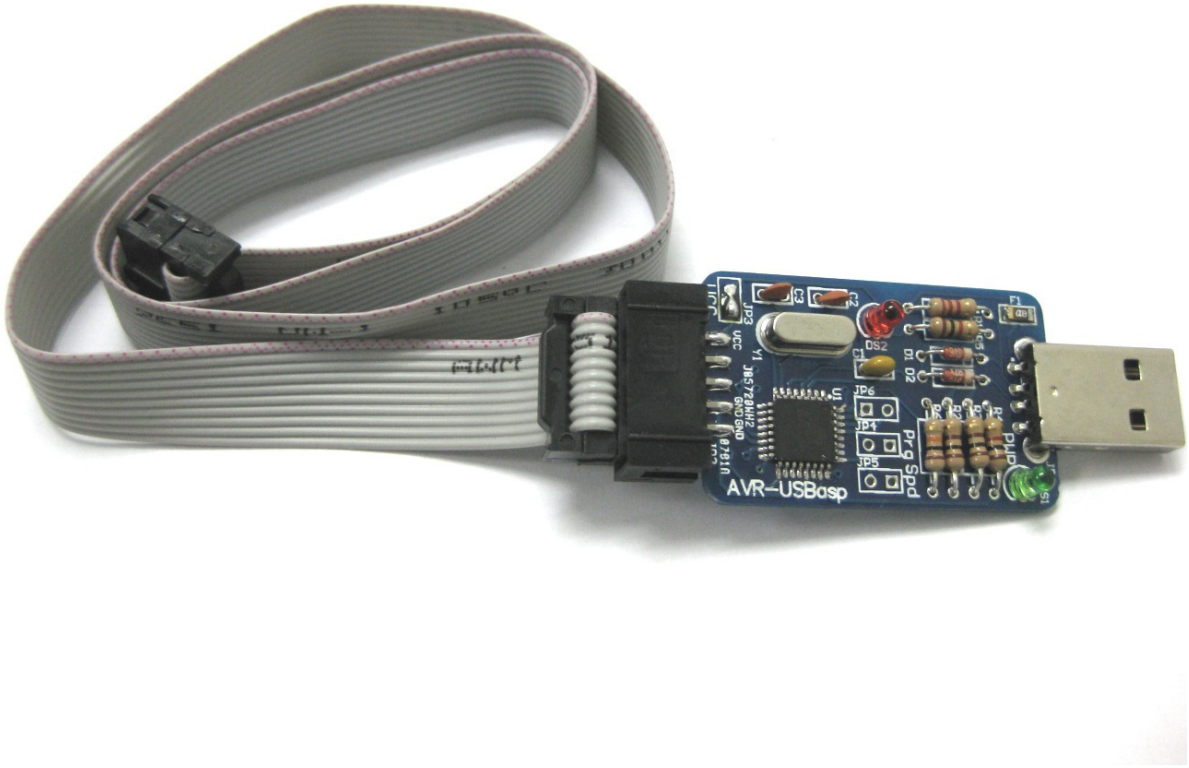
3. Packing List

Please check the parts and components according to the packing list. If there are any parts missing, please contact us at sales@cytron.com.my immediately.



1. 1 x AVR-USBASP
2. 10 ways programmer rainbow cable

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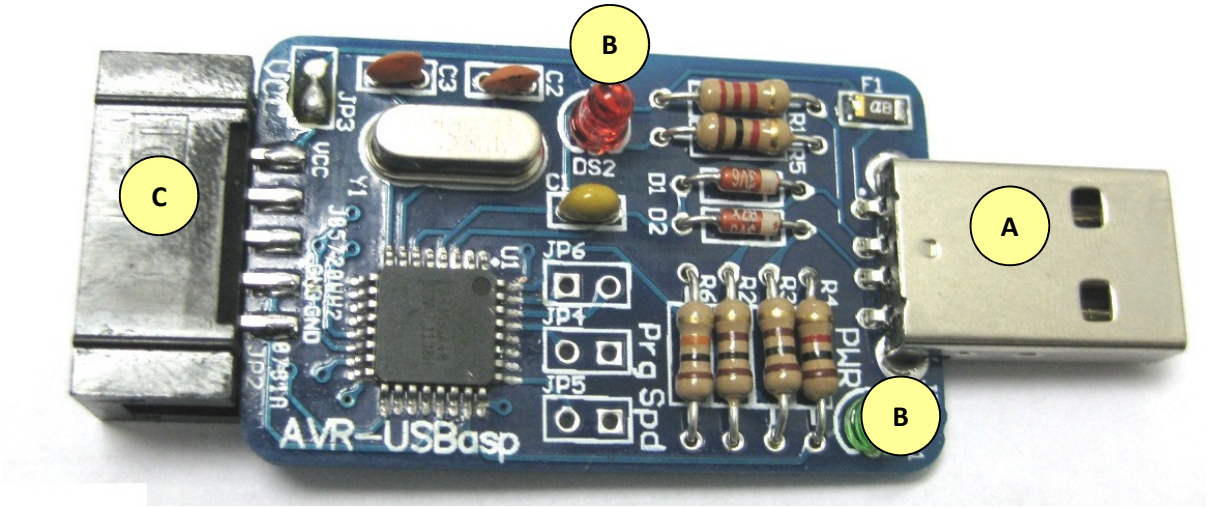
4. Board Layout and Specification



Label	Function
A	USB A type (male)
B	LEDs
C	10 pins IDC connector for interface to microcontroller
D	JP4 and JP5 for programmer and speed
E	Vcc supply

A – USB A type (male). This is for USB connection.

B – The USBASP programmer has 2 LEDs. The function is listed below:

- LED 1 (Green LED) – Power
- LED 2 (Red LED) – Programmer communicating with the target device

C – The 10 pins ISP connection provides an interface to the microcontroller. This interface uses a 10 pin IDC connector and the pinout is shown in figure below.

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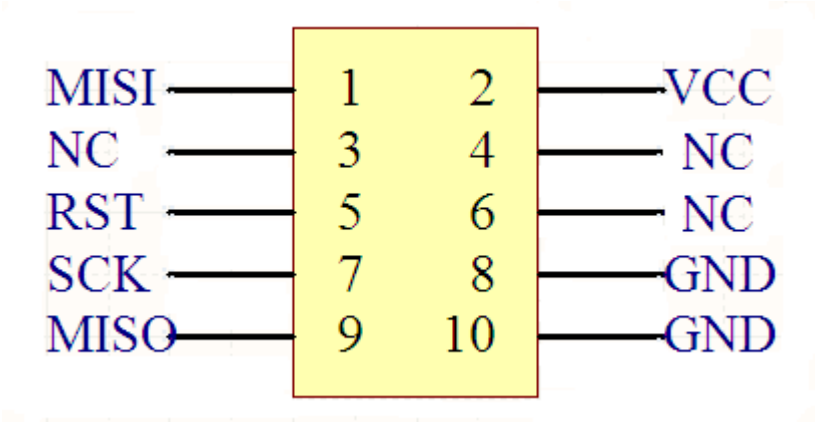
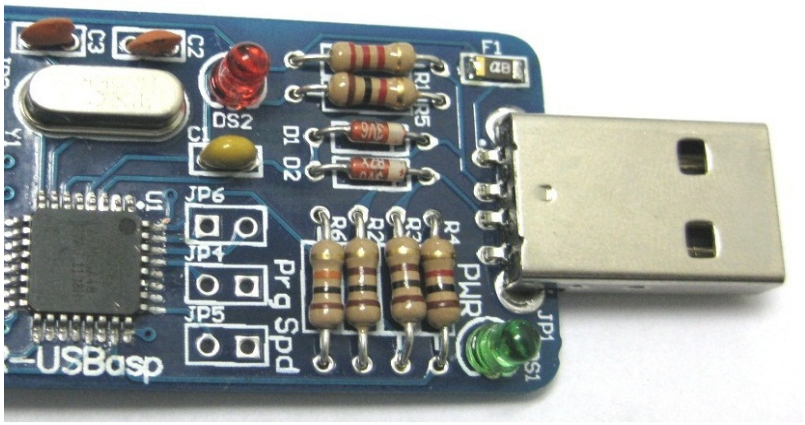
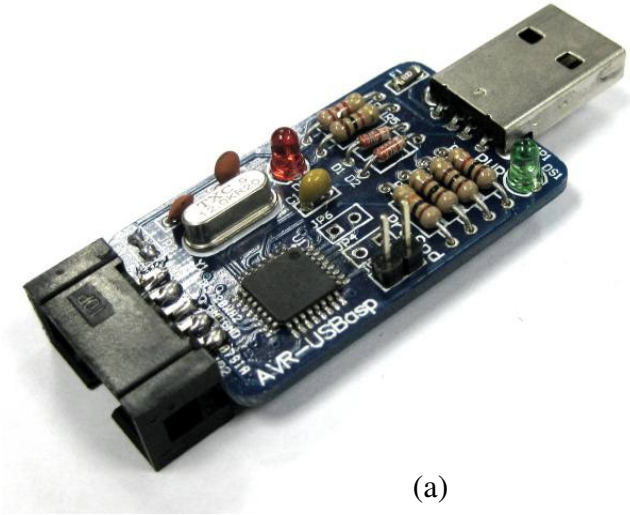


