

AVR High Speed USB Programmer [RKI-1043]



Users Manual

Robokits India

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Thank you for purchasing the Robokits AVR USB Programmer. This unit has been carefully engineered and tested to provide superior performance. This document covers the features and operation of the AVR USB Programmer.

This device is specially designed to work with Laptops/Notebooks which doesn't have Parallel or serial port. At full clock speed of 16MHz of the microcontroller it can program the flash at very high speeds in STK500 mode. This programmer is supported in STK500 as well as Human Interface Device (HID) mode. It is supported on all versions of Windows, including Windows XP, 2000, Vista, 7 and 8 as well as on Linux.

Features

- Compatible to Atmel's STK500V2 with implemented USB to Serial converter.
- Compatible with AVR Studio, AVRDUDE and compilers having support for STK500V2 protocol.
- Supports 2 modes, STK500 and USB-HID for compatibility.
- Adjustable ISP clock allows flashing of devices clocked at very low rate, e.g. 32 kHz.
- High Speed Programming: Programs 32 KB flash in just 15 seconds at full speed of microcontroller.
- ISP clock can be lowered with a jumper (if the programmer software does not support setting the ISP clock) for slow speed crystals such as 32.768Mhz
- Uses USB power supply, no external supply required.
- Supported on Windows 98, XP, Vista, 7 and Linux.*

Notes:

*On some PCs, the programmer can show clock errors while flashing the device, use HID mode in this case. For Windows Vista, 7 and Linux, this device must be used in HID mode.

*LED on the programmer will glow only when the programmer is programming or reading the target device.

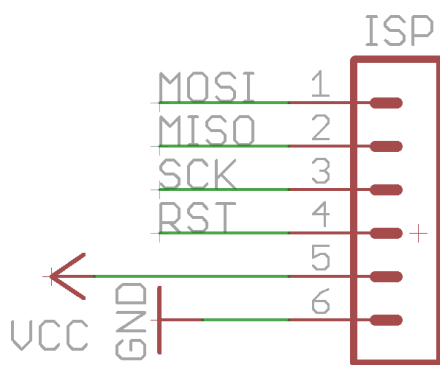
*If you do not get device list in Robokits avr USB programmer software under Windows 64bit OS then please copy "Robokits" folder from C:\Program Files x86 to C:\Program Files.

Supported Atmel AVR microcontroller devices

AT90 AVR	Mega AVR	Mega AVR	Tiny AVR	ATXMEGA AVR
AT90S1200	ATMega103	ATMega32U2	ATTiny4	ATXMega128A1
AT90S2313	ATMega128	ATMega32U4	ATTiny5	ATXMega128A1REVD
AT90S2333	ATMega1280	ATMega48	ATTiny9	ATXMega128A3
AT90S2343	ATMega1281	ATMega64	ATTiny10	ATXMega128A4
AT90S4414	ATMega1284P	ATMega640	ATTiny11	ATXMega16A4
AT90S4433	ATMega128RFA1	ATMega644	ATTiny12	ATXMega192A1
AT90S4434	ATMega16	ATMega644P	ATTiny13	ATXMega192A3
AT90S8515	ATMega161	ATMega645	ATTiny15	ATXMega256A1
AT90S8535	ATMega162	ATMega6450	ATTiny2313	ATXMega256A3
AT90CAN128	ATMega163	ATMega649	ATTiny24	ATXMega256A3B
AT90CAN64	ATMega164P	ATMega6490	ATTiny25	ATXMega32A4
AT90CAN32	ATMega168	ATMega8	ATTiny26	ATXMega64A1
AT90USB1286	ATMega168P	ATMega8515	ATTiny261	ATXMega64A3
AT90USB1287	ATMega169	ATMega8535	ATTiny4313	ATXMega64A4
AT90USB162	ATMega16U2	ATMega88	ATTiny44	
AT90USB646	ATMega2560	ATMega88P	ATTiny45	
AT90USB647	ATMega2561	ATMega8U2	ATTiny461	
AT90USB82	ATMega32		ATTiny84	
AT90PWM2	ATMega324P		ATTiny85	
AT90PWM2B	ATMega324PA		ATTiny861	
AT90PWM3	ATMega325		ATTiny88	
AT90PWM3B	ATMega3250			
32UC3A0512	ATMega328P			
	ATMega329			
	ATMega3290			
	ATMega3290P			
	ATMega329P			

ISP Connector

- Green: MOSI
- Yellow: MISO
- Orange: SCK
- Red: RESET
- Brown: VCC
- Black: GND



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Programming Modes

- This programmer can program AVR devices in 2 modes. **STK500V2(HID Mode)** & **STK500(CDC Mode)**
 - **STK500V2(HID)** mode can be used with any OS as it works as a HID device. No driver software is needed for installation. This mode can program chips at much faster rate than stk500 mode. This mode can not be used with AVR Studio but other software like AVRDUDE or Robokits USB Programmer software can program devices in this mode. We recommend using this mode as its much stable and fast to use.
 - **STK500(CDC)** mode can be used when you want to program device through AVR Studio or other software which support this mode.

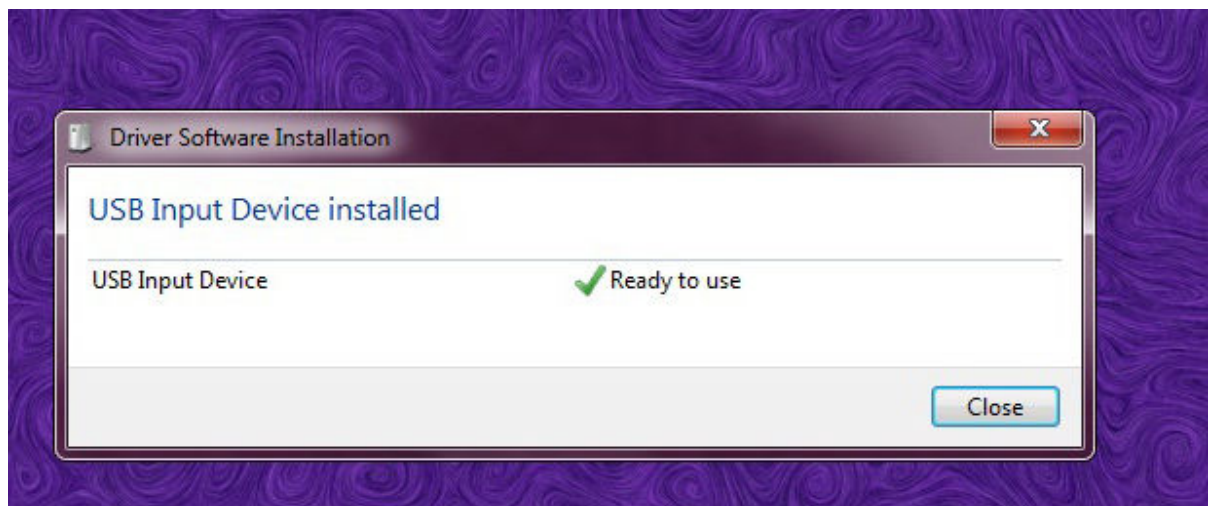
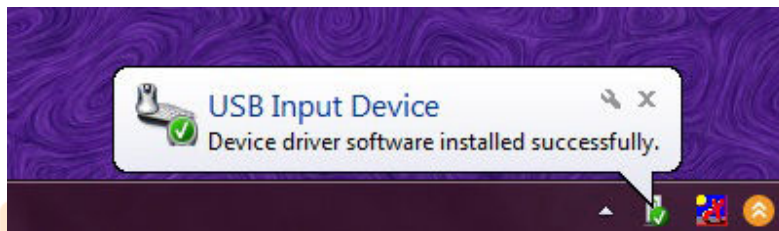
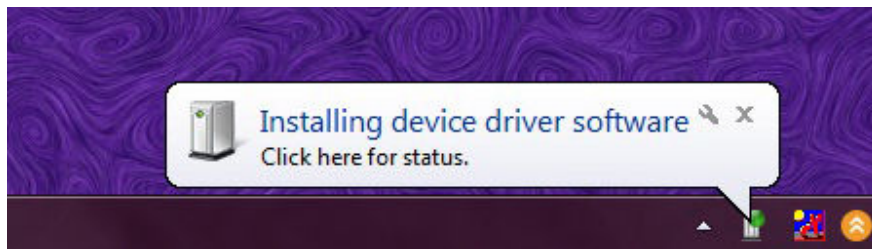
Mode 2: USB-HID Mode (Any Windows version & Linux)

- Before inserting the programmer place the USB-HID jumper. This mode doesn't require any drivers in any operating system.



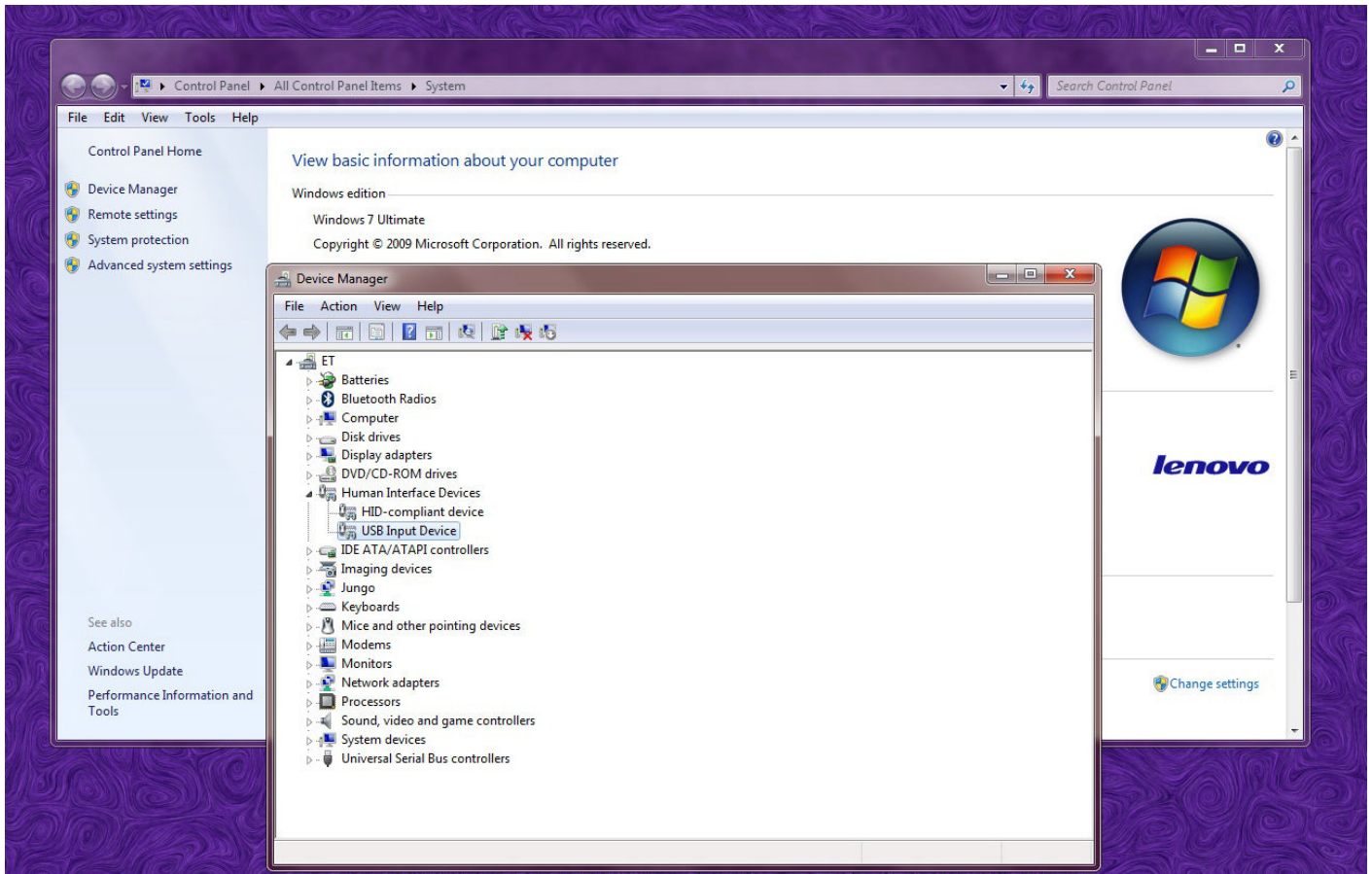
- Run RobokitsUSBProg.exe to install the programmer software. Latest version of this software can be downloaded from <http://www.robokits.co.in/downloads/RobokitsUSBProg.exe>
- To run this software you need to have .net framework 2.0. You can download this from <http://download.microsoft.com/download/5/6/7/567758a3-759e-473e-bf8f-52154438565a/dotnetfx.exe>
- .net framework 2.0 is also included on the CD included with programmer.

- When you insert AVR USB programmer to USB port you will see following messages on you Windows system. Following messages are from Windows 7 (32 bit) version, you should get similar ones in Windows 7 64 bit or Windows XP.
-



- This mode doesn't need any drivers or manual installation to operate.

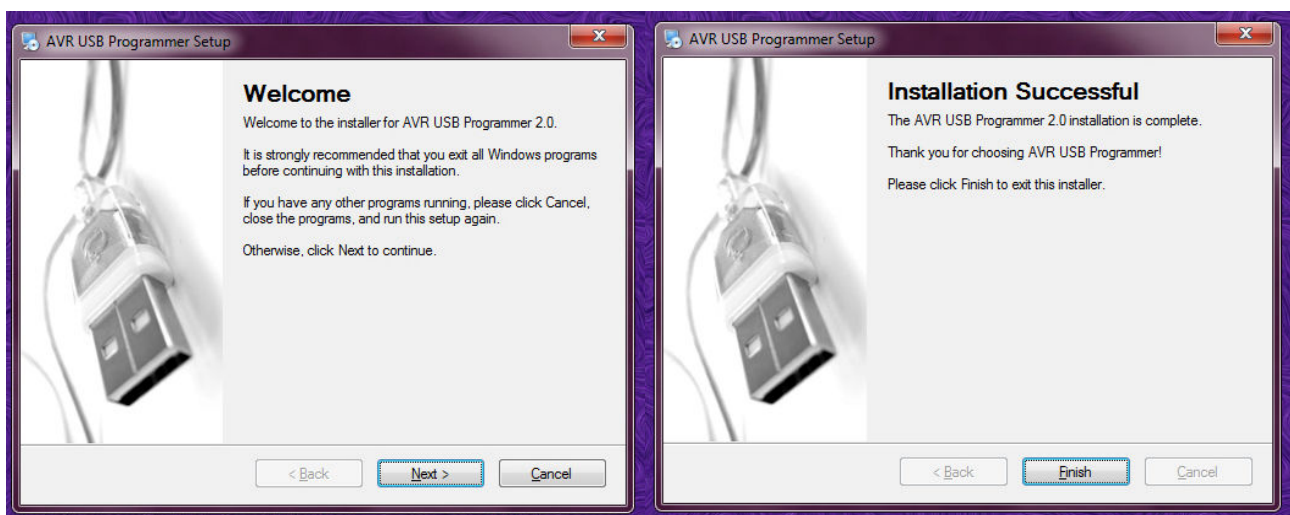
- To verify that installation is working properly, you can see device manager.



- You should get USB Input Device under Human Interface Device category.



- To use the programmer you either need our software or any other software (i.e. WinAVR) which can program AVR through AVRDUDE (<http://savannah.nongnu.org/projects/avrdude>)
- Execute Robokits USB Programmer setup executable from CD. You can get the latest version of software from our website : <http://www.robokits.co.in/downloads/RobokitsUSBProg.exe>
- You should get following screens for installation. Keep clicking Next until you install software. Click Finish on last screen.



- Once installed you can click Robokits AVR USB Programmer link created on your desktop or from start menu under Robokits folder. You will be able to see the main screen of software.

