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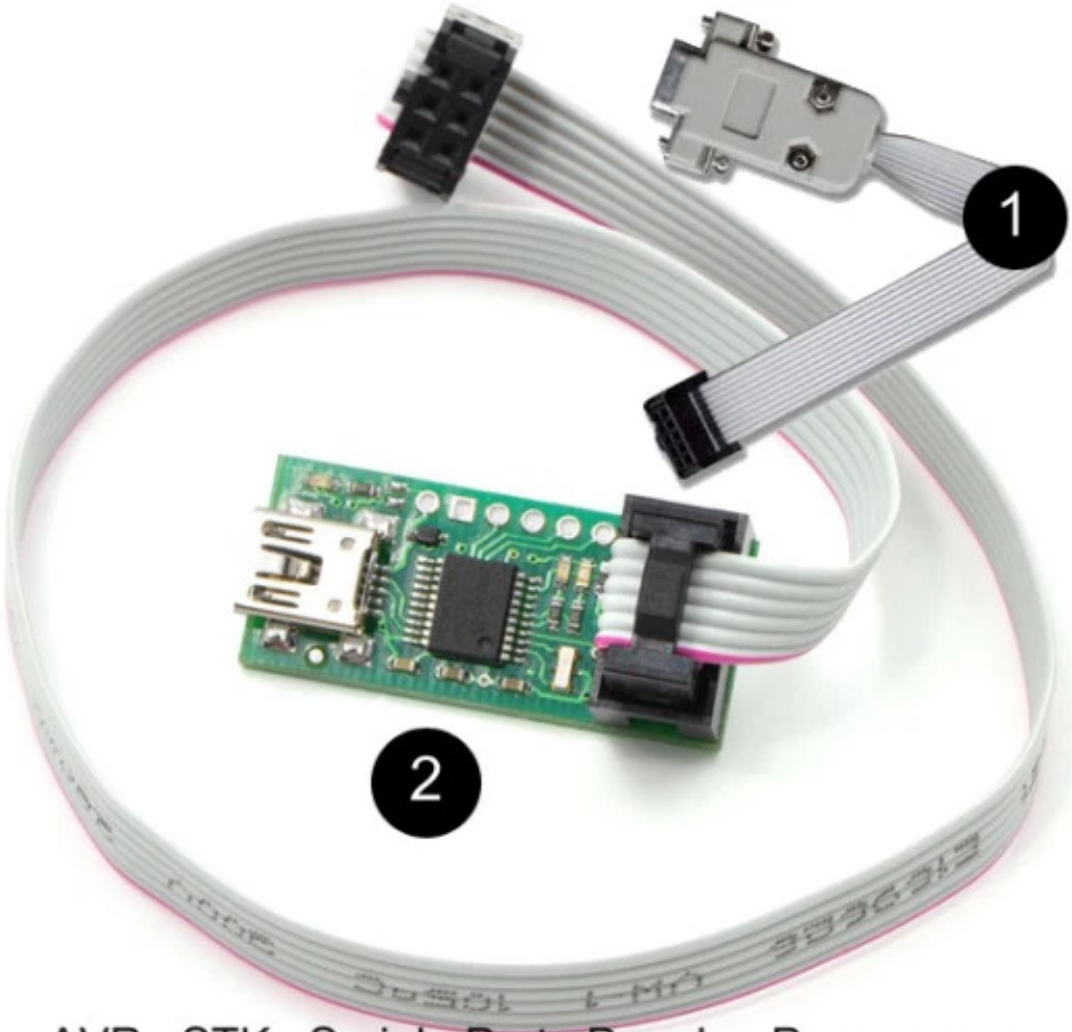

1. AVR STK Serial Port Dongle Programmer
2. AVR USB ISP Programmer

(https://www.electroschematics.com/wp-content/uploads/2014/10/avr-usb-isp-programmer.jpg?fit=600%2C590)

Working With Bootloaders & Build Your Own Bootloader – 2

T.K. HAREENDRAN (HTTPS://WWW.ELECTROSCHEMATICS.COM/AUTHOR/HAREENDRAN/)

AVR tutorial (/tag/avr-tutorial)