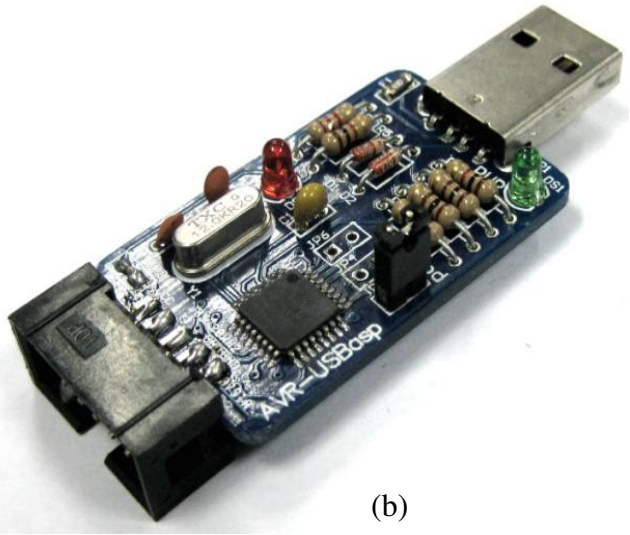
D – JP4 is for programmer and JP5 is for speed. Normally we are not using JP4 because JP4 function is to update the firmware on it. JP5 is only used for new microcontroller. It will not be used for others than new microcontroller because we want to increase the speed of the process of programming.



Below is example picture to show JP5 used for new microcontroller. Users may solder header pin on JP5 and use mini jumper to connect it.



(a)



(b)

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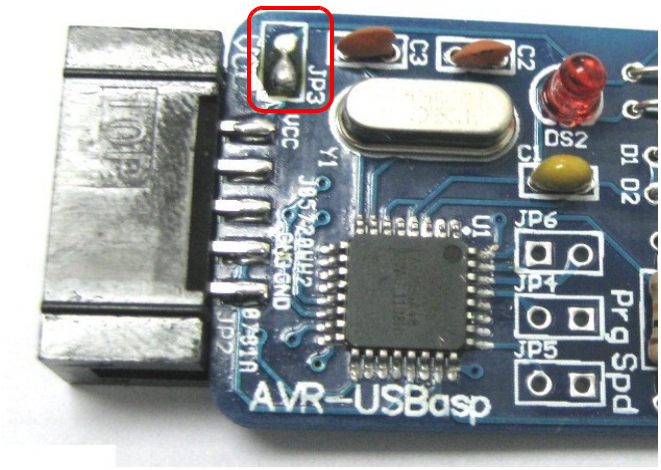
If JP5 not used (not new microcontroller), users may remove the mini jumper.

E – Vcc supply is to supply power from USB to Atmega target board. User may desolder JP3 if user didn't want to use it.



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5. Installation

In order to complete the installation, you need to follow several steps:
The first step is to direct connect the AVR USBasp programmer to the USB port of your PC. For the AVR USBasp programmer will work on a wide variety of operating systems, this procedure will only focus on Window Seven.

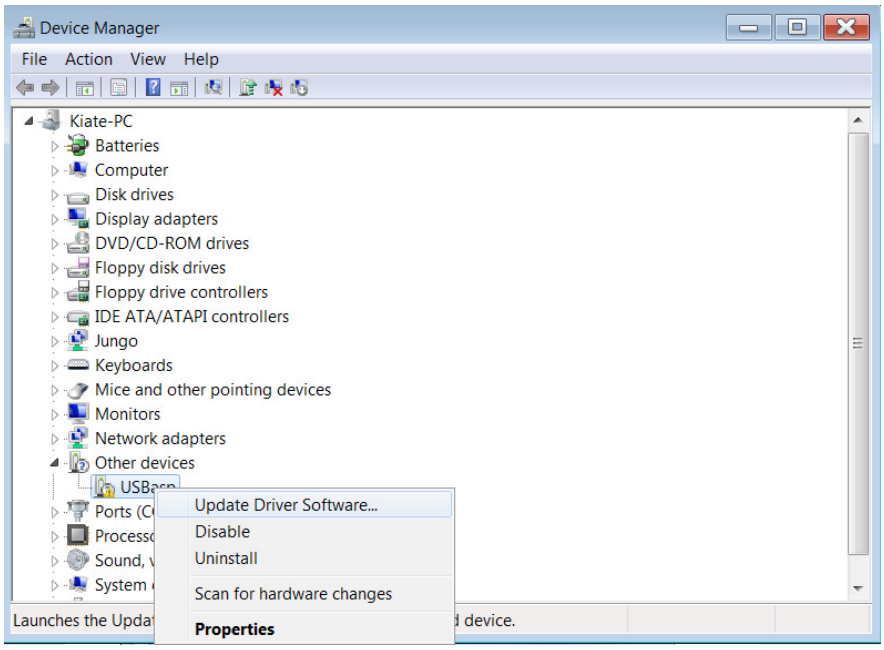
1. Required items
    a. AVR USBasp programmer

2. AVR USBasp drivers can be downloaded from Cytron Technologies Sdn. Bhd. product website page.

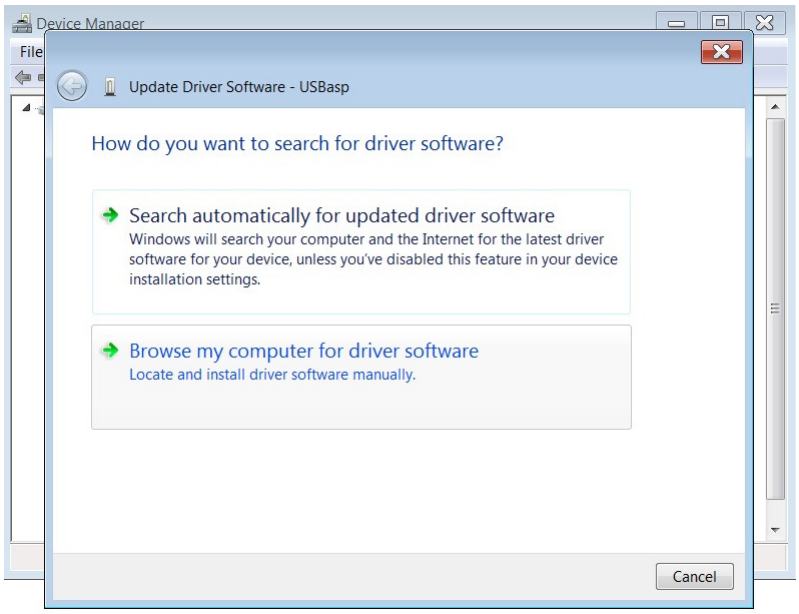
3. Procedure to install the AVR USBasp programmer

    a. Insert the programmer into and available USB port in your PC.

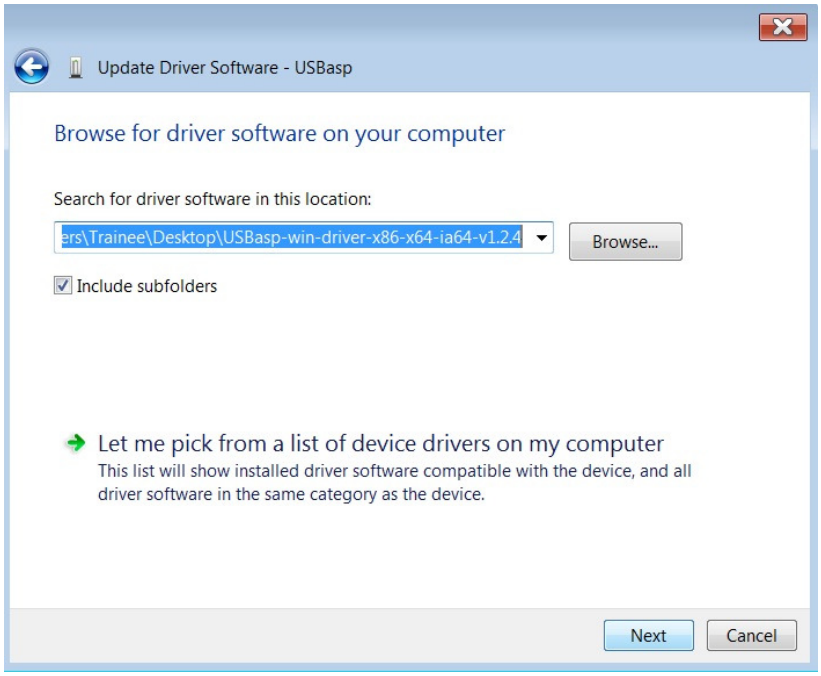
    b. Go into the device manager and find the entry for the USBasp and it should be displayed with a yellow alert icon on it. Then right click on the device and select "Update Driver Software".