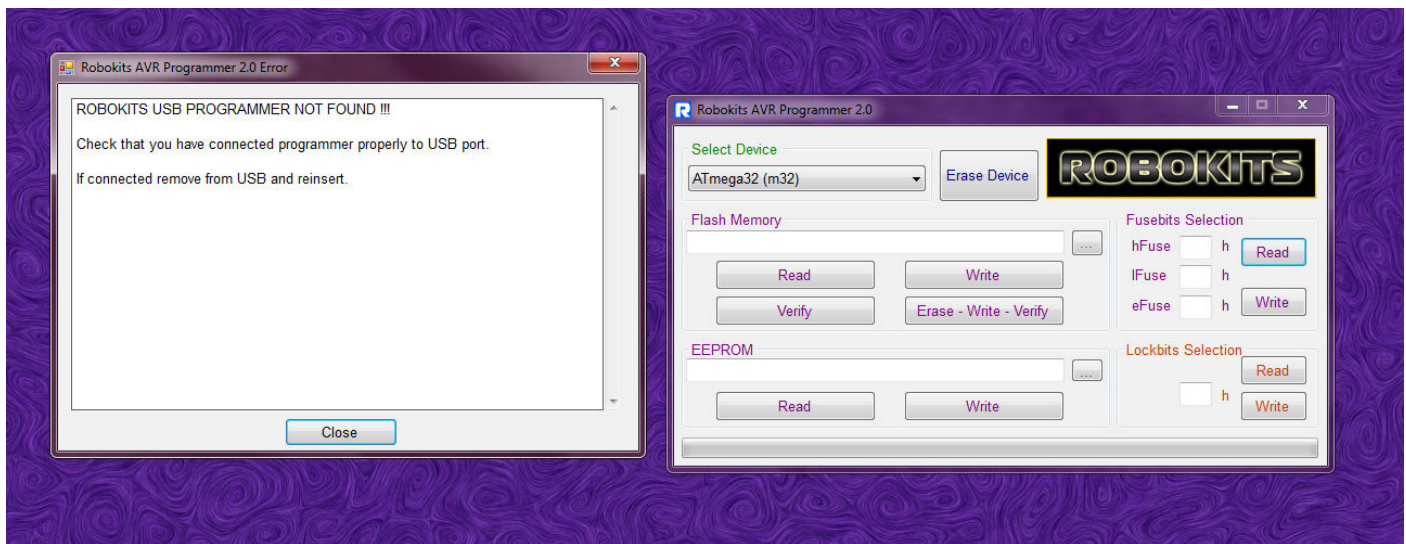


- First of all select the device you want to program. Rests of the functions are easy to understand. As a list they are as below
 - Flash Memory Read : Read data from AVR device to hex file
 - Flash Memory Write : Write data from hex file to AVR device
 - Flash Memory Verify : Verify the AVR device against hex file
 - Flash Memory Erase-Write-Verify : Erases flash memory from AVR, burns hex file content to AVR device and Verify after writing. – We suggest this option to program AVR for failsafe programming
 - EEPROM Read – Write : Read EEPROM contents to eep file or writes to EEPROM from eep file.
 - Fusebits and Lockbits Read –Write : Read Fusebits or Lockbits from device or write to device
 - Erase Device : Erase flash (& EEPROM if fusebits are set for that – see datasheet of device)

- **Troubleshooting**

There are mainly 2 errors which generally occurs using this programmer

1. Programmer is not connected to USB port properly.



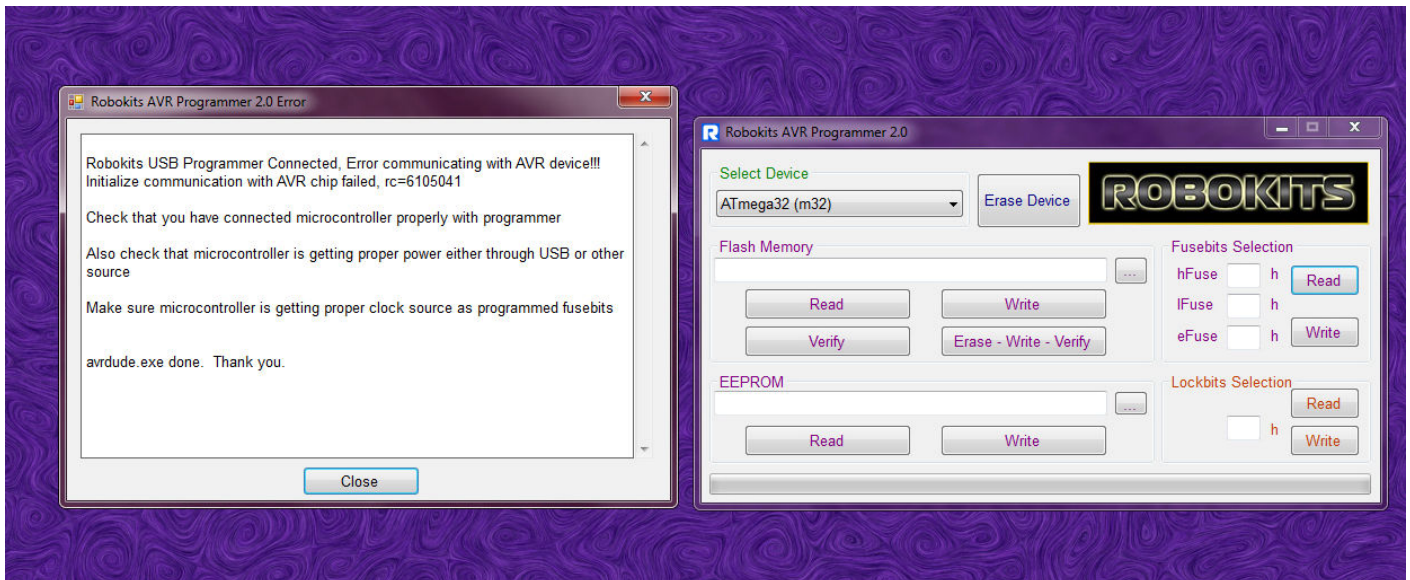
If you get ROBOKITS USB PROGRAMMER NOT FOUND!!! Error, please connect the programmer properly. Make sure USB programmer is in HID mode.

If the programmer is connected remove and insert again.

If ISP Supply Jumper is connected, make sure your device is not powered up with some other power or connected device is not taking current from USB port more than 500mA.

If nothing works, check Device manager for USB Input device (See Page 7 for details). If you can see device there check on some other PC or Laptop.

2. Microcontroller is not connected to Programmer properly.



If you are getting this error means that your programmer is working properly and connected with the PC properly but its not connected to microcontroller properly or microcontroller is not correctly working.

Make sure that microcontroller is getting proper power from either target board or from USB Programmer.

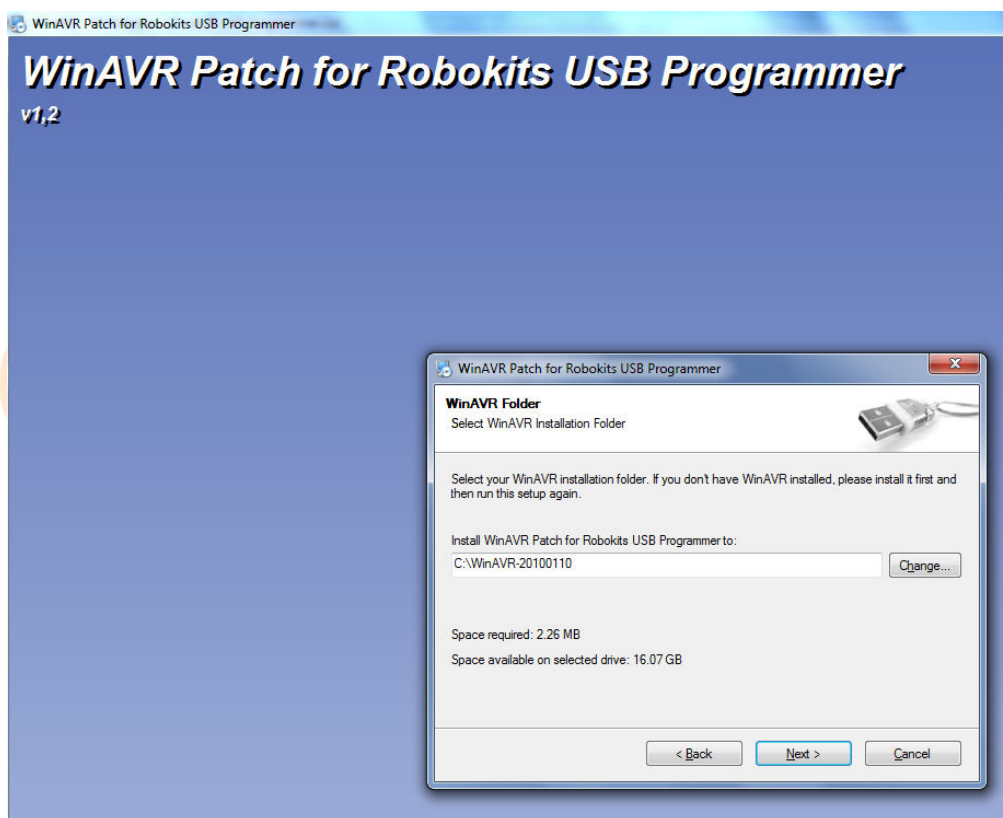
Make sure that microcontroller is getting proper clock source as programmed fusebits. If clock source is not correct microcontroller will not respond or work. For example you programmed a fresh ATmega8 which by default have internal 1 Mhz clock. Now programmer will detect chip and work properly even if you don't connect any external clock source but then you programmed the fusebits to use external crystal, now the controller will not start until you connect a crystal properly to MCU and you will see above error.

Make sure all wires are connected to proper pins to microcontroller. If you are powering microcontroller with external power supply(not using USB power supply) VCC (Brown Wire) is not required to be connected.

If still not working check with some other microcontroller which you know is working.

If your programmer is still not working, you can contact us on email with error details. You can see warranty policy and procedure here : http://robokits.co.in/resources/?page_id=106

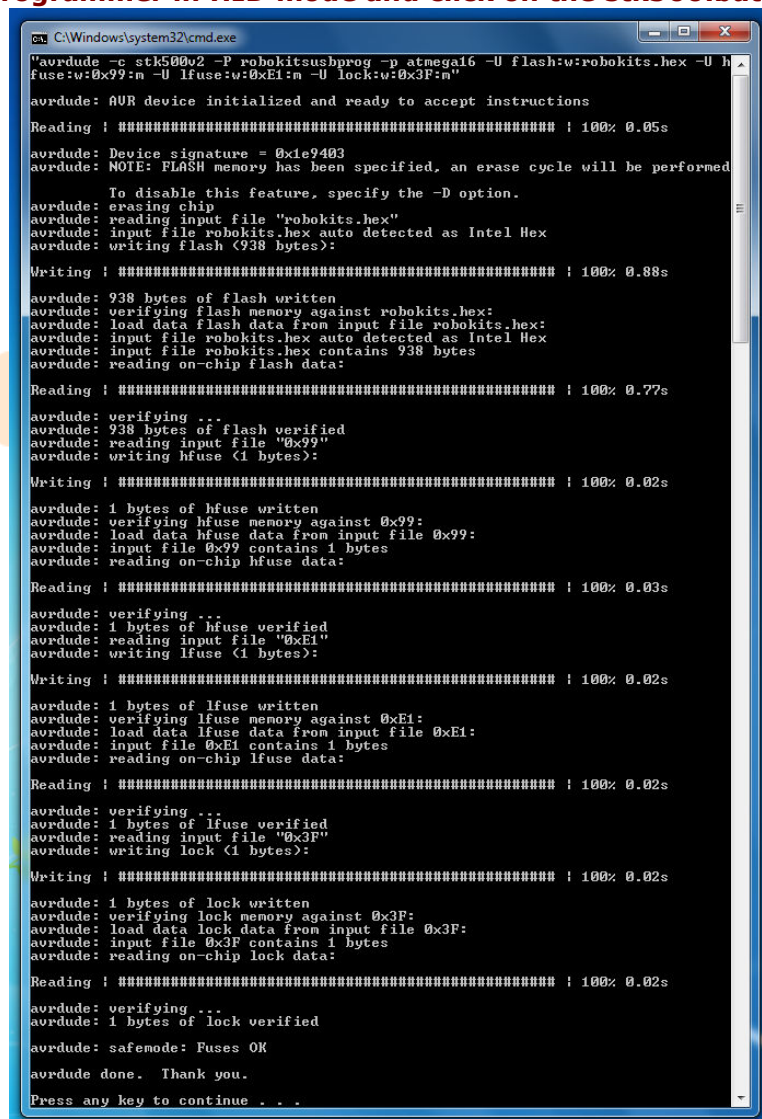
- **Using WinAVR / Command line arguments to program AVR**
- **Install WinAVR**
- **Install WinAVR software provided on CD. You can also download latest version and install the same.**
- **Install WinAVR Patch**
- **Install "RobokitsUSBProg patch for WinAVR.exe". It will automatically search path of WinAVR installation however if it doesn't select correct path where you have installed WinAVR. E.g. "C:\WinAVR-20100110".**



- **Now you can use sample makefile given on CD and directly program your code through winavr. We have given sample winavr projects also on CD to test the functionality. Just open any project on winavr and select Tools->[WinAVR] Program and check status in output window. Also the same folder is having batch files stk500.bat. Just run that to program your microcontroller.**

- **Change parameters in batch file**

- **avrdude -c stk500v2 -P robokitsusbprog -p atmega16 -U flash:w:robokits.hex -U hfuse:w:0x99:m -U lfuse:w:0xE1:m -U lock:w:0x3F:m**
- **Select correct device number e.g. "atmega16, atmega8, atmega32 etc".**
- **Select correct hex file name to program.**
- **Select correct fuse bits for programming. Refer <http://www.engbedded.com/fusecalc> for calculations at your risk or datasheet of the product.**
- **You can edit above changes in stk500.bat file if required.**
- **Programming**
- **Connect USB programmer in HID mode and click on the stk500.bat file to program.**

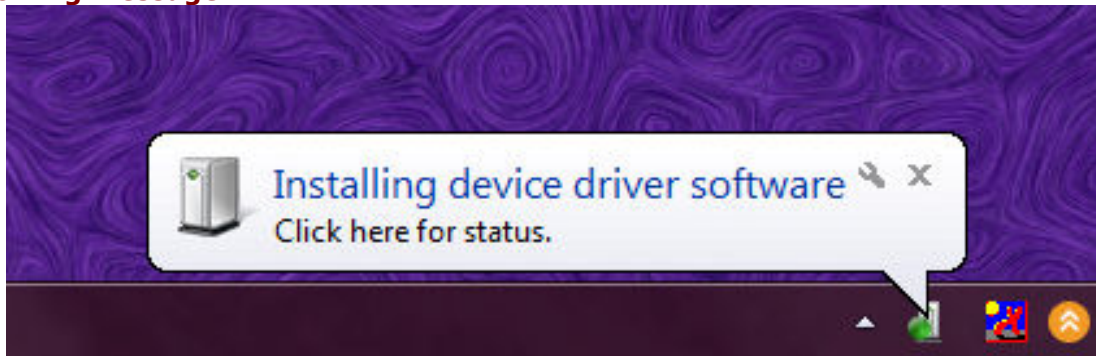


```
C:\Windows\system32\cmd.exe
avrdude -c stk500v2 -P robokitsusbprog -p atmega16 -U flash:w:robokits.hex -U hfuse:w:0x99:m -U lfuse:w:0xE1:m -U lock:w:0x3F:m
avrdude: AVR device initialized and ready to accept instructions
Reading : ##### : 100% 0.05s
avrdude: Device signature = 0x1e9403
avrdude: NOTE: FLASH memory has been specified, an erase cycle will be performed
        To disable this feature, specify the -D option.
avrdude: erasing chip
avrdude: reading input file "robokits.hex"
avrdude: input file robokits.hex auto detected as Intel Hex
avrdude: writing flash (938 bytes):
Writing : ##### : 100% 0.88s
avrdude: 938 bytes of flash written
avrdude: verifying flash memory against robokits.hex:
avrdude: load data flash data from input file robokits.hex:
avrdude: input file robokits.hex auto detected as Intel Hex
avrdude: input file robokits.hex contains 938 bytes
avrdude: reading on-chip flash data:
Reading : ##### : 100% 0.77s
avrdude: verifying ...
avrdude: 938 bytes of flash verified
avrdude: reading input file "0x99"
avrdude: writing hfuse (1 bytes):
Writing : ##### : 100% 0.02s
avrdude: 1 bytes of hfuse written
avrdude: verifying hfuse memory against 0x99:
avrdude: load data hfuse data from input file 0x99:
avrdude: input file 0x99 contains 1 bytes
avrdude: reading on-chip hfuse data:
Reading : ##### : 100% 0.03s
avrdude: verifying ...
avrdude: 1 bytes of hfuse verified
avrdude: reading input file "0xE1"
avrdude: writing lfuse (1 bytes):
Writing : ##### : 100% 0.02s
avrdude: 1 bytes of lfuse written
avrdude: verifying lfuse memory against 0xE1:
avrdude: load data lfuse data from input file 0xE1:
avrdude: input file 0xE1 contains 1 bytes
avrdude: reading on-chip lfuse data:
Reading : ##### : 100% 0.02s
avrdude: verifying ...
avrdude: 1 bytes of lfuse verified
avrdude: reading input file "0x3F"
avrdude: writing lock (1 bytes):
Writing : ##### : 100% 0.02s
avrdude: 1 bytes of lock written
avrdude: verifying lock memory against 0x3F:
avrdude: load data lock data from input file 0x3F:
avrdude: input file 0x3F contains 1 bytes
avrdude: reading on-chip lock data:
Reading : ##### : 100% 0.02s
avrdude: verifying ...
avrdude: 1 bytes of lock verified
avrdude: safemode: Fuses OK
avrdude done. Thank you.
Press any key to continue . . .
```