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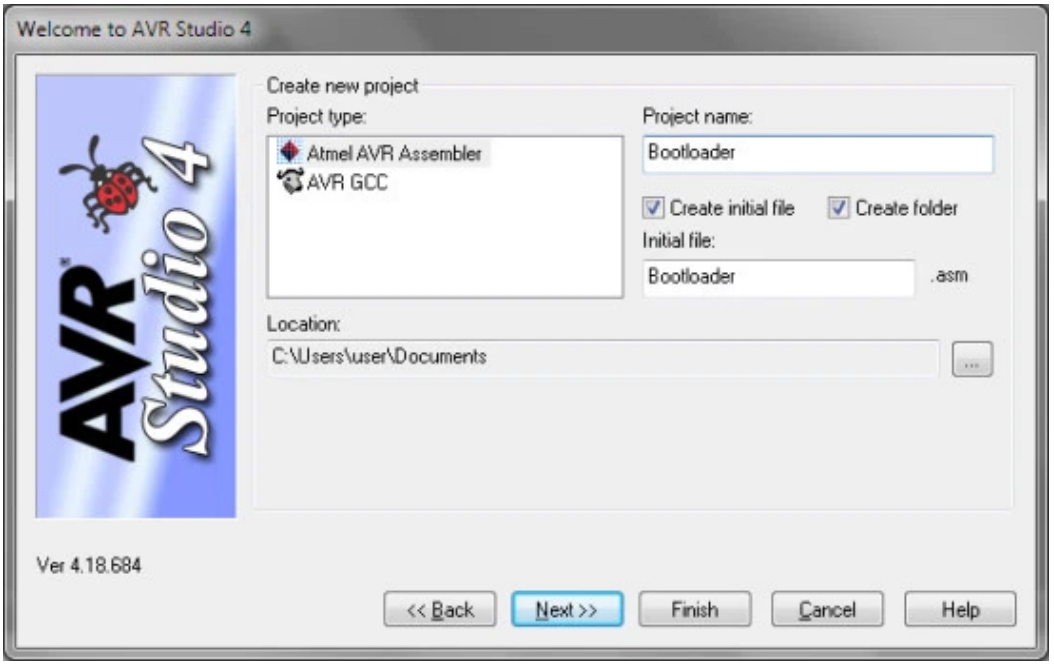
Now you understand that what is a bootloader is and what are the benefits of a bootloader. Inspired by many online tutorials, now I am giving you an introduction to install a bootloader into your own electronics project with an ATmega microcontroller at its heart!

You can download the zip file "
Bootloader Hex (https://www.electroschematics.com/wp-content/uploads/2014/10/Bootloader-Hex.rar)
" with a precompiled bootloader (for Atmega8) available here. Now unzip the bootloader, and upload the hex code using AVR Studio. On the otherhand, if you are in a plan to modify the bootloader code, go through the following steps:

- Open AVR Studio, start a new project called bootloader in the Project Wizard Make sure you select Atmel AVR Assembler as we are programming in Assembly. Actually,you do not need to program in Assembly to write a bootloader, but the bootloader included here is written in that language, and hence you must compile for it.



(https://www.electroschematics.com/wp-content/uploads/2014/10/avr-studio.jpg)

- Click Finish to load the New Project
- Download the zip file "Bootloader Source", and unzip it into your bootloader directory. Now you should also put the compiled program .hex of your own project into the bootloader file as well
- Look for the asm file in the unzipped folder. Open that file, copy the contents into your bootloader.asm that is already open in AVR Studio

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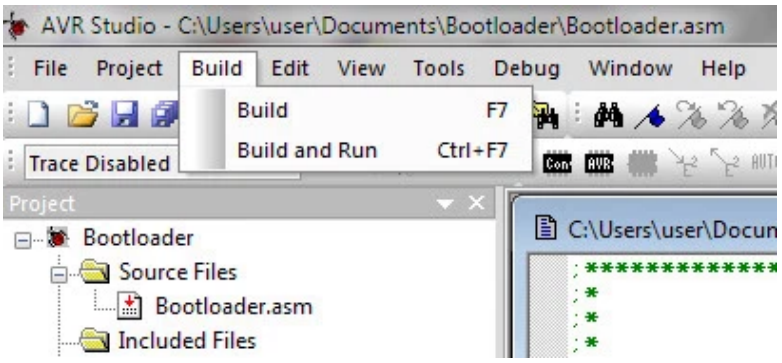
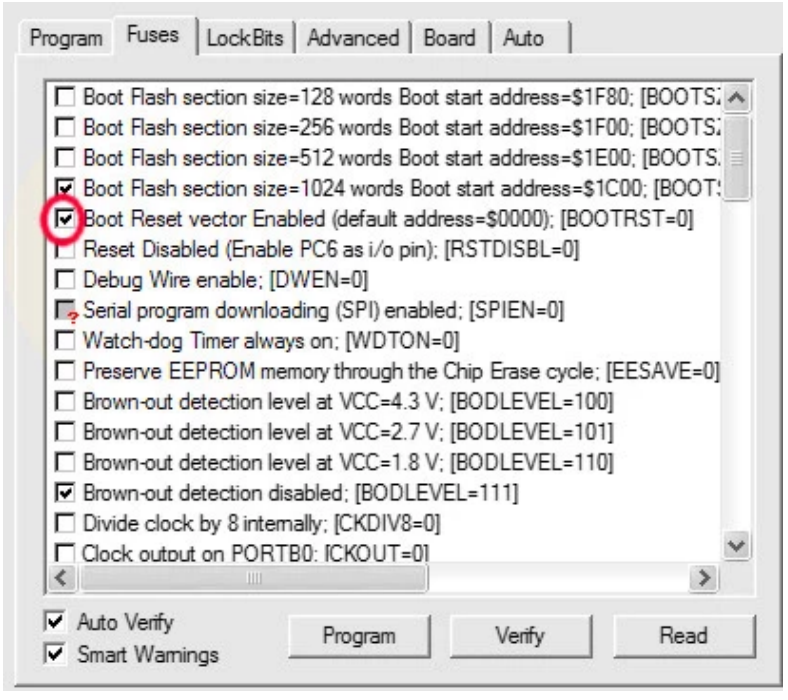
- Now refer the datasheet of your microcontroller (pin assignment), and verify that the Tx and Rx pins are correct in bootloader.asm. Make any changes if necessary.
- Finally, build, and upload your custom bootloader .hex file into your microcontroller using your own hardware programmer, as usual.