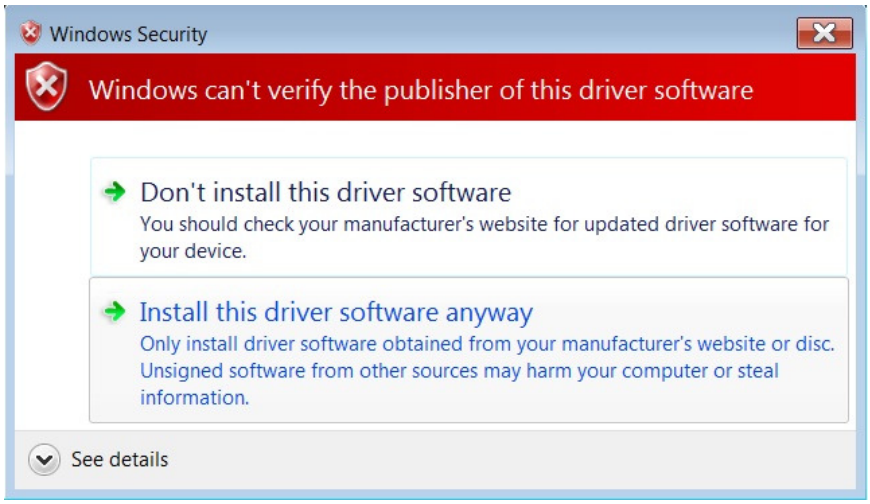
c. After you left click the "Update Driver Software", it will come out with "How do you want to search for driver software?" Then choose the second one which is "Browse my computer for driver software" and click into it.



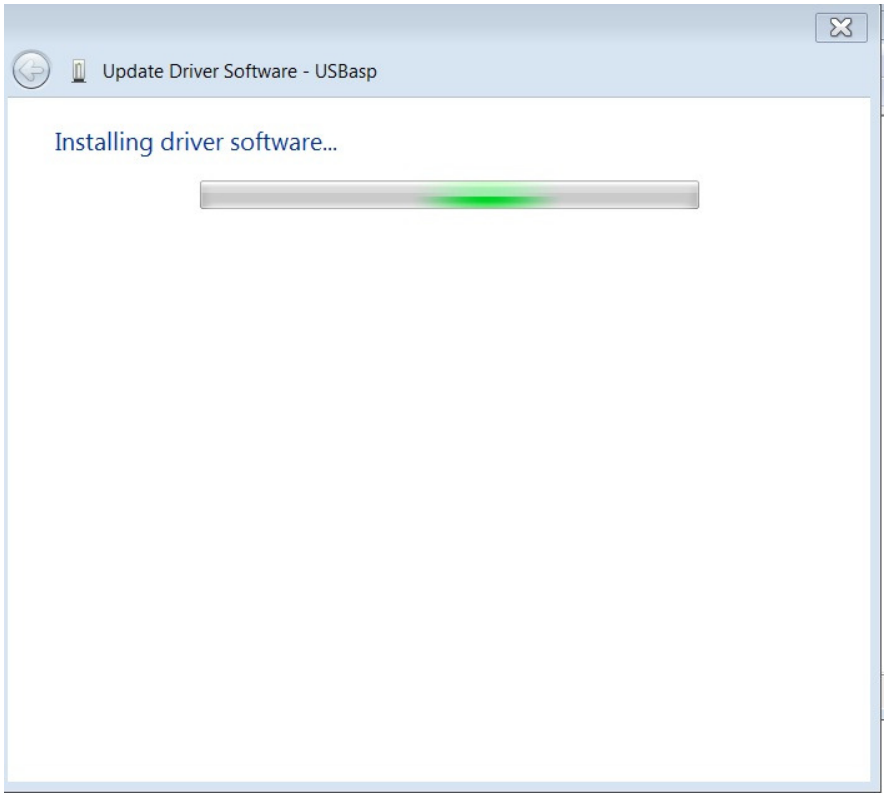
d. After that, you will see the screen which will prompt out "Browse for driver software on your computer". In this step, you need to select the folder where you unzipped the driver files then click "Next".



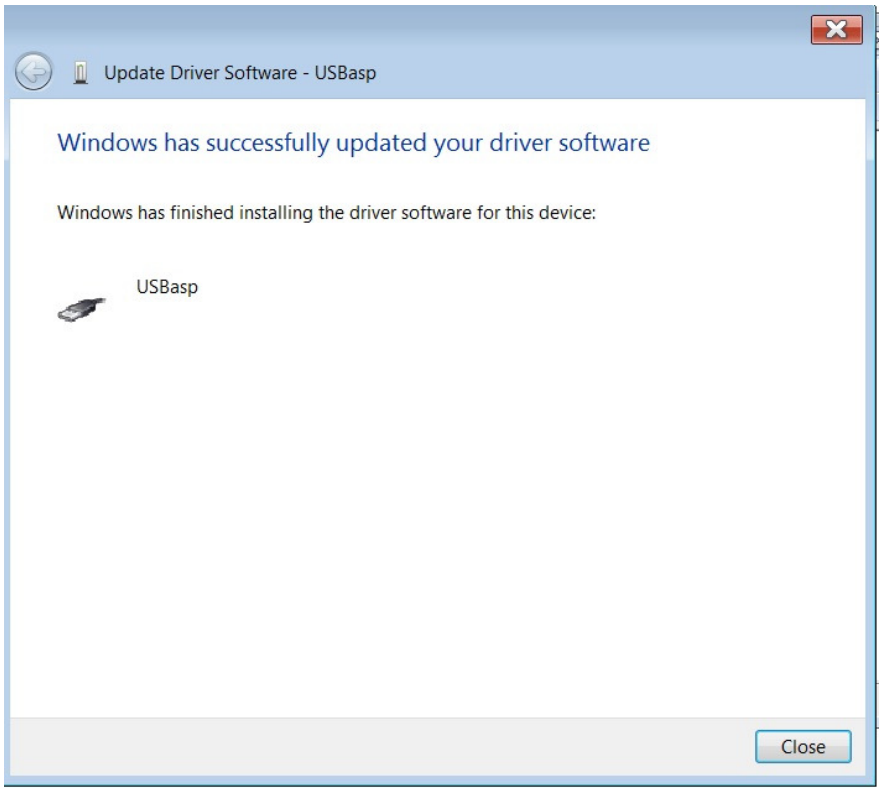
e. Next, the windows will prompt out a "Windows Security" with a red warning dialog. Do not worry about it, and just click "Install this driver software anyway" and the driver will install.



f. After click it, the next step is to wait a few seconds to let your computer to process the installation of driver software.



g. Now, you can use the AVR USBasp to do the programming for the microcontroller.



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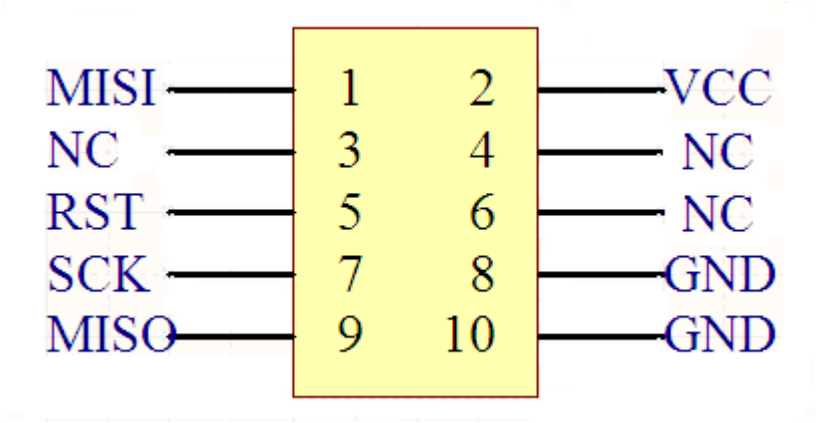
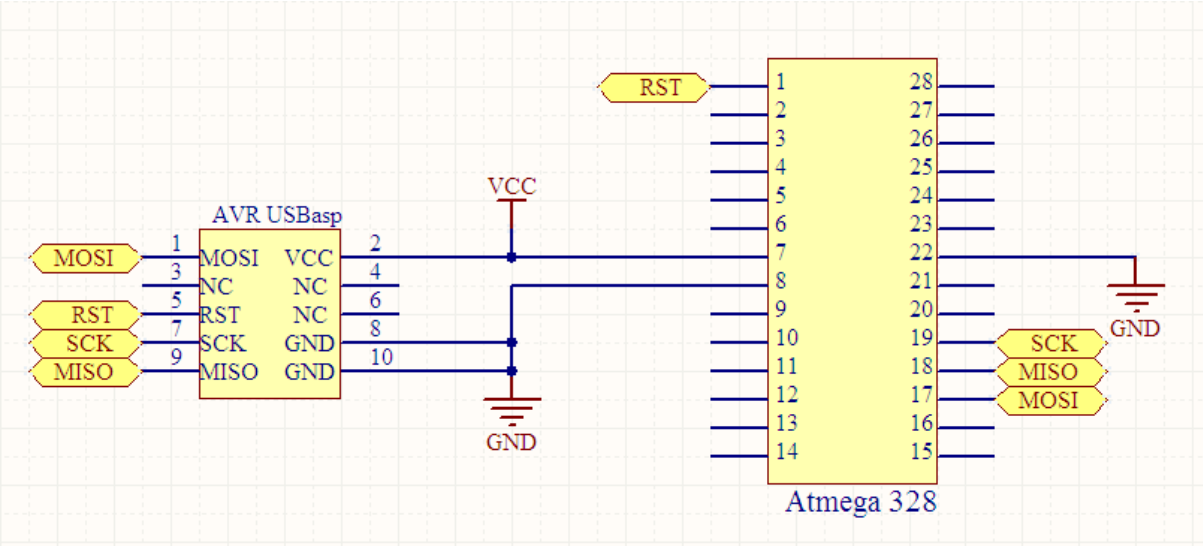
6. Example Schematic

In this example, we will show the port layout for 10 pins ISP connection of AVR USBasp and the connection between AVR USBasp with the microcontroller Atmega328.