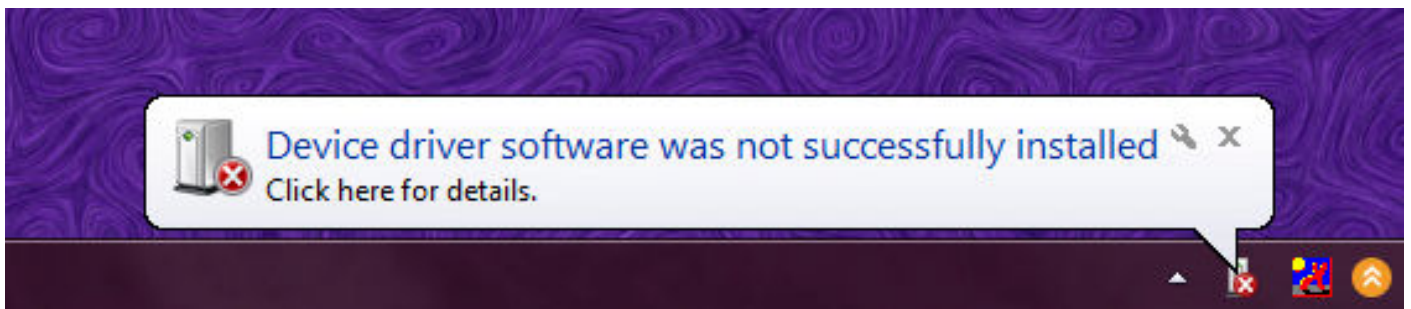
Mode 2: AVR Studio (STK500) Supported mode

Installation STK500 Mode (Windows Vista, 7 & 8)

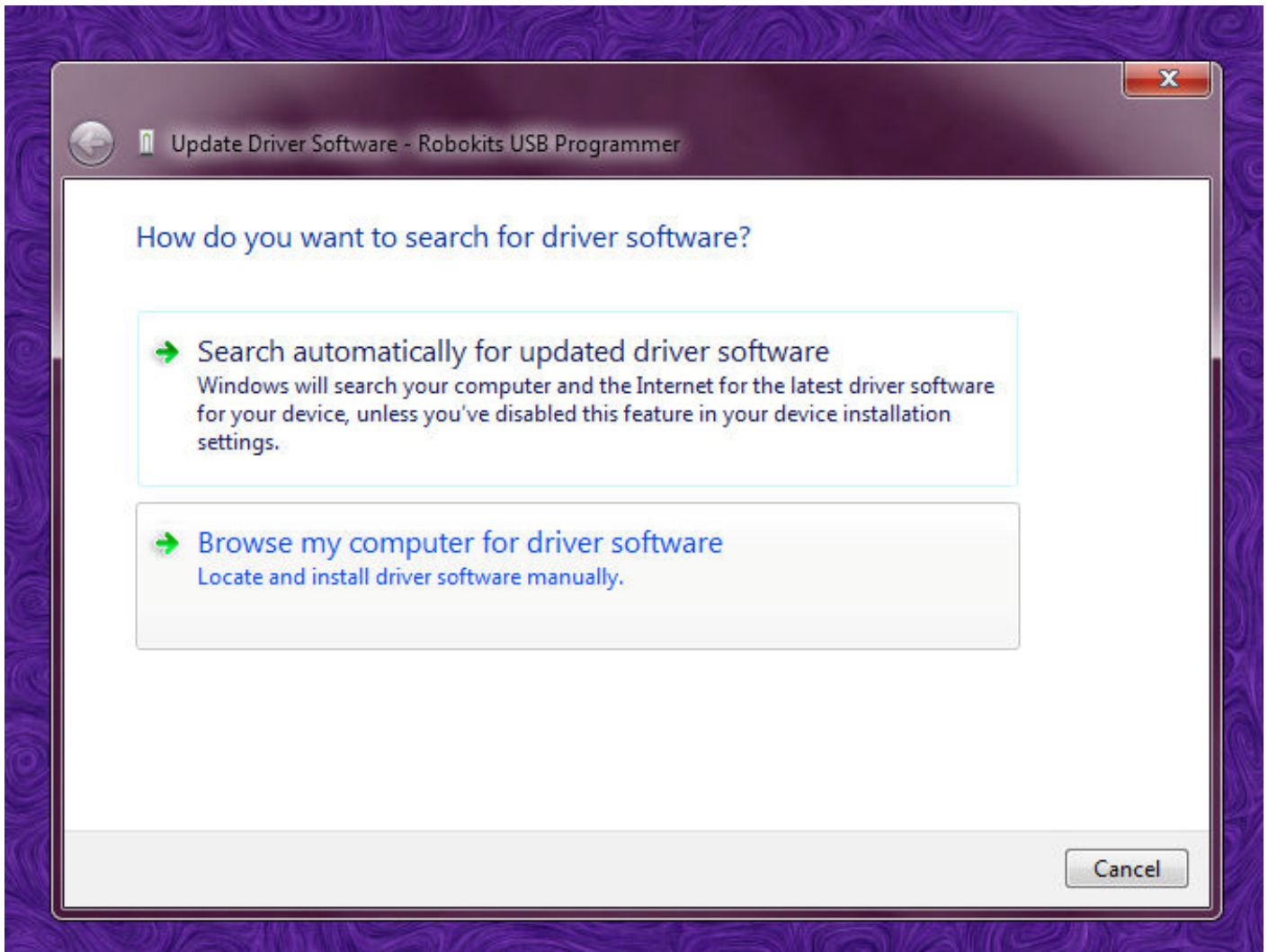
1. Remove USB HID jumper. Insert the Programmer to USB Prot. Inserting you will get following message.



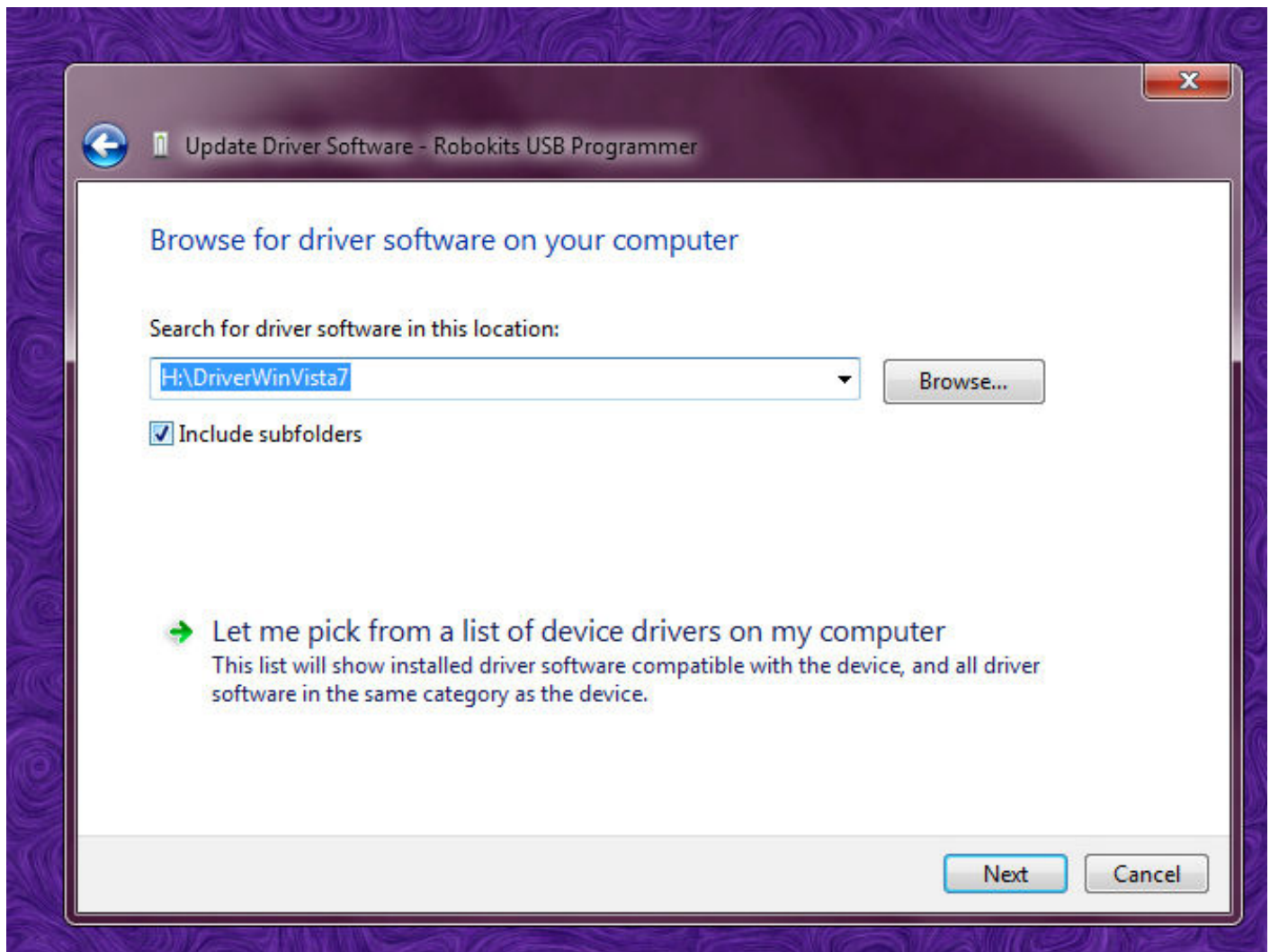
If some other driver for this kind of device is already installed on your system you may also get a message like this one.



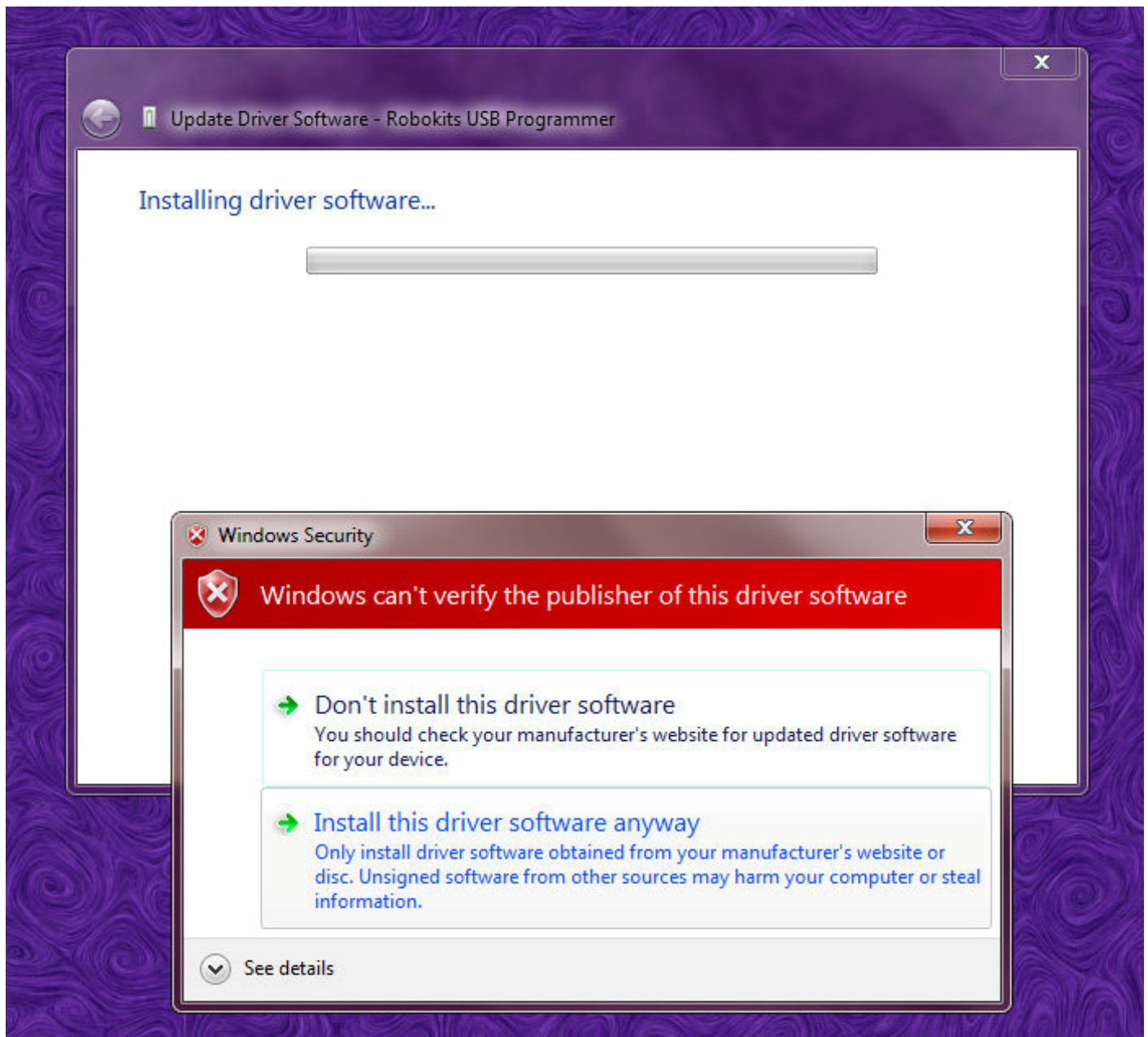
Click the message and you will see driver installation dialog. If you don't, go to device manager and double click yellow error marked device and then click update driver.



If it asks or tries to get driver from windows update, cancel and proceed. Click Browse my computer for driver software.

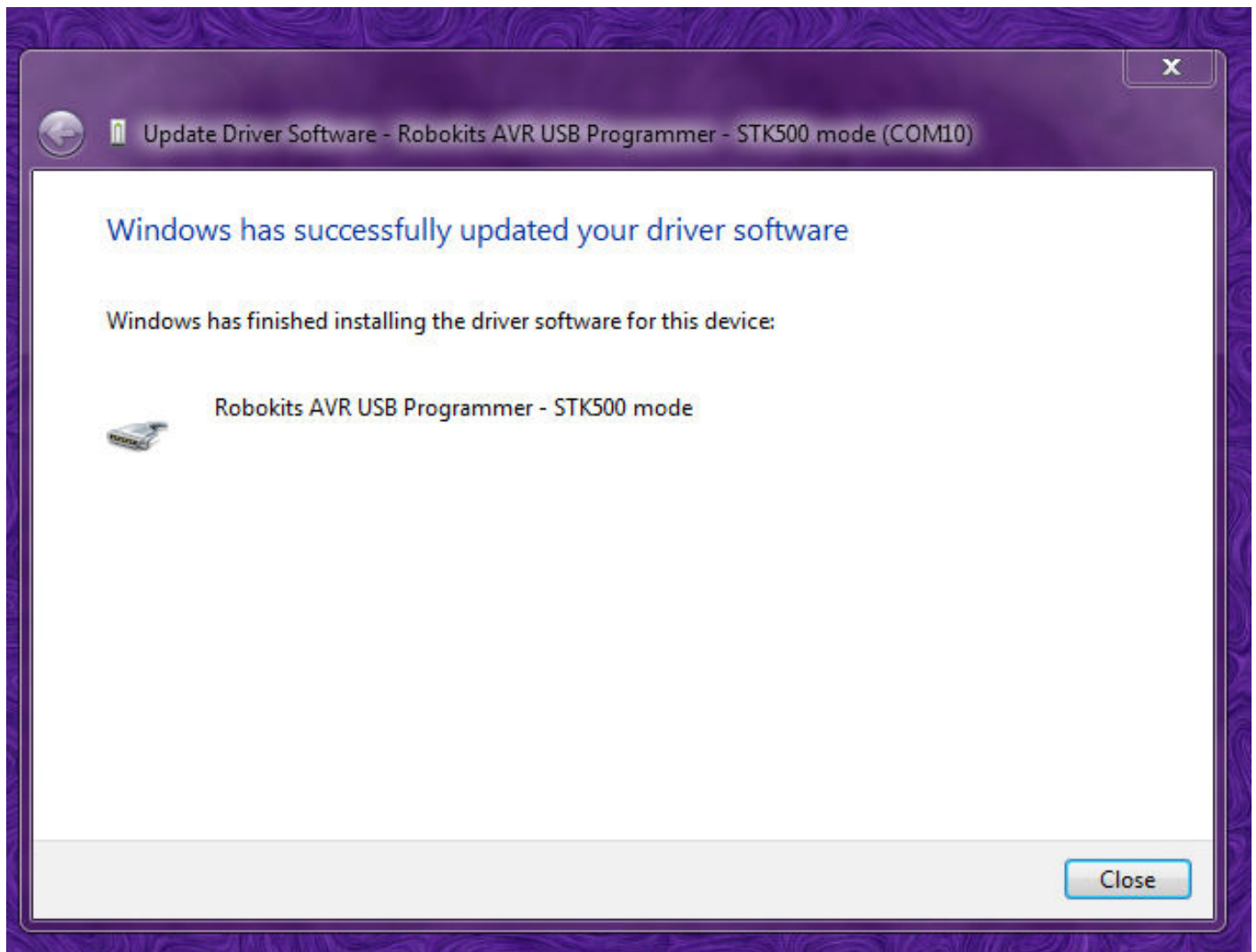


Insert CD which came with programmer to drive. Point the location of "DriverWinVista7" folder of your CD by clicking browse button. Click Next.