10 pins ISP connection of AVR USBasp



Schematic of AVR USBasp with Atmega328

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7. Software Using

There are varieties of software which can be work also for the programmer AVR USBasp. These are including:

- AVRdude – Version 5.2 or later. AVRdude is available for many platforms.
- Arduino Software– Normally we are using this software to program most of the Arduino board.
- Khazama AVR Programmer – An AVRdude GUI for MS Windows.
- BASCOM-AVR – Version 1.11.9.6 or later.
- eXtreme Burner – An easy to use GUI application for MS Windows.

For the list of the software above, we have no responsibility to teach users how to use, users must study themselves in order to use it.

7.1 AVRdude

AVRdude is a very popular and common for the command-line program for the programming of AVR chips. Here are some examples that you can try to load the program using AVR USBasp.

7.1.1 Programming for LED Blinking

Command:

avrdude –c usbasp –p m328p –e

Explanation:

To delete the program of the microcontroller.

-c means which programmer that you are using, in this stage, we are using USBasp.

-p means which microcontroller that you are using, in this stage, we are using 328p.

-e means to delete the program inside the microcontroller.

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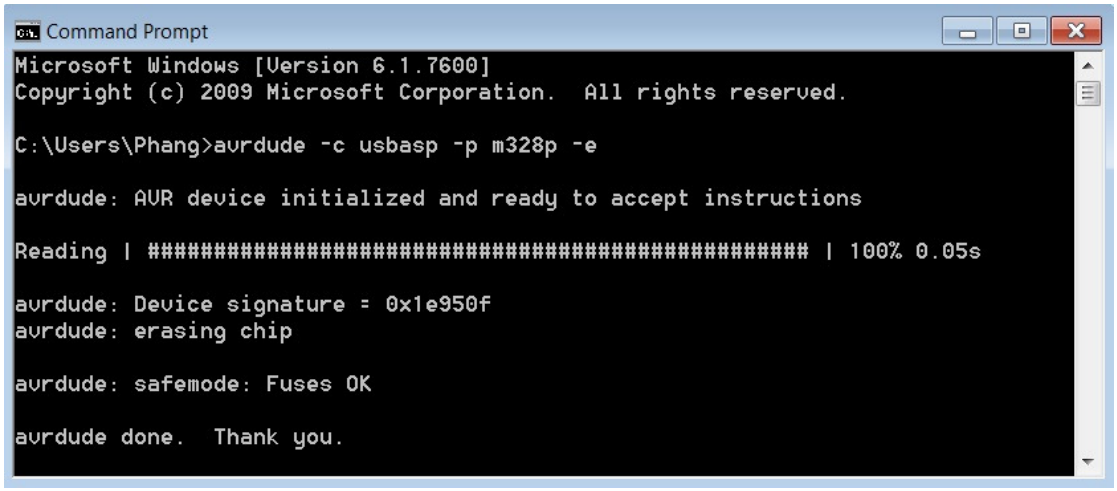

Command:

avrdude –c usbasp –p m328p –u –U flash:w:Blink.cpp.hex

Explanation:

When you write the Blink.cpp.hex for the LED Blinking, you need to make sure that the hex file of LED blinking need to be in the same folder with the drive you has call out just now. For example, the command below shows the drive of C:\Users\Phang, it means that I need to copy the LED Blinking hex file to the folder of C:\Users\Phang.

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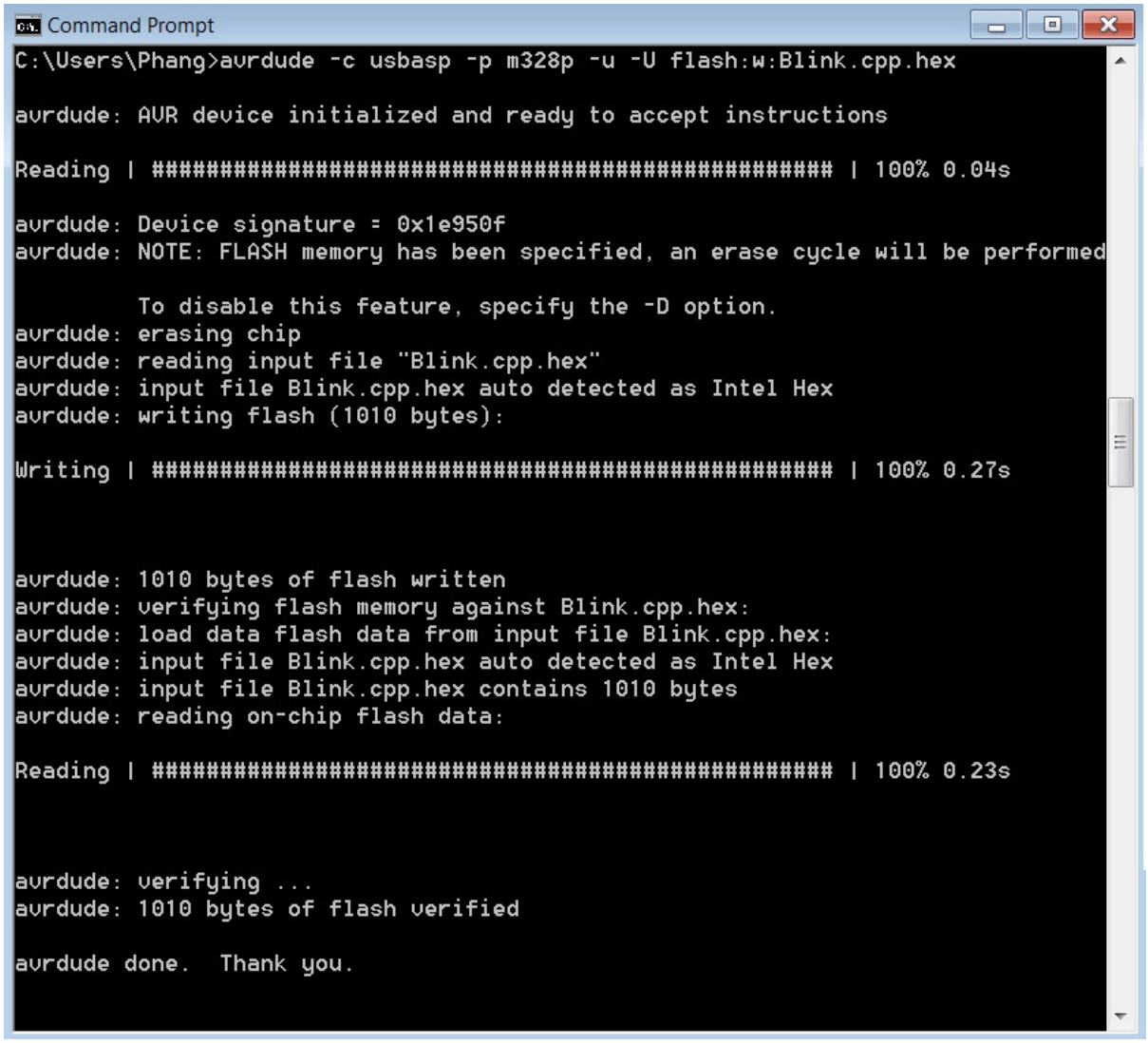

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7.1.2 Programming for Bootloader

Command:

avrdude –c usbasp –p m328p –e

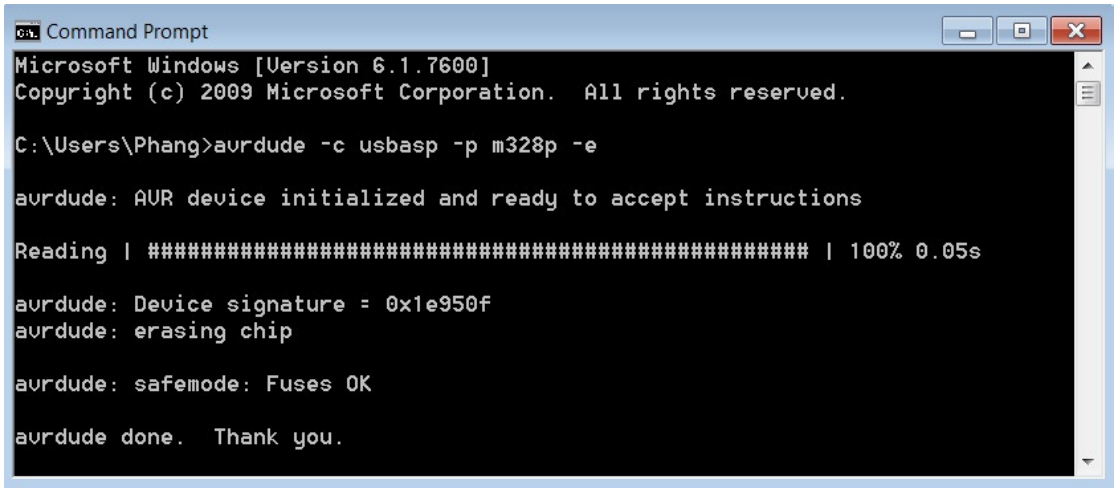
Explanation:

To delete the program of the microcontroller.

-c means which programmer that you are using, in this stage, we are using USBasp.

-p means which microcontroller that you are using, in this stage, we are using 328p.

-e means to delete the program inside the microcontroller.



Command:

avrdude –c usbasp –p m328p –u –U flash:w:AtmegaBOOT_168_atmega328.hex

Explanation:

To write the bootloader program into the microcontroller.

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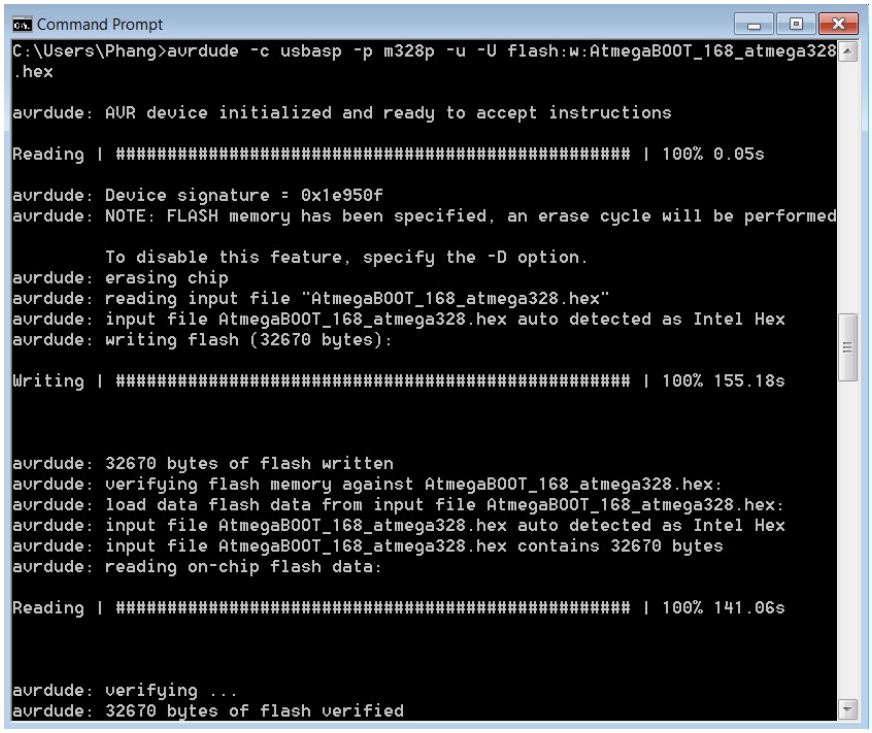
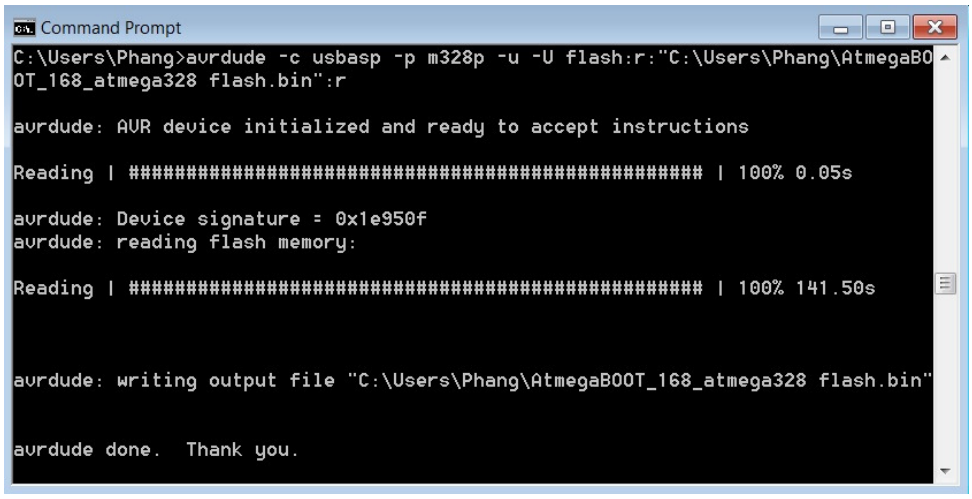


Command:

avrdude –c usbasp –p m328p –u –U flash:r: "C:\Users\Phang\AtmegaBOOT_168_atmega328 flash.bin.":r

Explanation:

Read the flash memory from the microcontroller connected to USBasp programmer and save it in raw binary format in the file name C:\Users\Phang\AtmegaBOOT_168_atmega328 flash.bin.

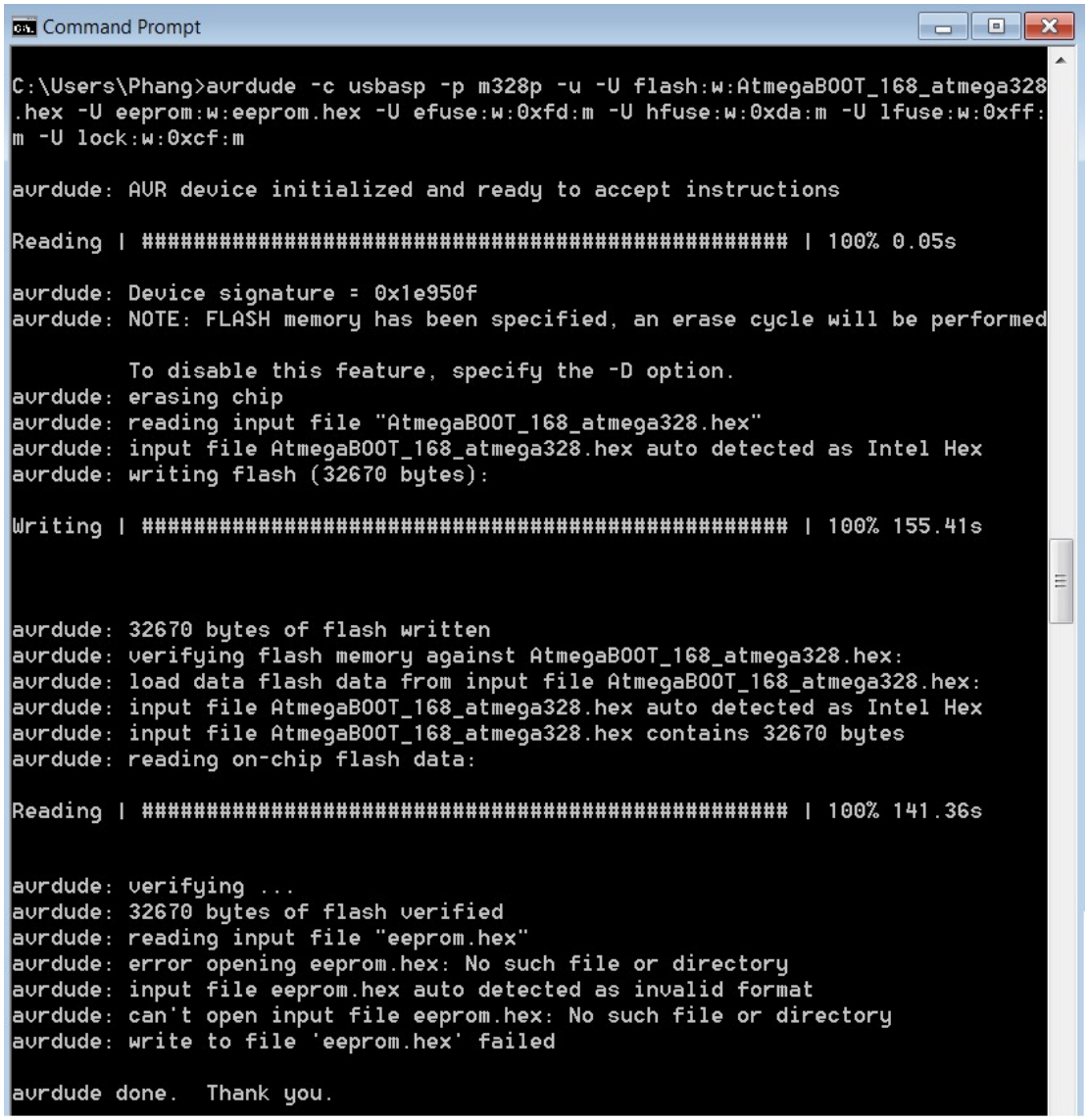


Command:

avrdude –c usbasp –p m328p –u –U flash:w:AtmegaBOOT_168_atmega328.hex –U eeprom:w:eeprom.hex –U effuse:w:0xfd:m –U hfuse:w:0xda:m –U lfuse:w:0xff:m –U lock:w:0xcf:m

Explanation:

Using the default programmer, write the file AtmegaBOOT_168_atmega328.hex to flash, ,eeprm.hex to EEPROM, and set the Extended, High, Low and lock fuse bytes to 0xfd, 0xda, 0xff and 0xcf respectively.