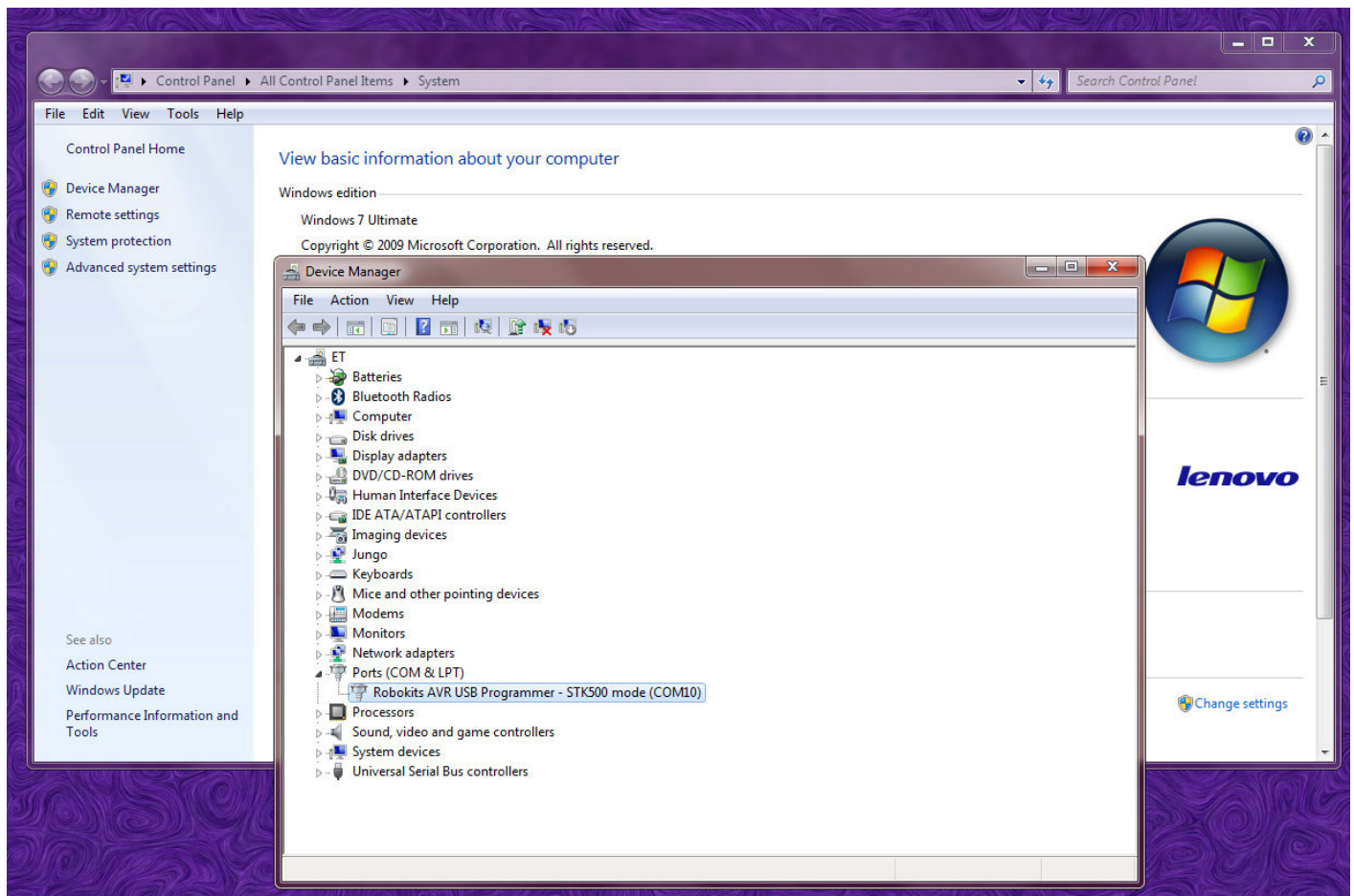


If it shows security error, click Install this driver anyway.

Don't worry there is no virus, malware or Trojan to harm your PC if you install this driver. Its showing this error just because Robokits is not registered publisher for driver in Windows database.



Now it should show you the success message.

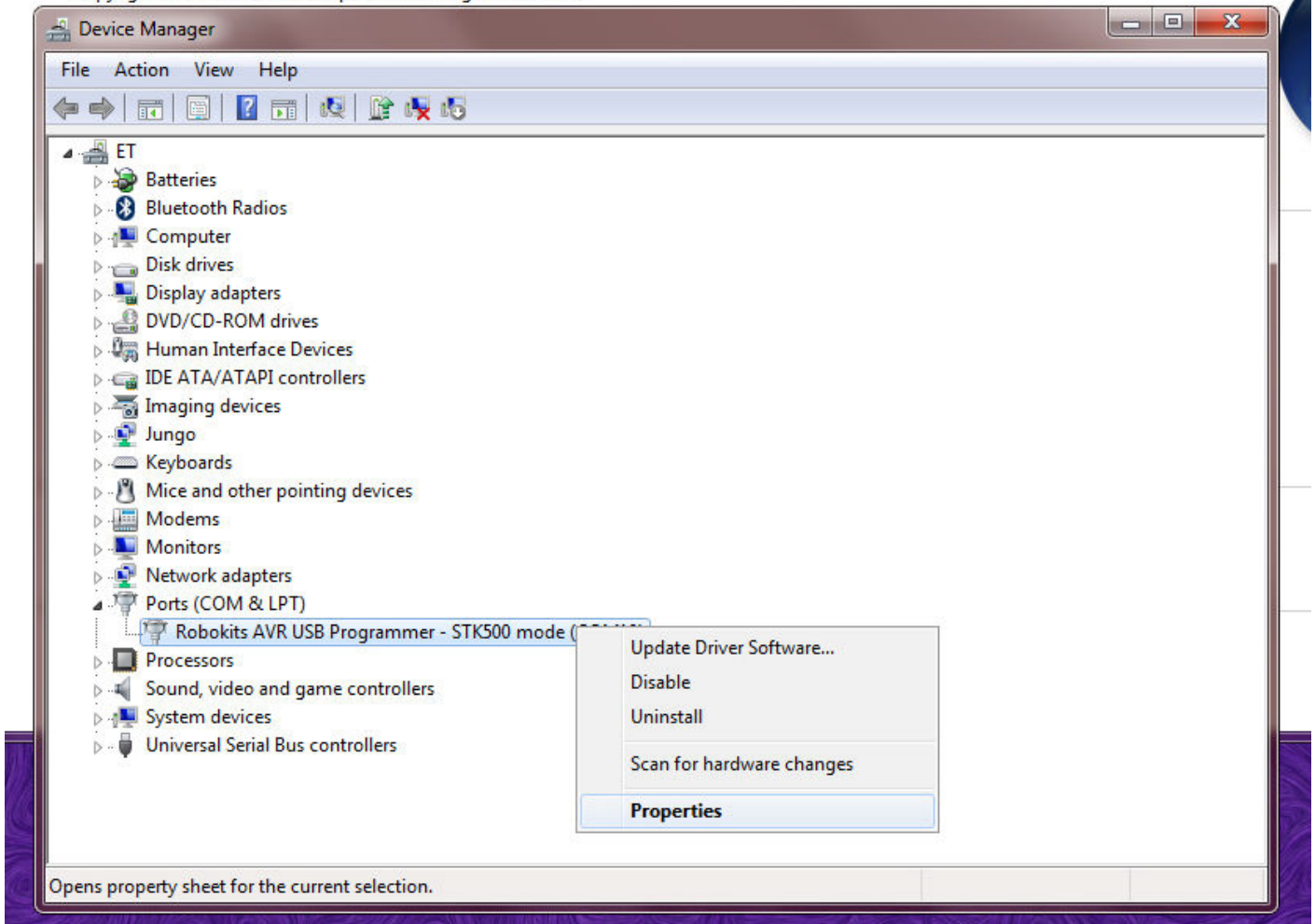


Before going ahead open your device manager and expand Ports category. You will see a virtual com port assigned to Robokits AVR USB Programmer.

If the COM port number is more than 9 you should change it to range between 1-9 as AVR studio will not recognize device which have com port more than 9.

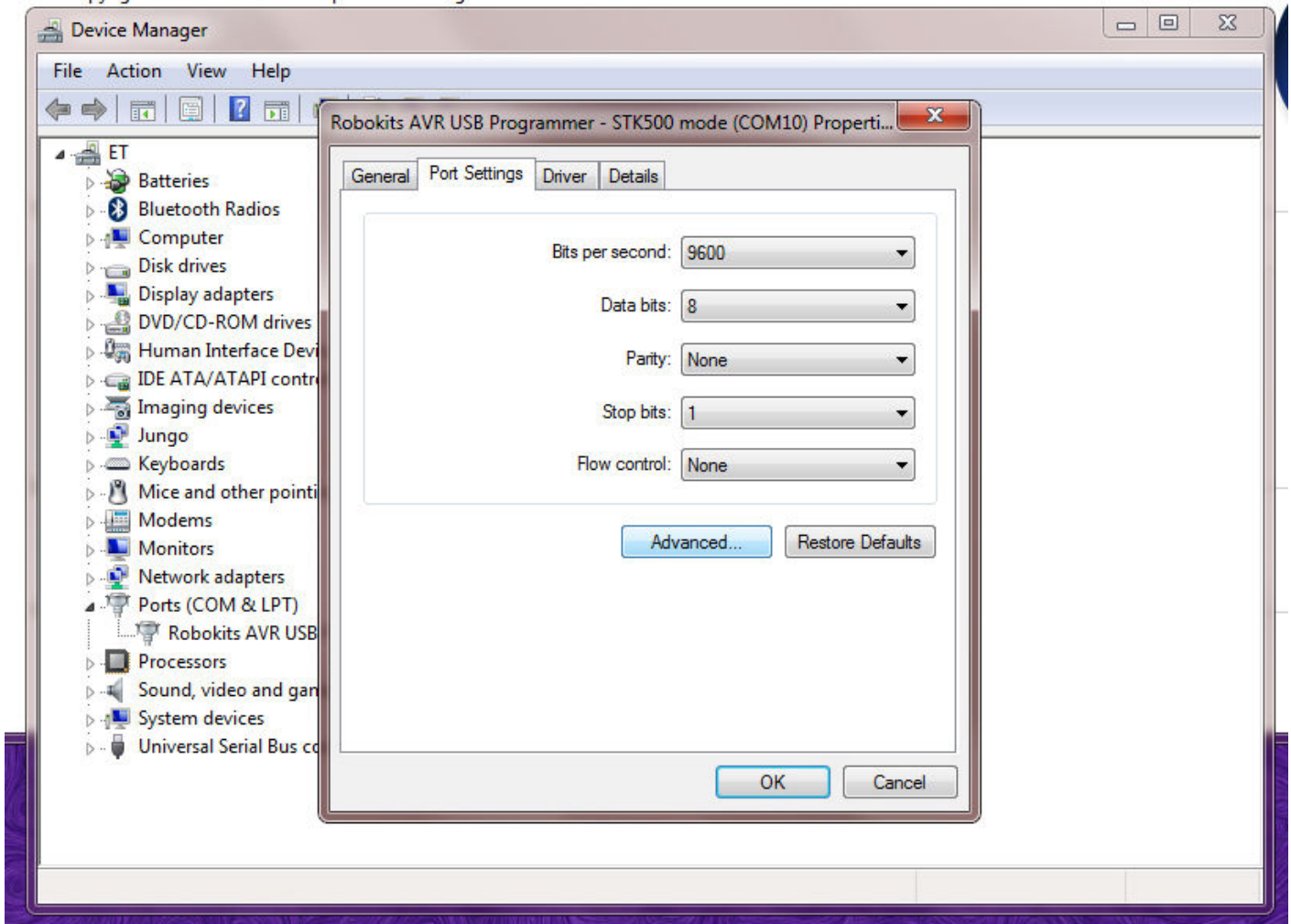
Follow the instructions on next 3 pages for changing COM Port number or if the Port number is COM 9 or below directly go to page 24 for AVR Studio instructions.

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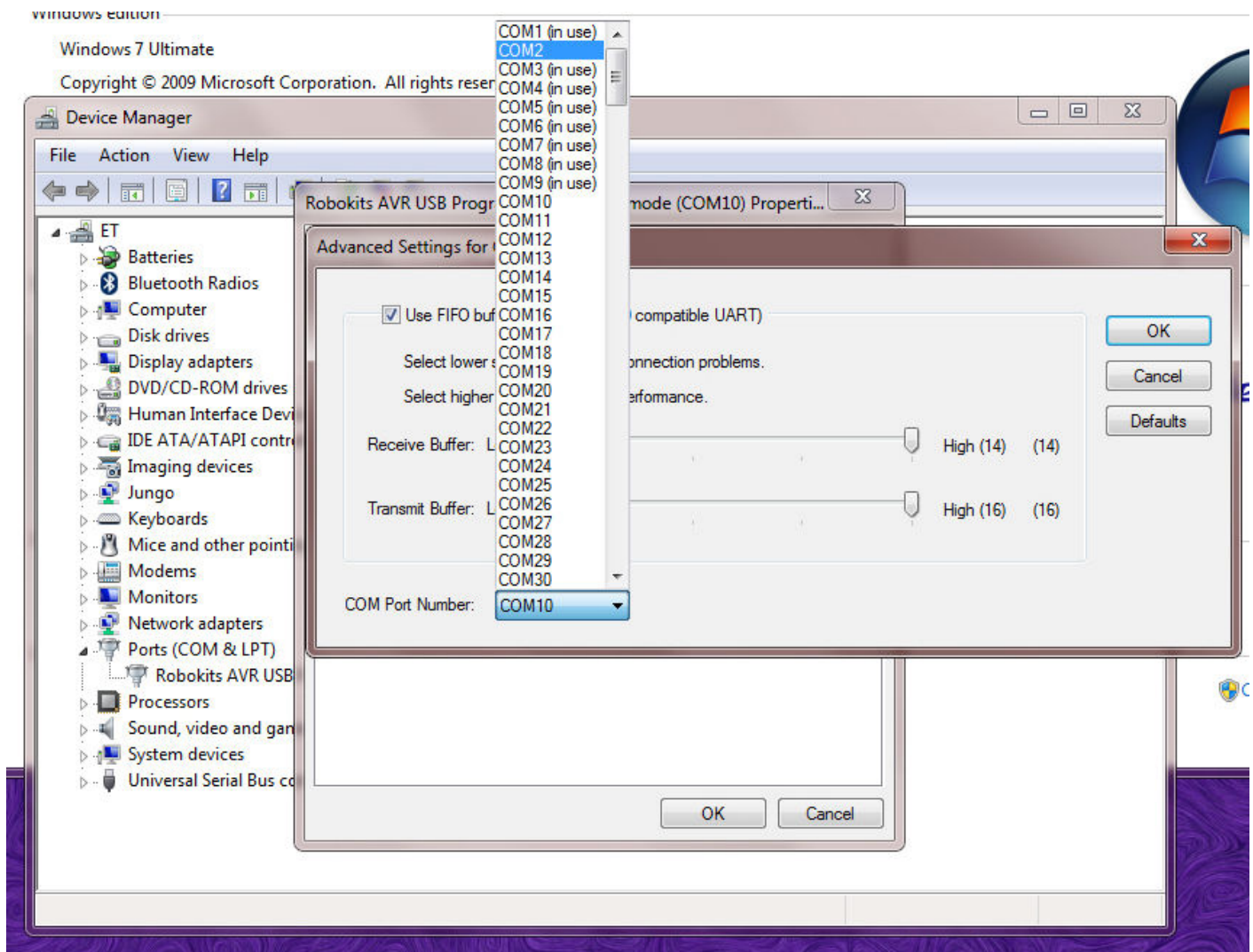


Right click on device name and select Properties.