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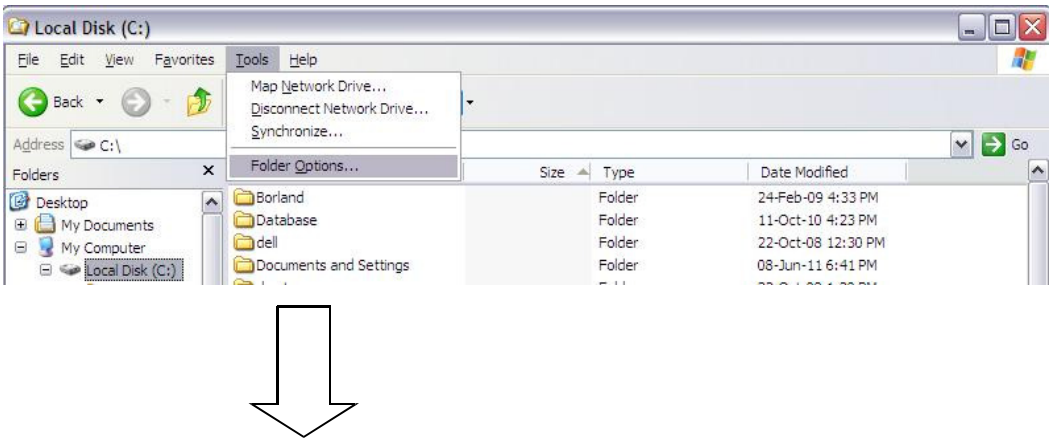
7.2 Arduino Software

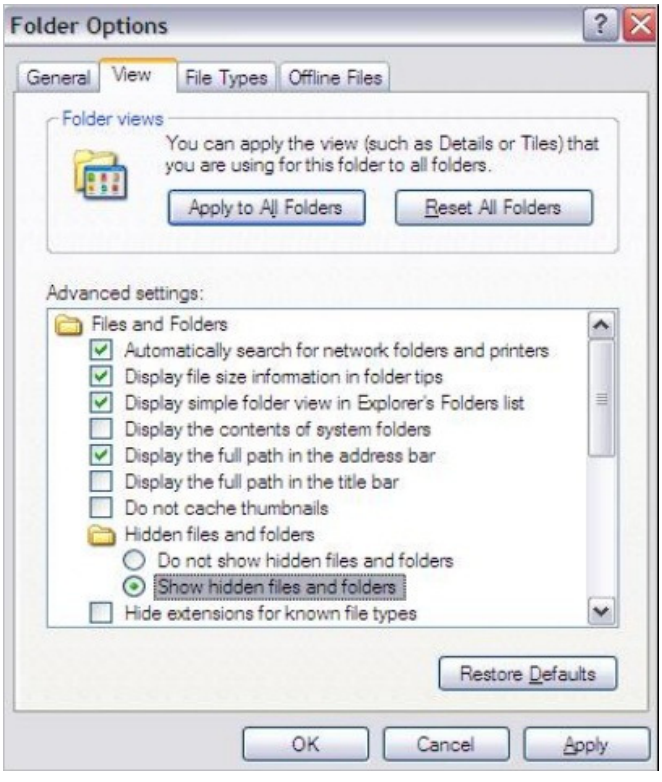
By modifying Arduino Software, we are able to program the Arduino board using AVR USBasp without pre-program bootloader in microcontroller. Besides that, we are also able to program the microcontroller without using Arduino board. For Arduino software, you can download it on this website: http://arduino.cc/en/Main/Software

Steps of modification

1. After you have installed the Arduino software to your PC, do not open the software first.

2. Goto C: ,click Tools > Folder Options > View , and tick the column which show "show hidden files and folder" then click apply and ok.





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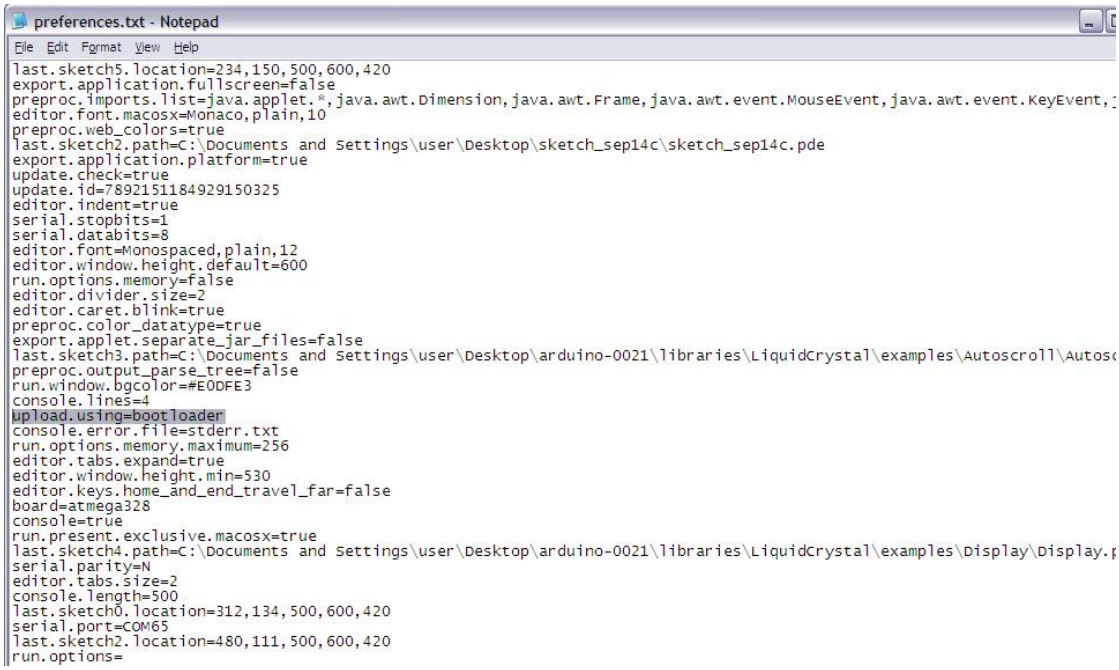
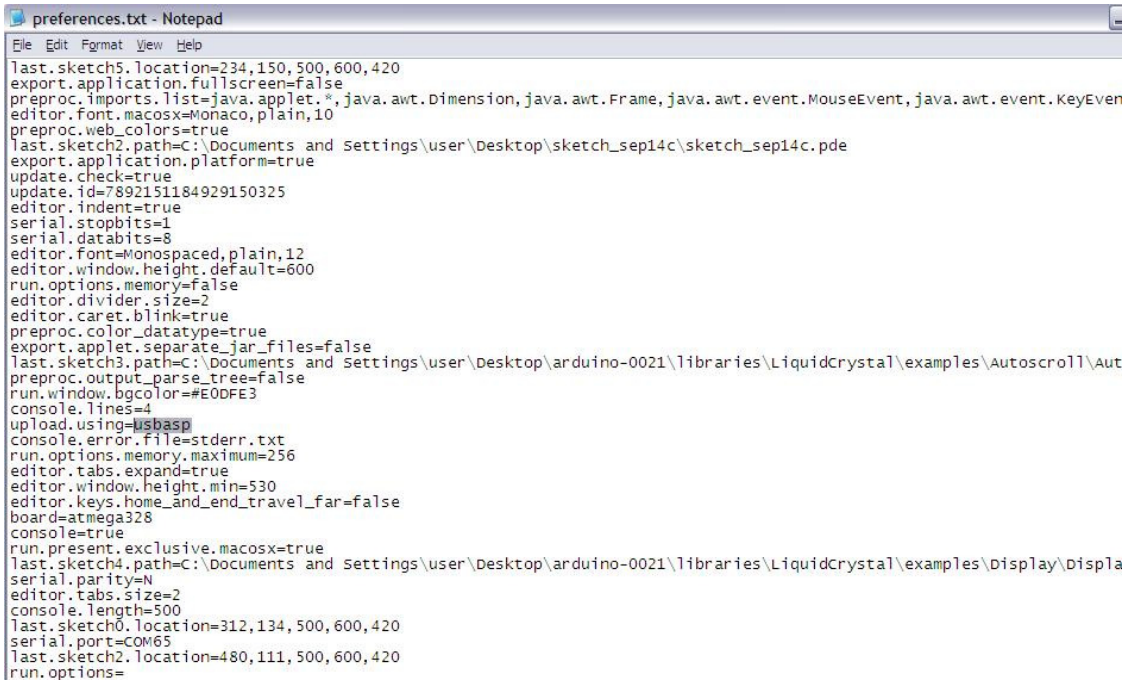
3. Go to C:\Documents and Settings\"user"\Application Data\Arduino

4. Open the file preferences.txt

5. Find the sentence upload.using=bootloader, and change it to upload.using=usbasp





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6. After replace it, save and close it.
7. Next, open the folder of the software Arduino which you have installed at the beginning.
8. Open Folder …\hardware\arduino
9. Open the text file programmers.txt
10. Add another 2 lines in the below of the last sentence in the text file :

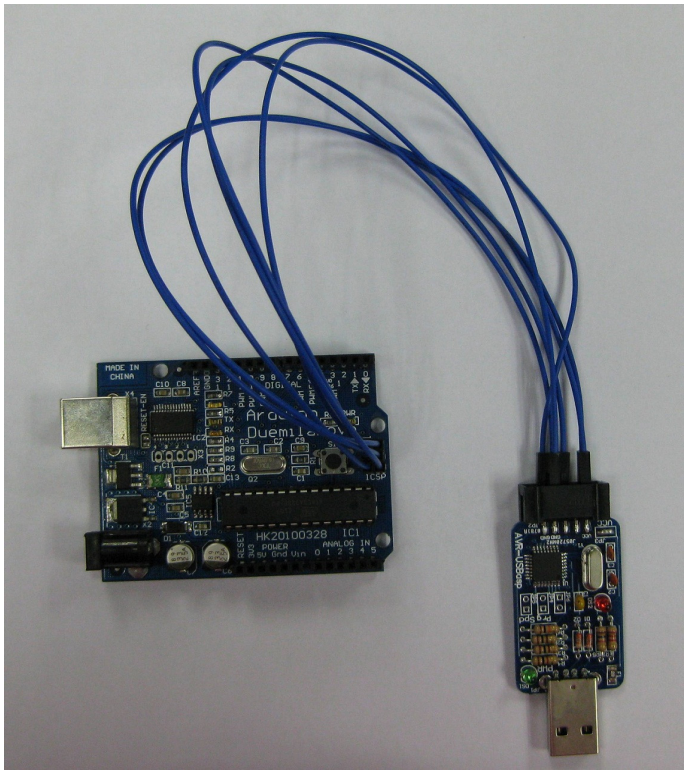
    Usbasp.name=USBasp

    Usbasp.protocol=usbasp

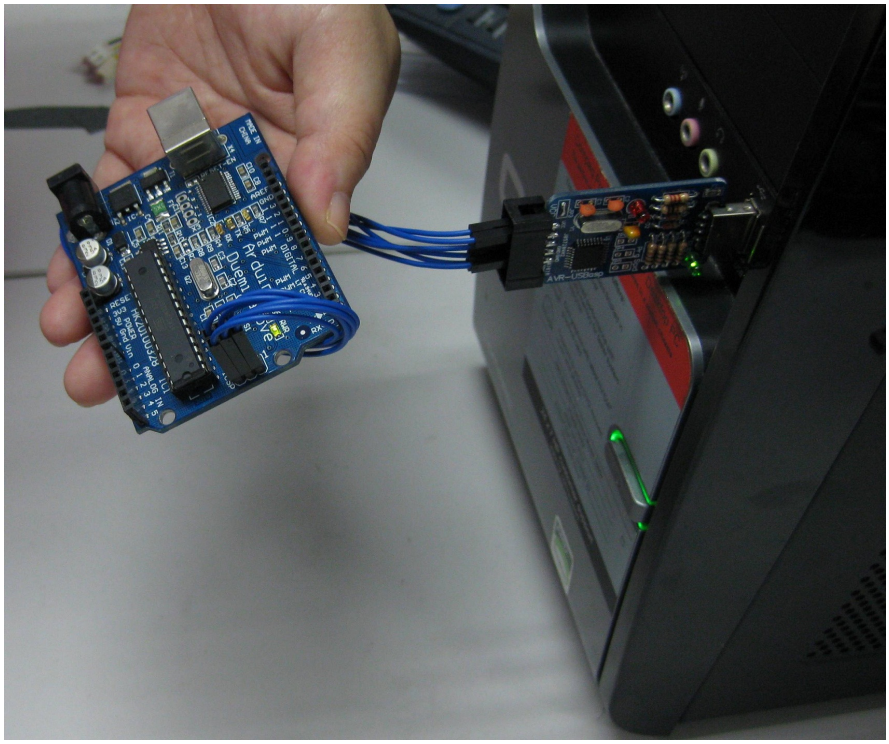
11. Save and close the text file.
12. The last step is to open the Arduino software Arduino.exe, and you can write your program in it and load it to your microcontroller using AVR USBasp.

Examples below show on how to load the program of LED Blinking to the Arduino Duemilanove board using AVR USBasp programmer.

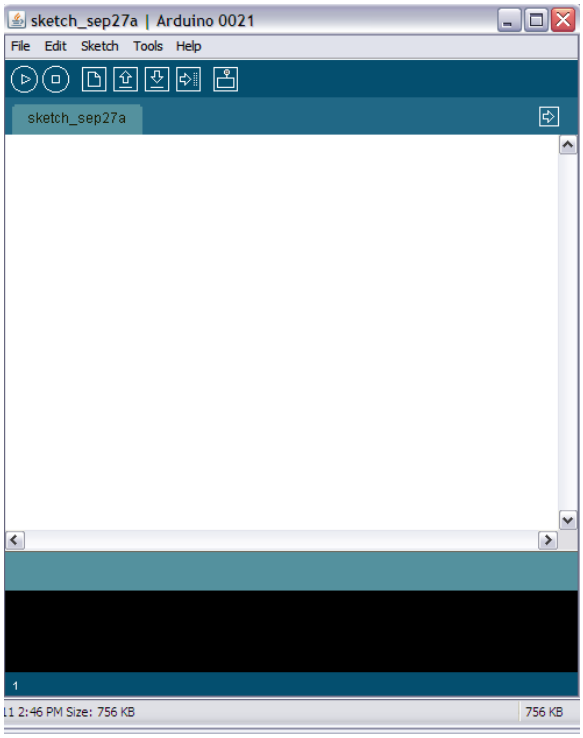
1. Do some wiring on the hardware parts. (Female to female jumper wire which show in the figure below is not come together with the product AVR USBasp, you should buy it if you need it on Cytron Technologies Sdn. Bhd.) The connection below, you can refer page 10, section 6: Example Schematic.



2. Connect the AVR USBasp to the USB port of the PC.



3. Open the Arduino software "Arduino.exe" to load the program in to the Arduino Duemilanove board. By using USBasp programmer, we do not need to load any bootloader program in it, and also, we do not need to choose the COM Port, and directly program into it.



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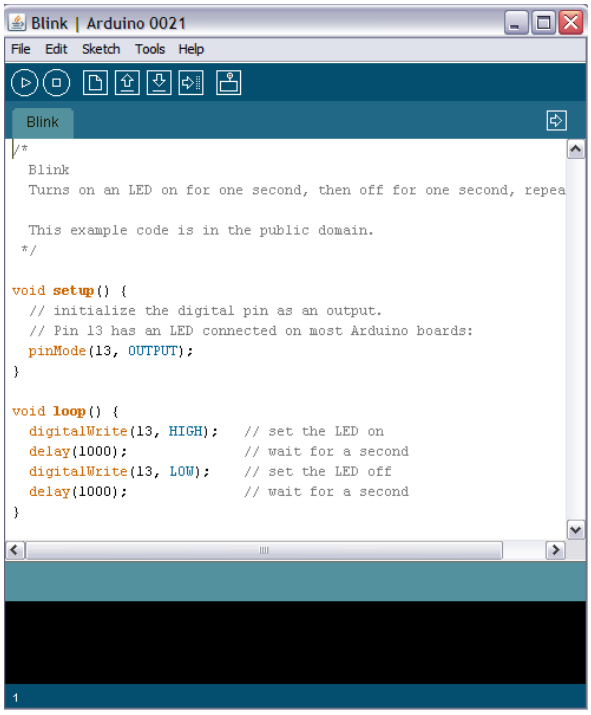
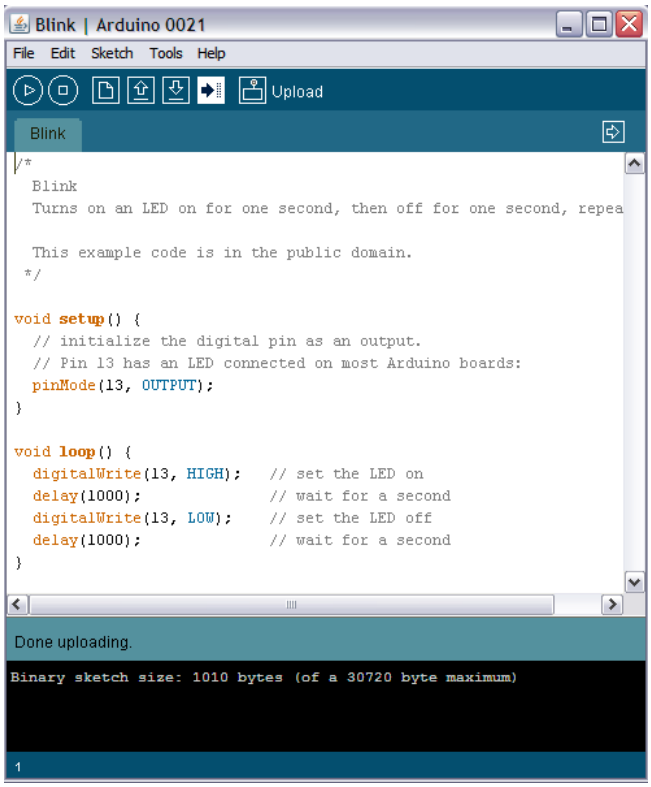
4. Next, we need to call out the example of the source code by click on the Files > Examples > Basics > Blink. Then the source code of LED blinking will pop out in few seconds.