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Go to Port Settings tab and click Advanced...

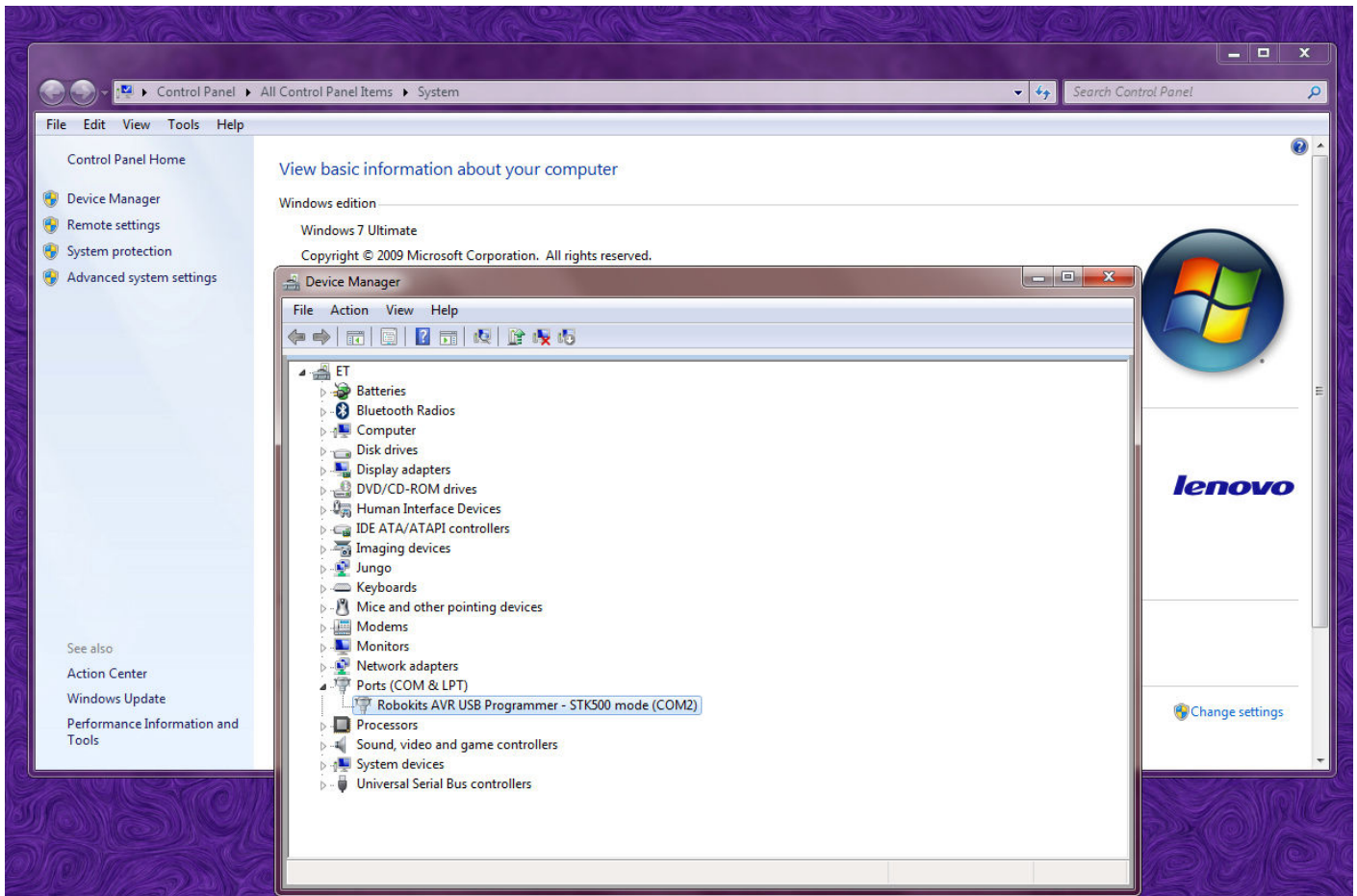


Click on COM Port Number drop-box and select Any port from COM 1 to 9.

If it shows in use don't worry, normally its for bluetooth devices and when that device will connect it will get a new com port number.

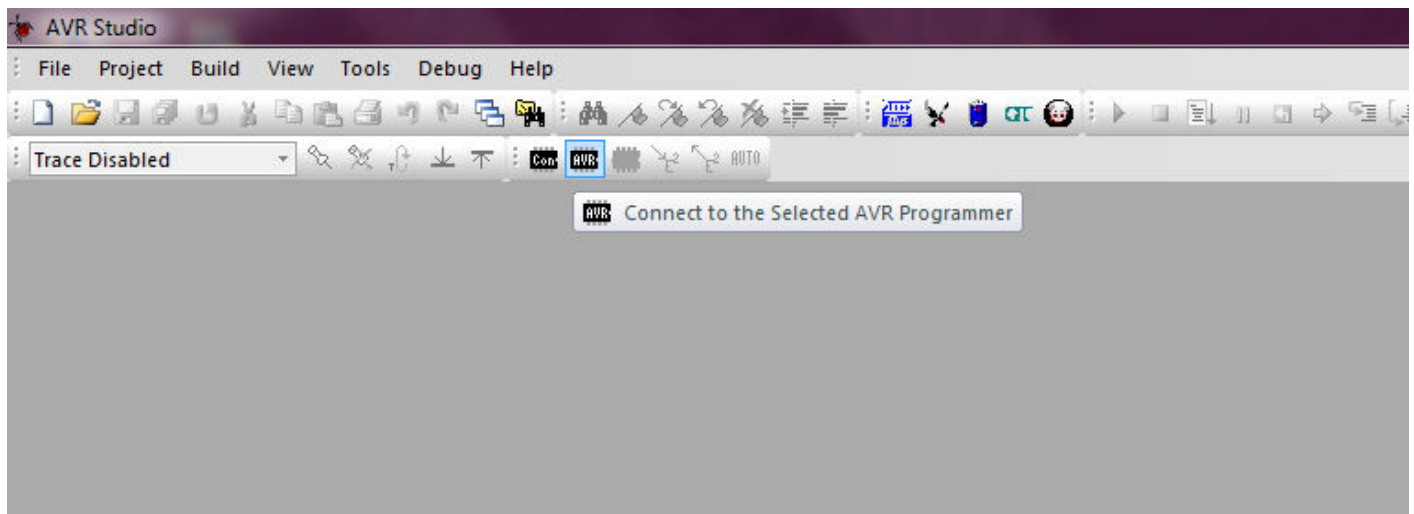
On Desktops and Laptops with COM port don't select COM1 & 2 as they may be hardware serial ports.

Once selected click OK and OK on both open dialogs.

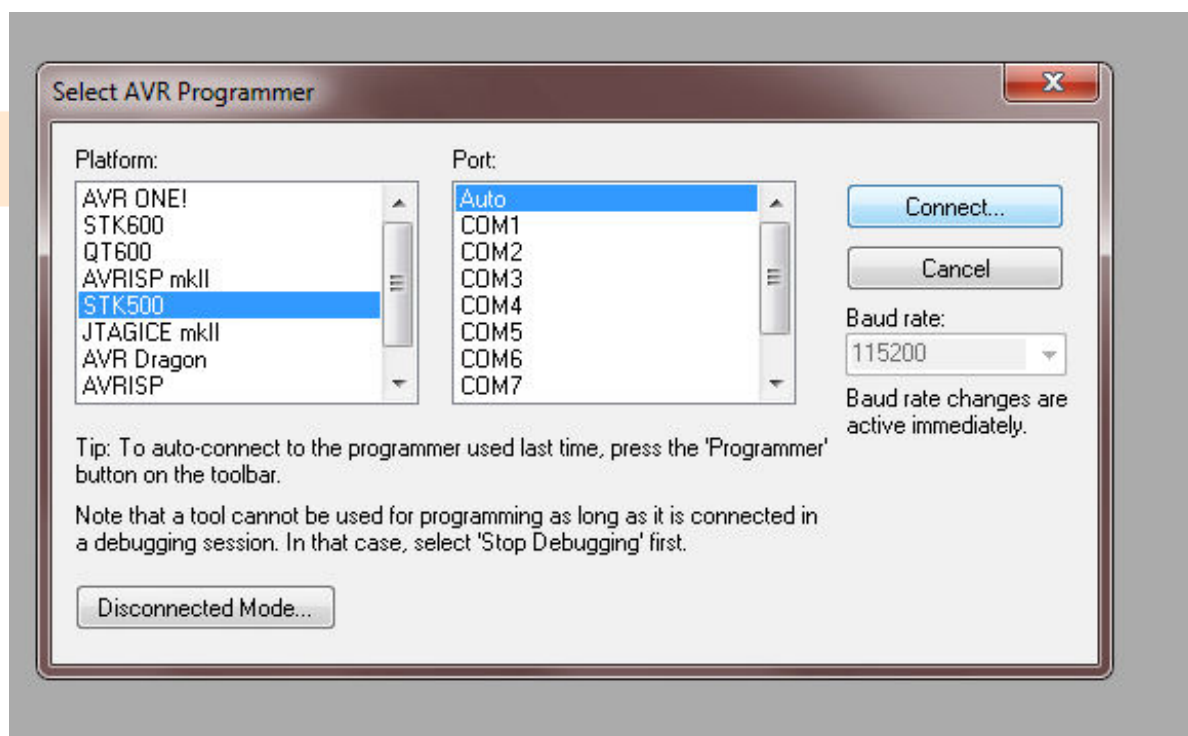


Click refresh and check for Port number.

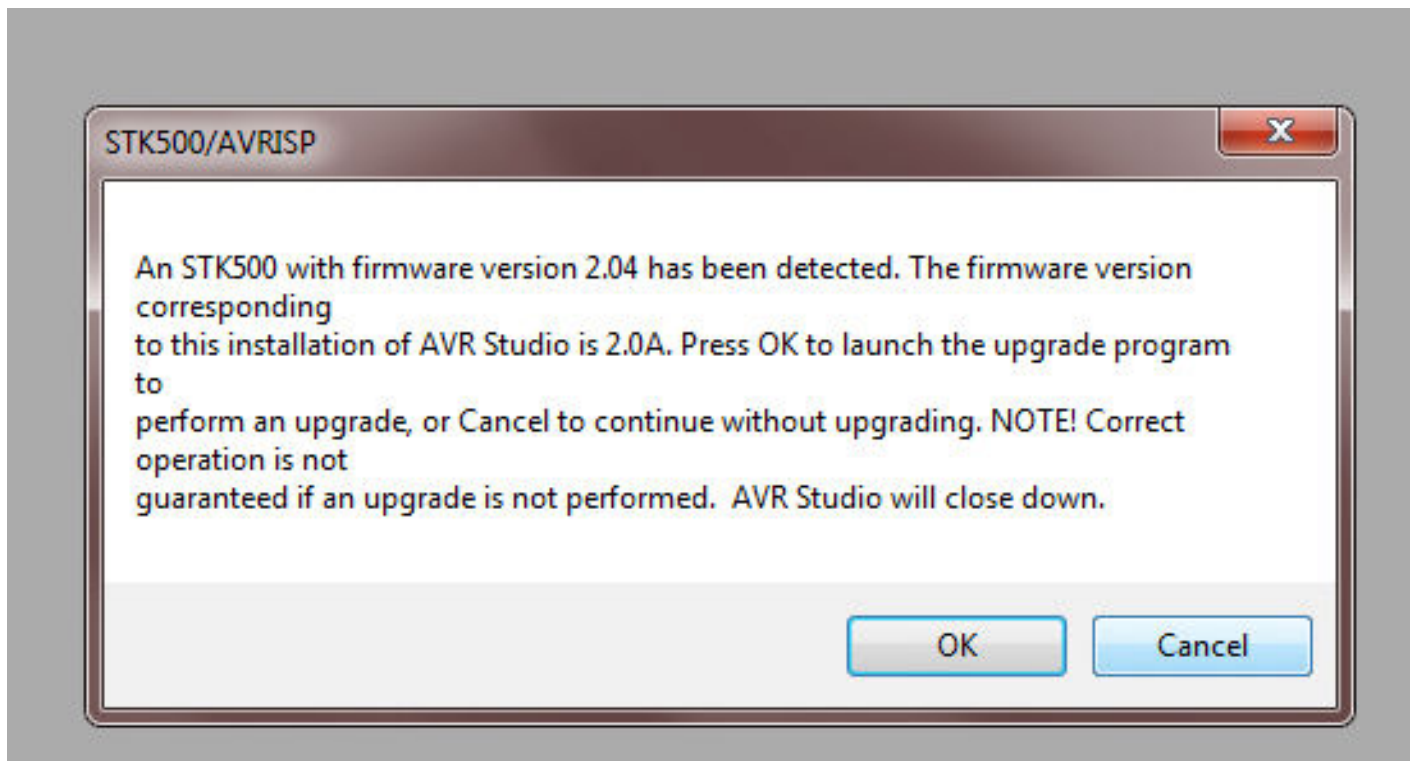
Install AVR Studio available on CD. If not installing from CD install AVR studio 4. AVR Studio 5 will not work properly with this programmer.



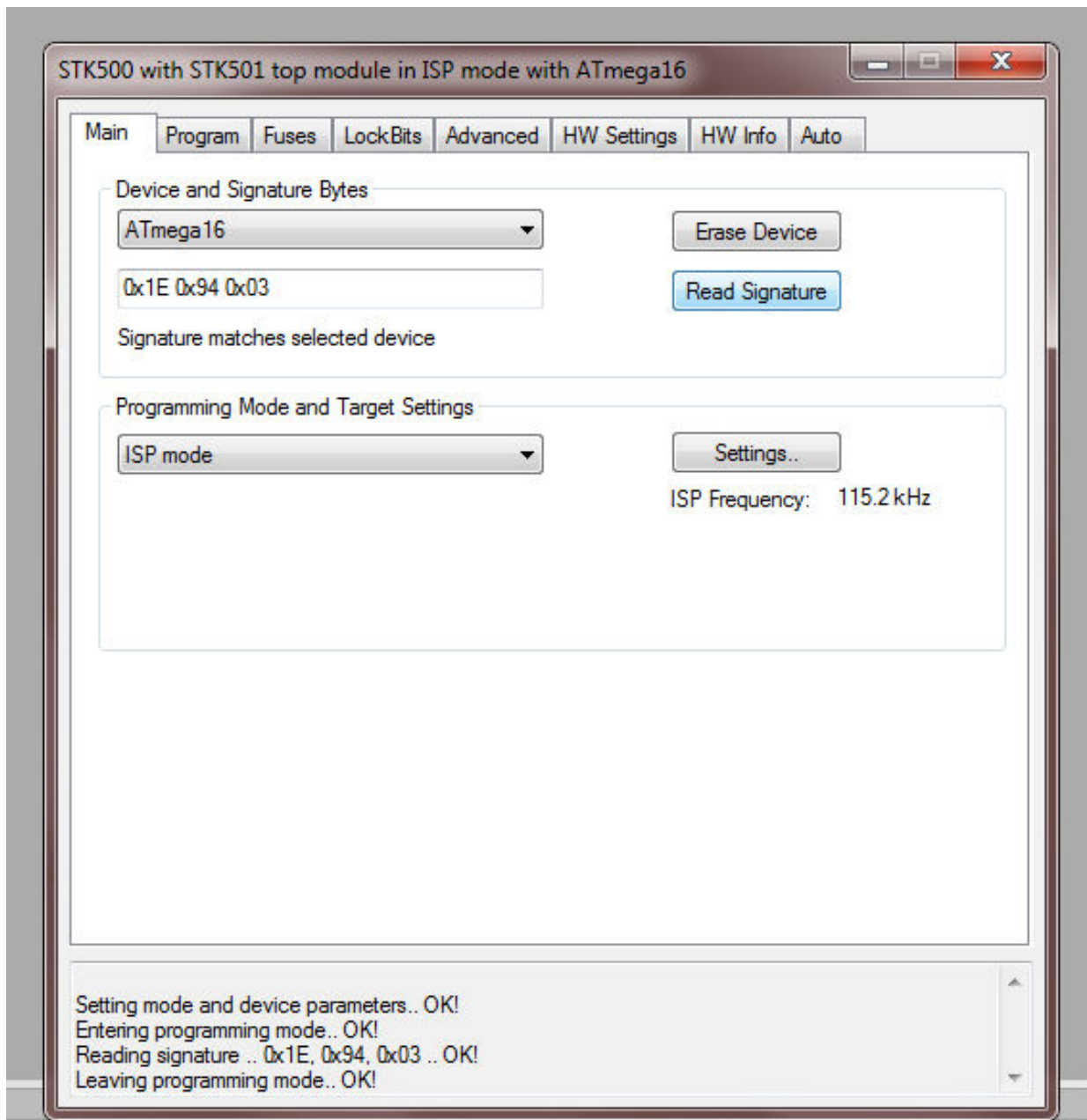
Open AVR Studio. On main interface you can see connect to AVR Programmer dialog.



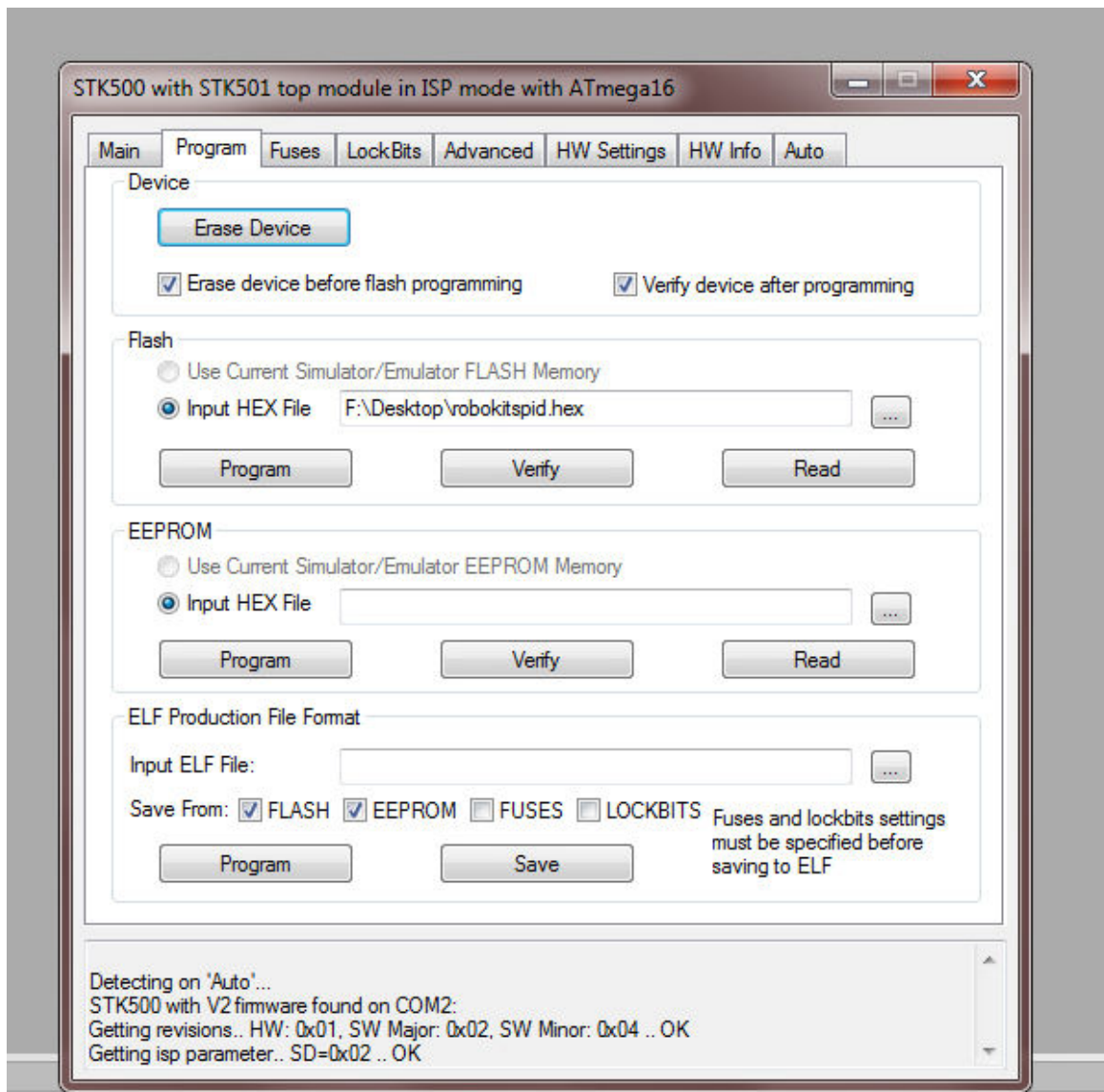
Select STK500, keep Port to Auto. Keep the programmer connected to PC and click Connect.



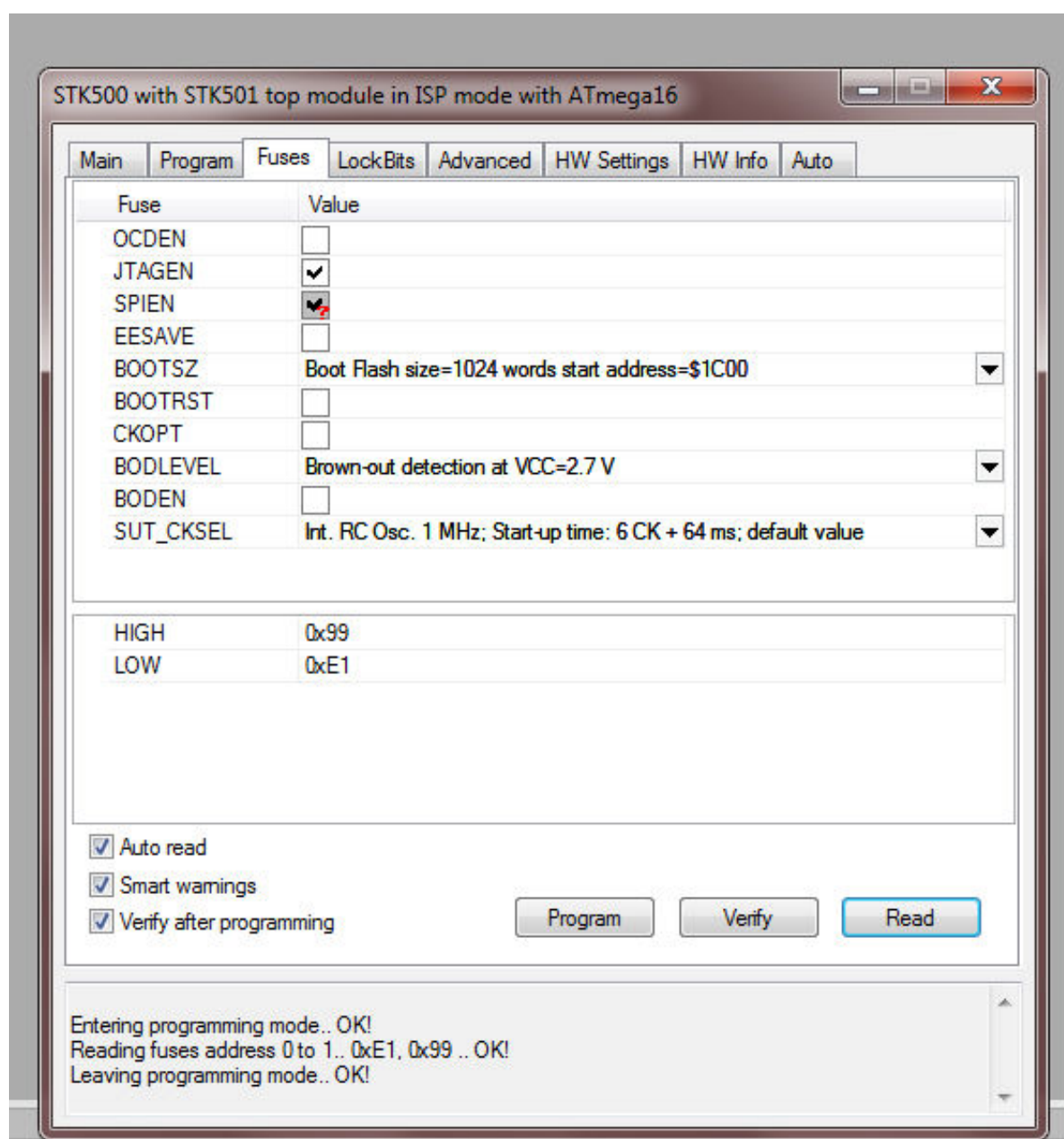
On connecting it will show dialog to upgrade firmware. Click cancel as firmware on programmer is not upgradable as this is not actual STK500 but a simulated protocol.



On main screen you can see this dialog. Connect to AVR board, select device and click read signature. If the signature matches it means the device is working correctly.



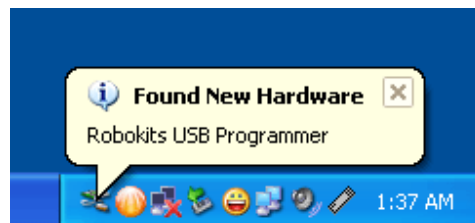
To program device and EEPROM you can select program tab.



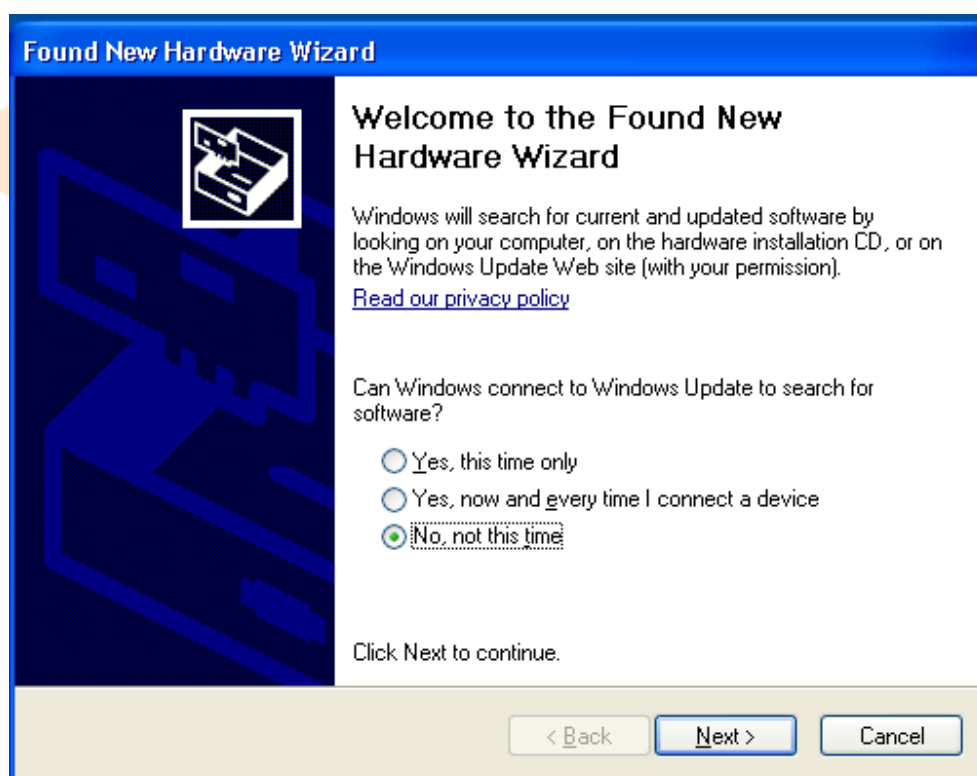
To set or read Fuse bits go to Fuses tab. You can select other tabs to set Lock Bits and batch programming.

Installation STK500 Mode (Windows 98, ME, XP)

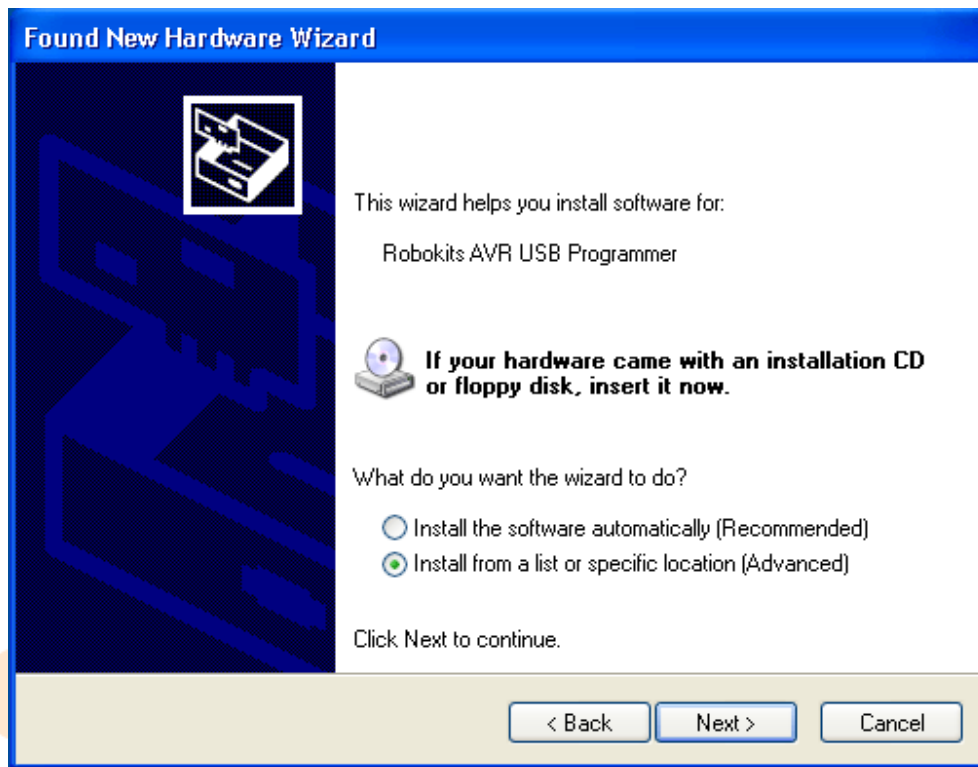
1. Remove USB-HID jumper. Insert the programmer in the USB port. After inserting the programmer in the USB port you will get following message.



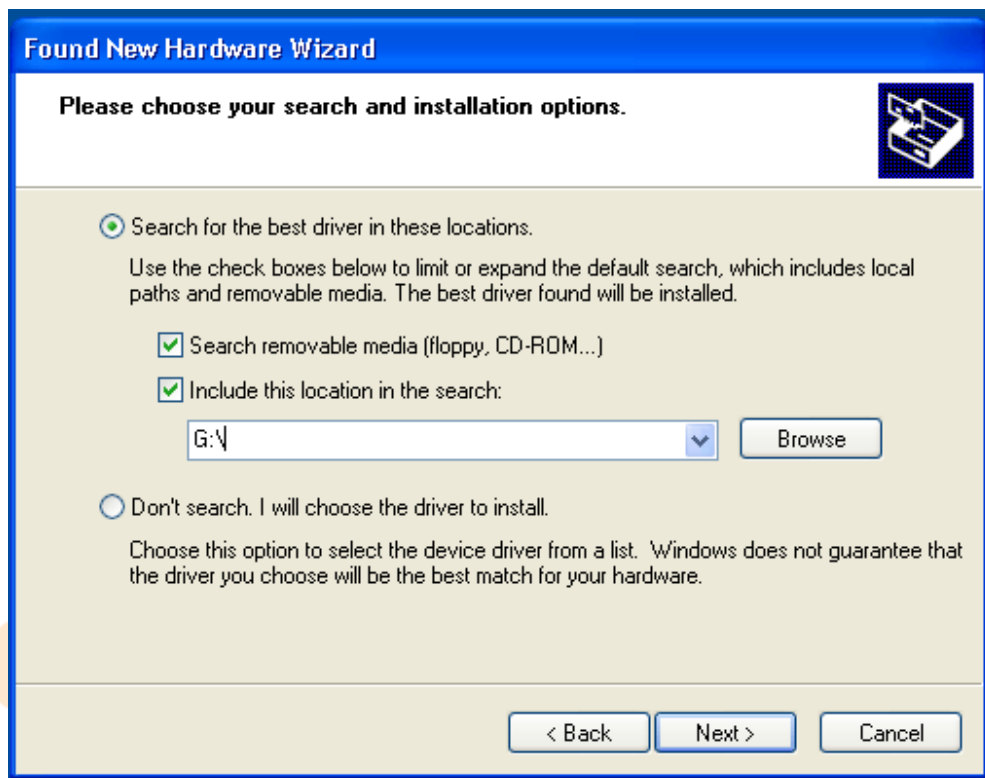
2. You will get this window asking for appropriate driver. Choose option "No, not this time" and click next if it asks for searching through Windows Update.