5. Last step is to click on the Upload button which appears on the page of LED blink's source code to load the program to the microcontroller.



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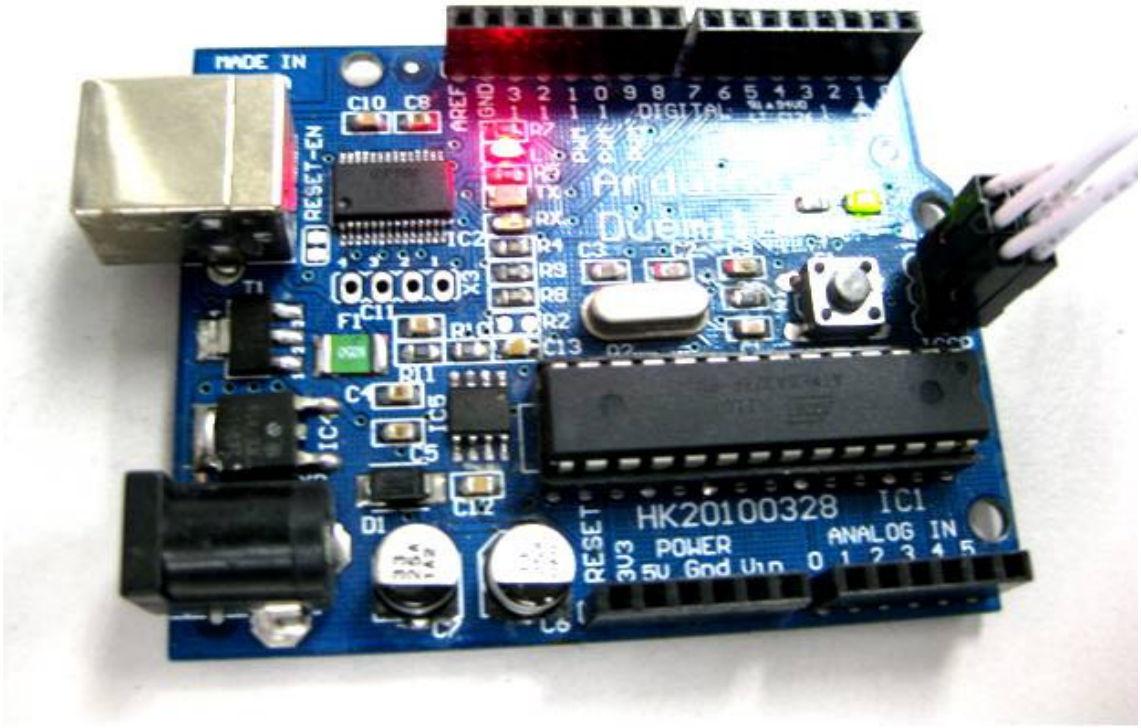

Output of LED Blinking

For your information, the hex file for the Arduino's example source code can be found by follow the steps below. By default, hex file will not be generated in Arduino Software. This allows you to write the code in Arduino Software, but program the AVR microcontroller by others software like AVRdude discussed at section 7.1 which require hex file.

1. Open the Arduino software.
2. Open the example source code (LED Blinking, LCD4bit_mode example and ect.). For this example, we are going to open the LED Blinking Source code.
3. Press "Shift" button on the keyboard and in the same time, click verified button on the LED Blinking source code's page. Then you will see the location of the hex file for the LED Blinking. It is same for every example source code.

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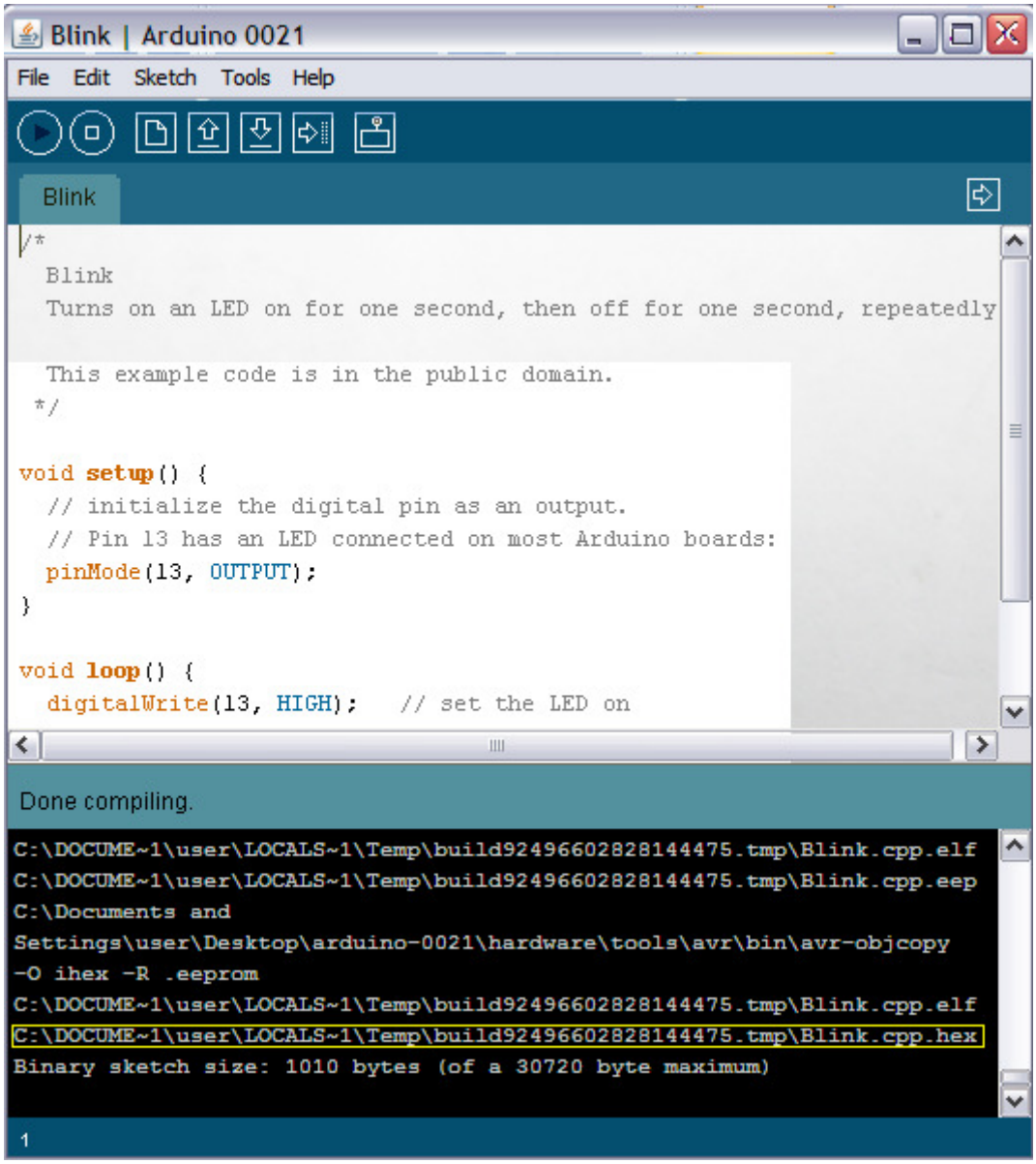

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8. Warranty

- Product warranty is valid for 6 months.
- Warranty only applies to manufacturing defect.
- Damage caused by mis-use is not covered under warranty.
- Warranty does not cover freight cost for both ways.

Prepared by
Cytron Technologies Sdn. Bhd.
19, Jalan Kebudayaan 1A,
Taman Universiti,
81300 Skudai,
Johor, Malaysia.

Tel: +607-521 3178
Fax: +607-521 1861

URL: www.cytron.com.my
Email: support@cytron.com.my
sales@cytron.com.my

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