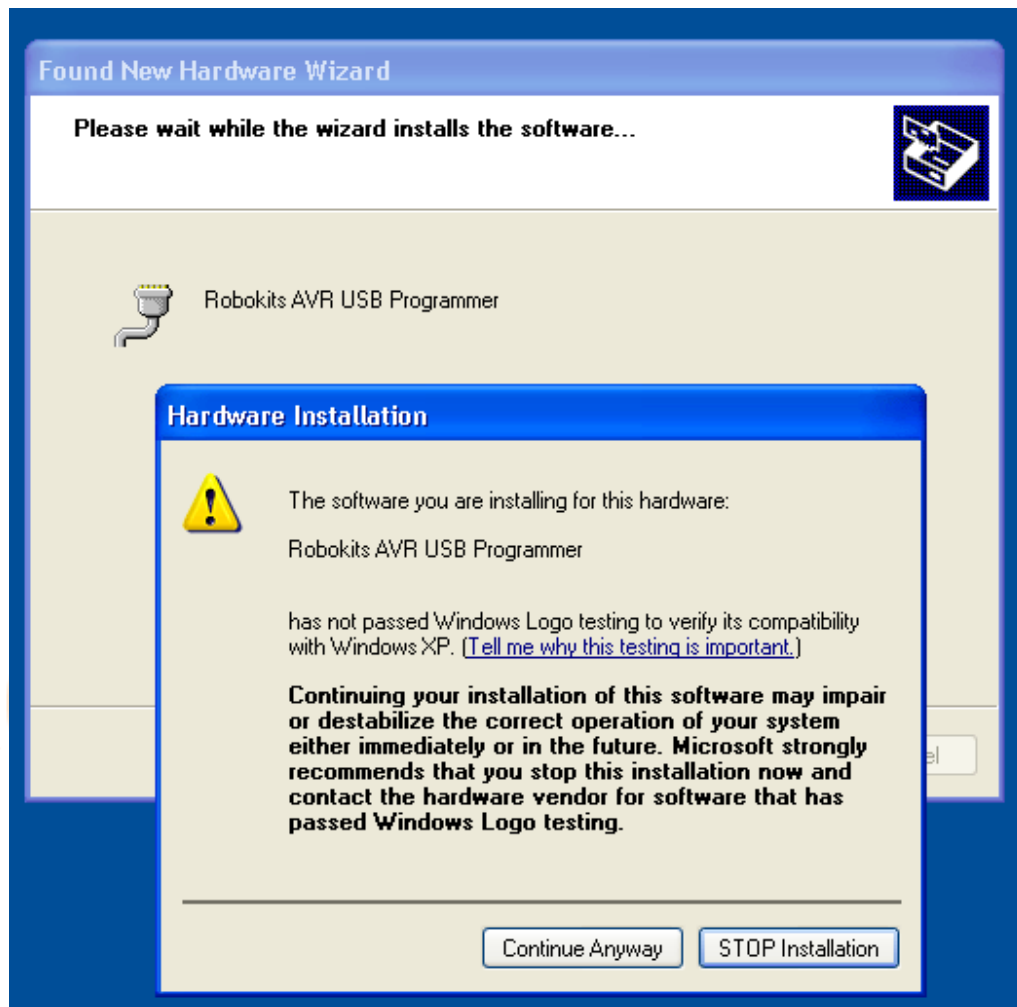
3. Now Choose "Install from a list or specific location (Advanced)", and click next.



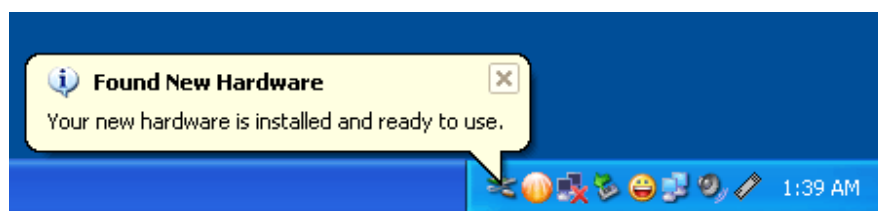
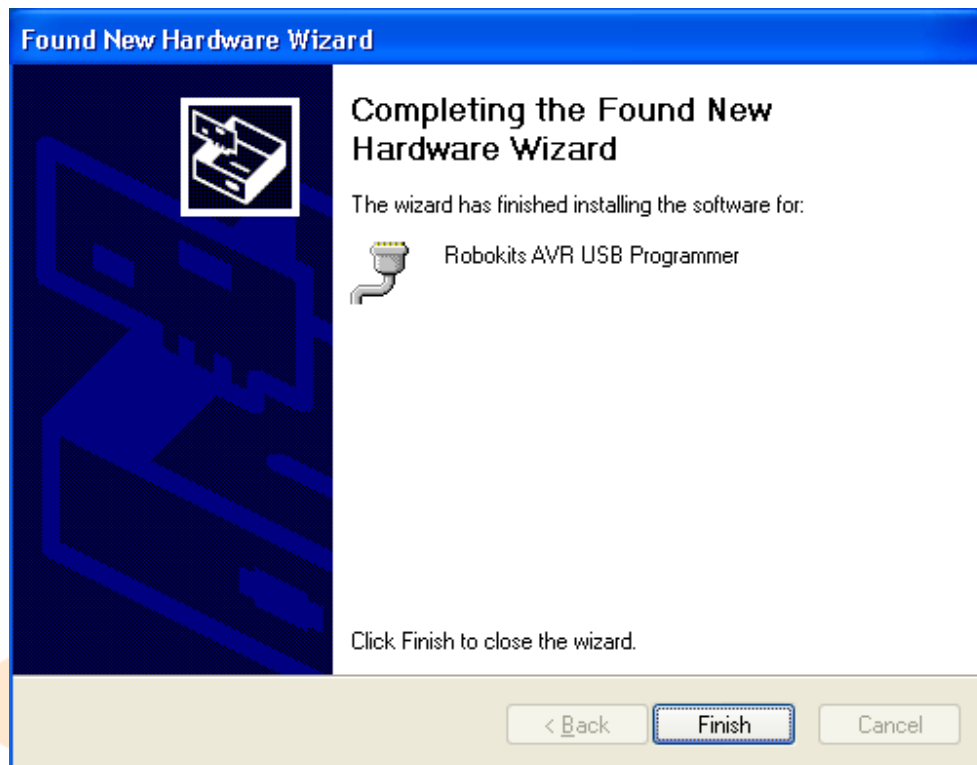
4. Choose the path of Robokits CD which contains "Robokits USB Programmer.inf" file. i.e. "E:\Driver98MEXP", click next.



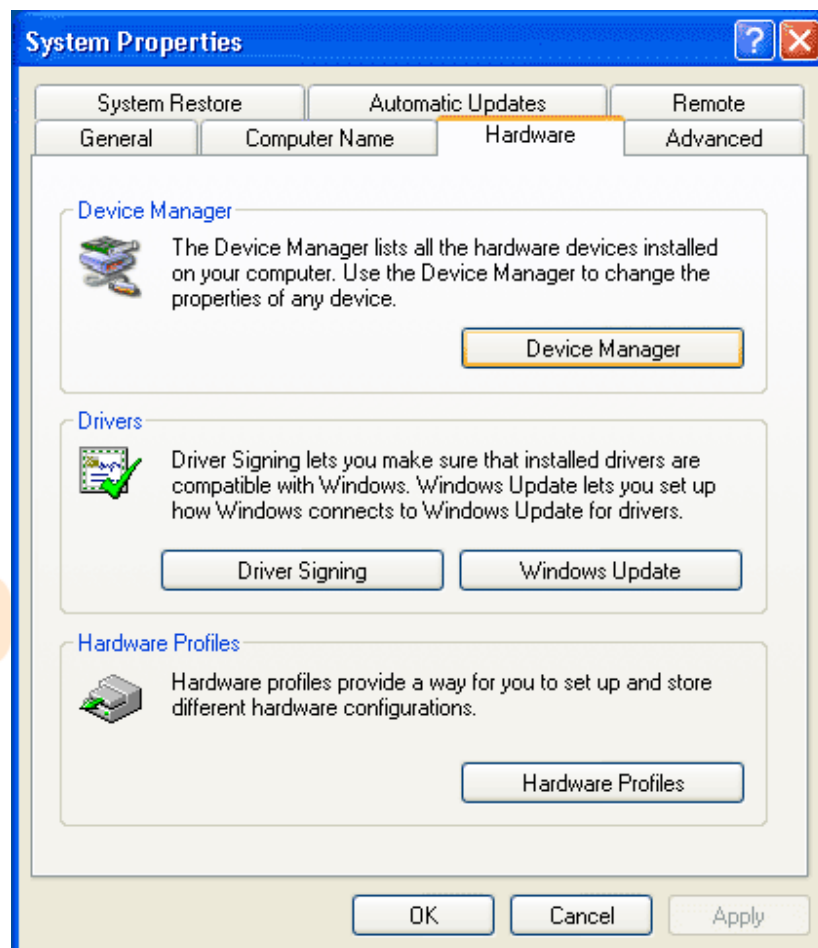
5. Click "Continue Anyway" option. This driver is not Digitally Signed by Microsoft.

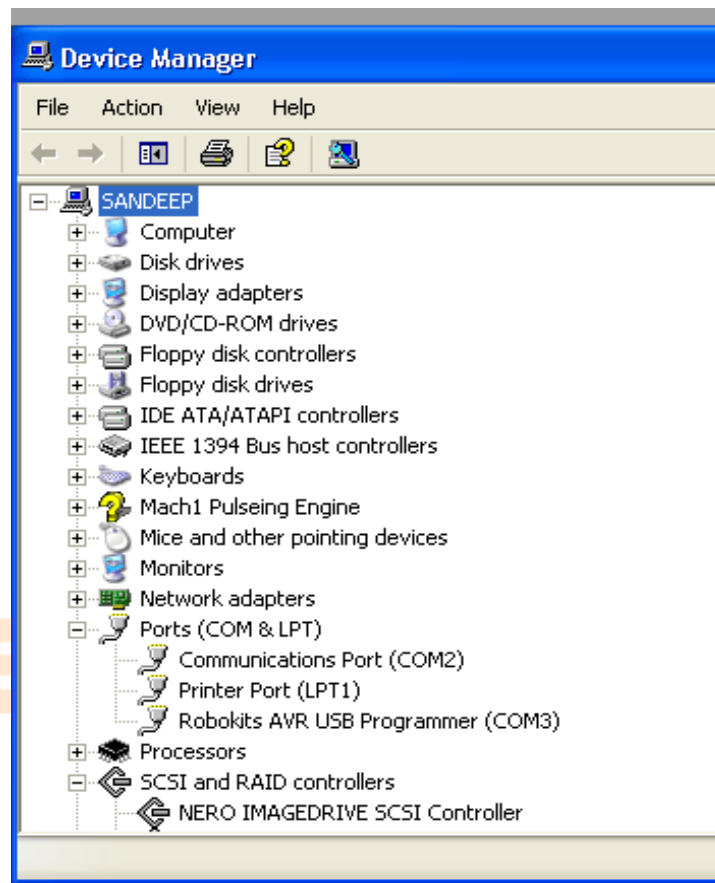


6. Click Finish to complete the wizard. Now your hardware is ready to work.



7. For further customization go to Control Panel -> System -> Hardware -> Device Manager.

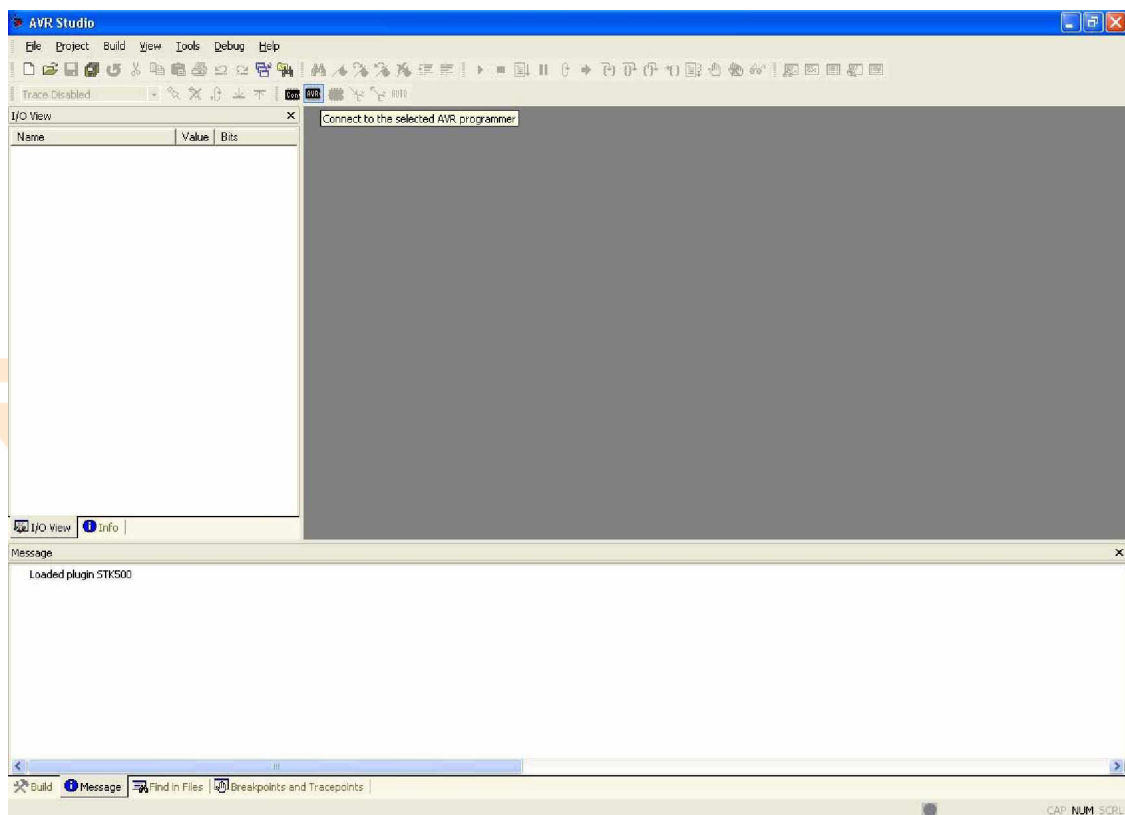




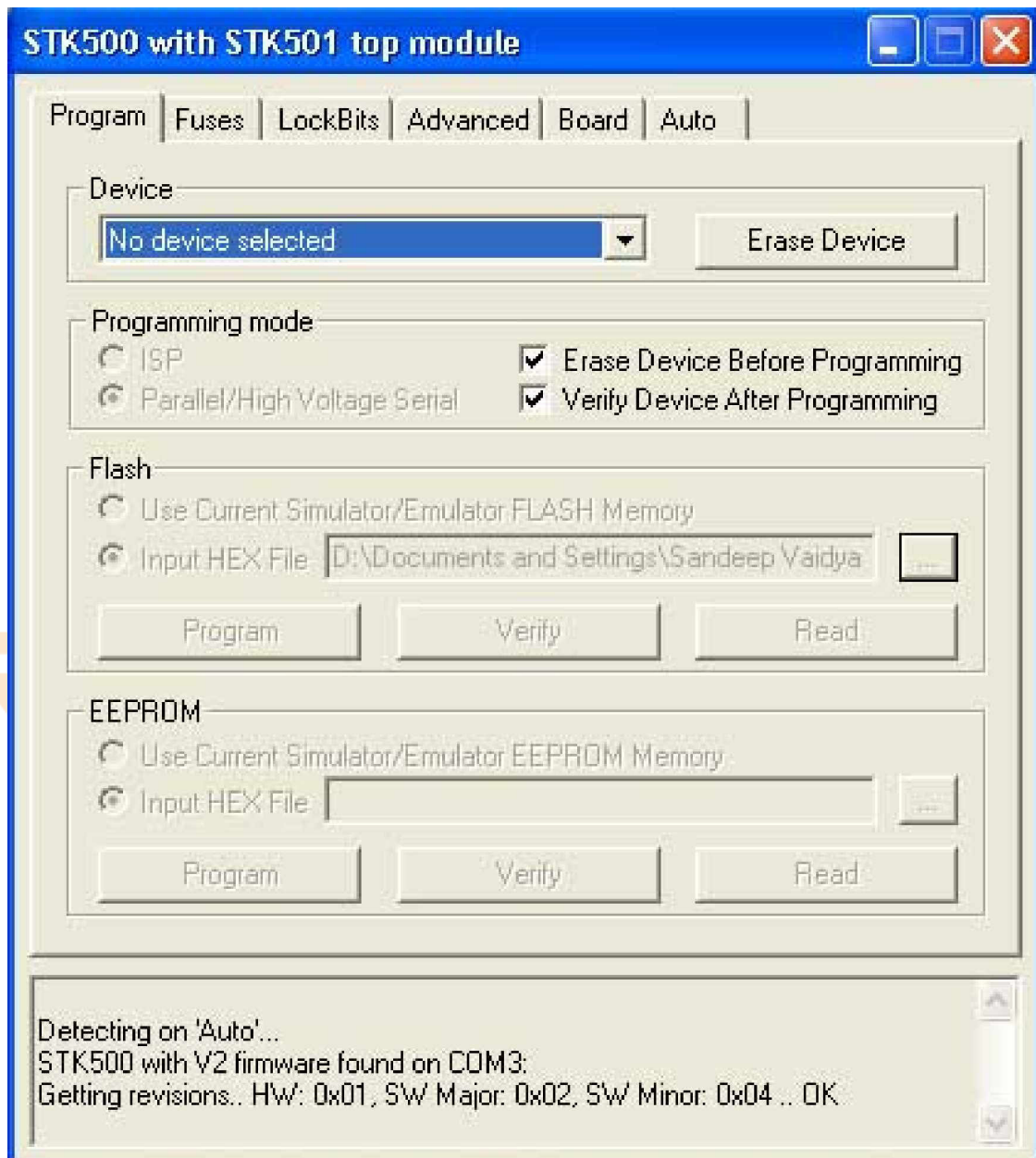
8. Double click "Robokits AVR USB Programmer" to select appropriate COM port and changing setting. By Default it will take any port available. To select other com port go to Port Settings - > Advance -> COM Port Number. Set COM Port between 1 to 8.

Instructions

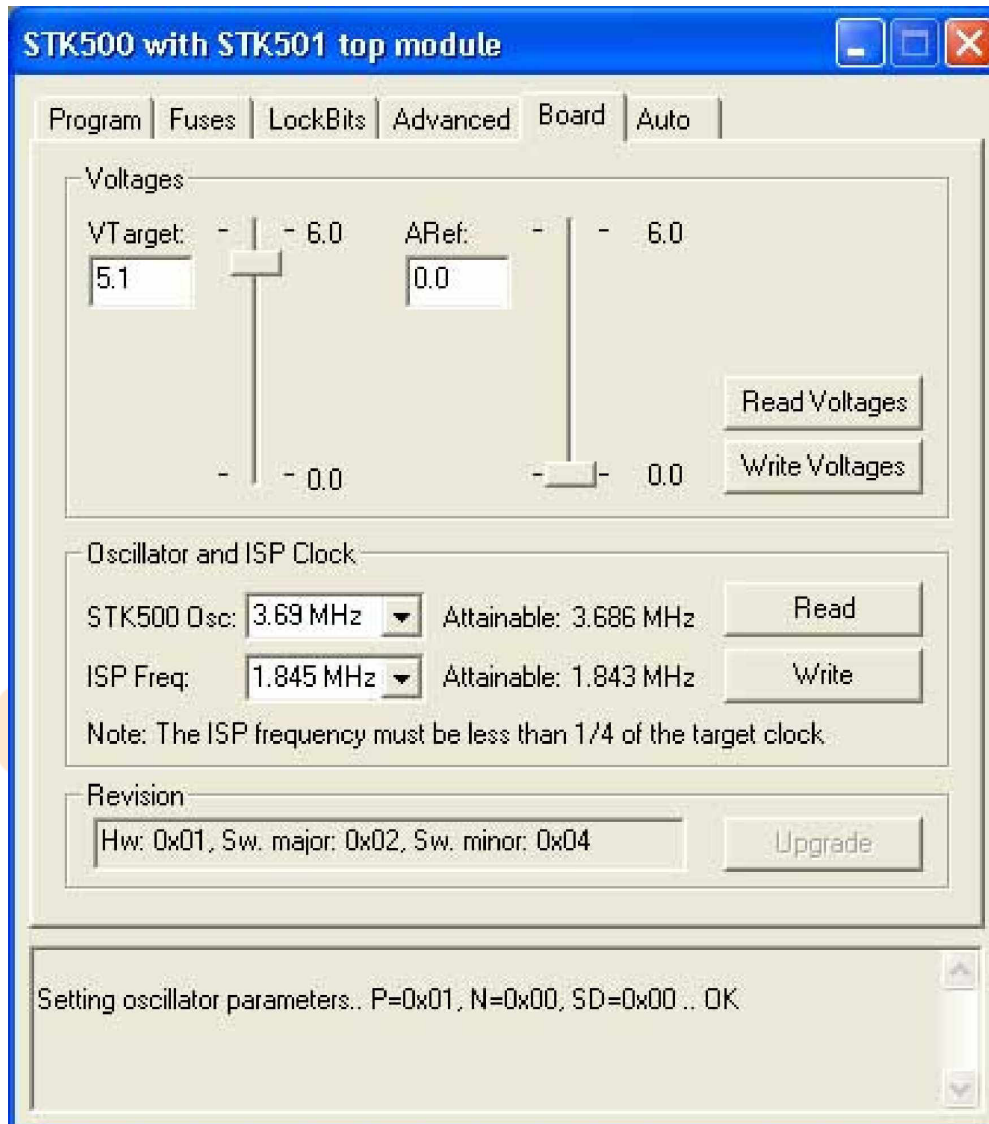
- **STK500** is one of the kits made by **ATMEL** for learning **AVR**. It uses **STK500V2** for programming the device.
- For more details about **STK500V2** protocol visit www.atmel.com.
- **AVRStudio** is a free source Assembler, C compiler, Simulator and Debugger.
- It supports the **STK500V2** protocol. For high speed programming you need to use this software.
- When you run **AVRStudio** it will show the following screen.



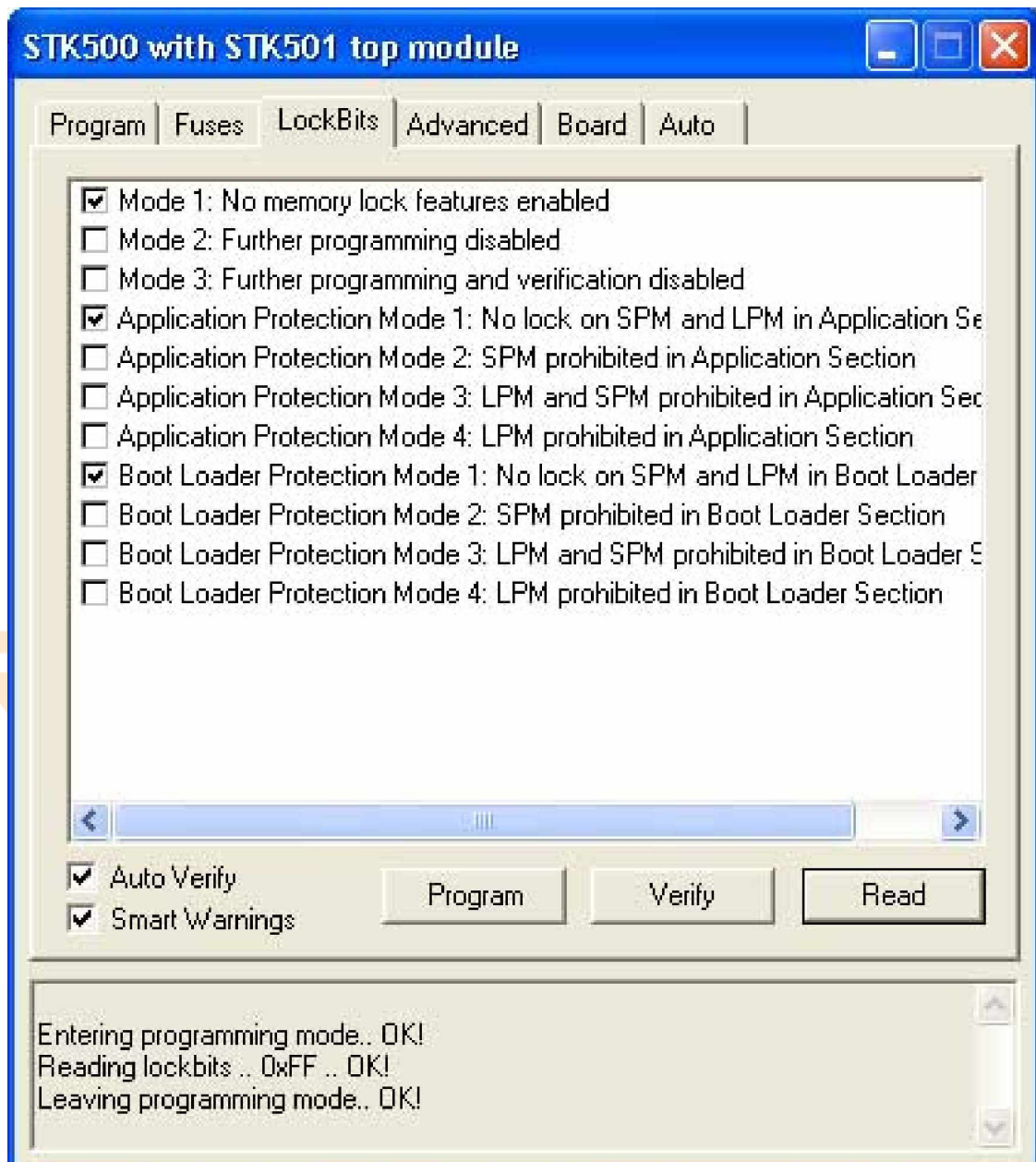
- **Robokits AVR USB programmer** assigns a serial port which has to be taken care of. In **AVRStudio** auto detect function does not need the previous task to be done. It automatically connects to the programmer.
- Click on the icon where the cursor is pointing. It will Auto connect the programmer without specifying any COM port settings if the programmer is present at USB port.

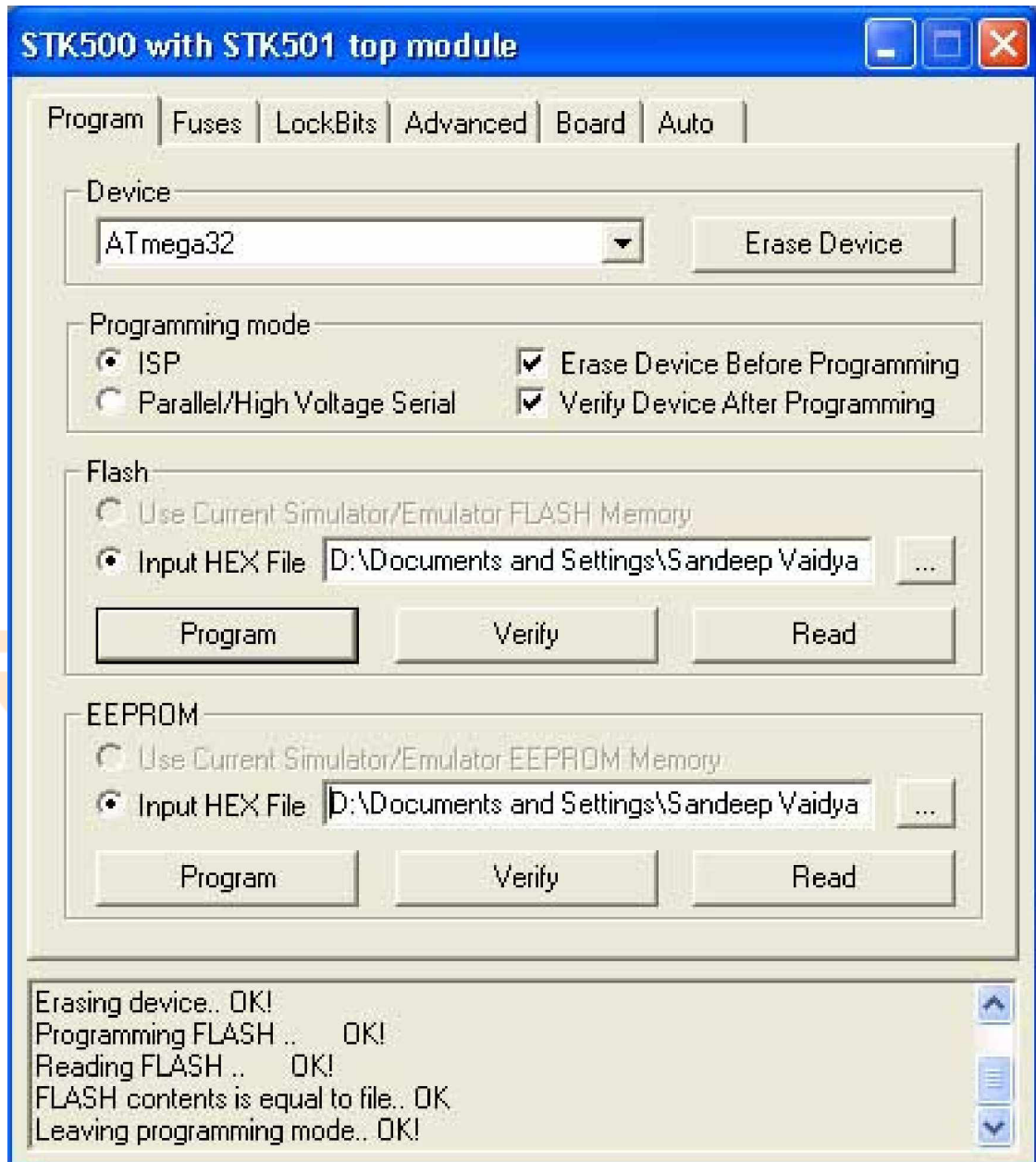


- Once you get the window shown above the programmer is ready to use.
- Select the device and the programming mode ISP / High voltage serial.
- Economy Edition of this product does not support high voltage serial programming.
- For high speed programming, go to Board tab.



- Normally the setting here is for a STK500 protocol and not for STK500V2 so you have to change the clock settings.
- Set the STK500 Osc: to 3.69 MHz and ISP Freq: 1.845MHz and click on the write tab. You will get the message shown in the last box.
- This procedure is not required if you don't want very high speed programming.
- Now you can go to program tab and browse the hex file you want to write in flash and EEPROM and click program.
- You can set the Fuses and LockBits from the relevant tab.





- After programming the flash you will get the message shown in the last box.



Service and Support

Service and support for this product are available from Robokits India. The Robokits Web site (<http://www.robokits.co.in>) maintains current contact information for all Robokits products.

Limitations and Warrantees

The AVR High Speed USB Programmer [RKI-1043] is intended for personal experimental and amusement use and in no case should be used where the health or safety of persons may depend on its proper operation. Robokits provides no warrantee of suitability or performance for any purpose for the product. Use of the product software and or hardware is with the understanding that any outcome whatsoever is at the users own risk. Robokits sole guarantee is that the software and hardware perform in compliance with this document at the time it was shipped to the best of our ability given reasonable care in manufacture and testing. All products are tested for their best performance before shipping, and no warranty or guarantee is provided on any of them. Of course the support is available on all of them for no cost.

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