(https://www.electroschematics.com/wp-content/uploads/2014/10/avr-studio-build.jpg?resize=407%2C185)

Remember that you need to program a fuse to tell it to use the bootloader. For this, set BOOTRST to 0 by check the relevant box. Yes, Your Bootloader is uploaded and ready for action! Now disconnect your programmer cable. It is necessary to power cycle your microcontroller (turn it off then on again) after uploading your bootloader for the new settings to take effect.



(https://www.electroschematics.com/wp-content/uploads/2014/10/BOOTRST-.jpg?resize=410%2C362)

Points To Remember

- You can either program your own or use someone else's bootloader
- We are using "Fast Tiny & Mega Uart Bootloader" from Danni at AVRFreaks (http://www.avrfreaks.net/projects/fast-tiny-mega-uart-bootloader

(http://www.avrfreaks.net/projects/fast-tiny-mega-uart-bootloader))

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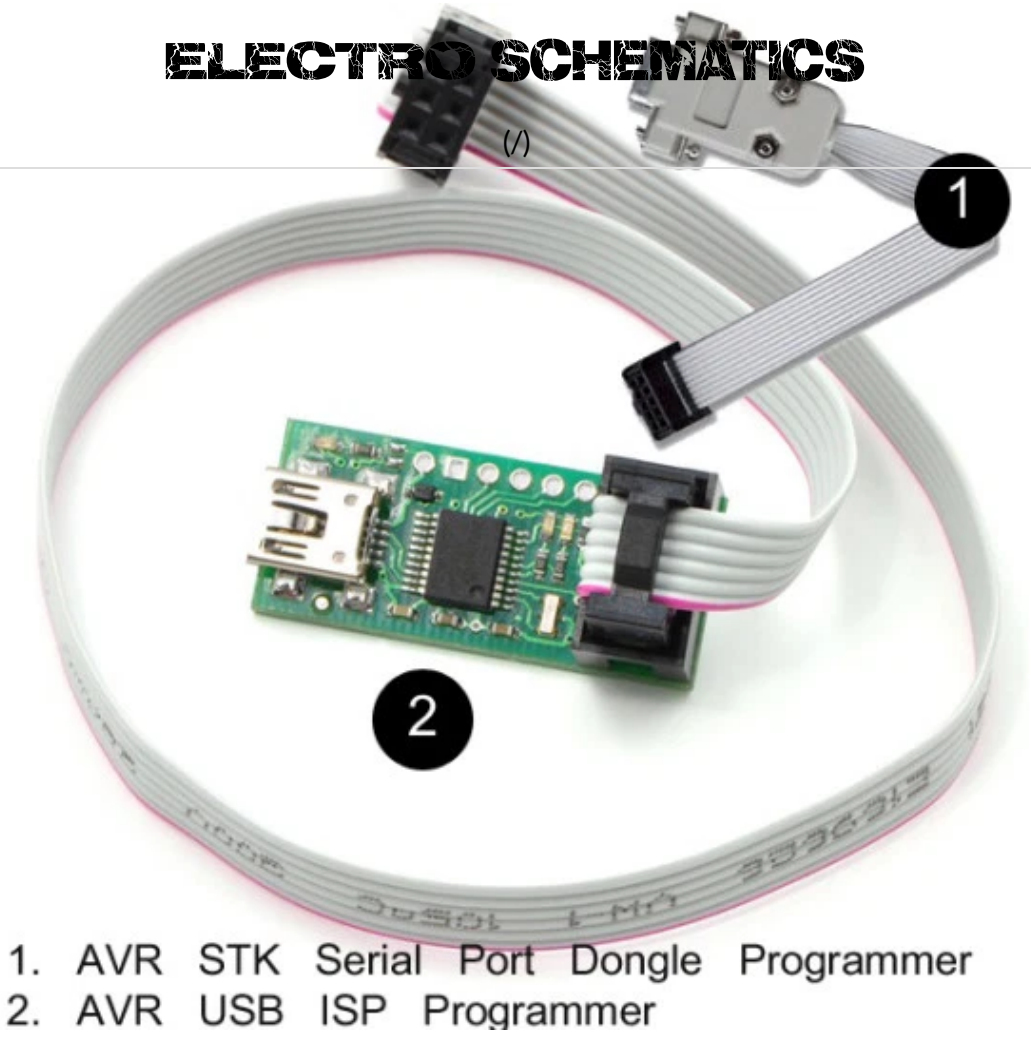
```
;*****************************************************************************
;*                                                                           *
;*              Generic AVR Bootloader                                       *
;*                                                                           *
;*                      Author: Peter Dannegger                              *
;*                                                                           *
;*****************************************************************************
.nolist

;           select the appropriate include file:

.include "tn13def.inc"
;.include "tn2313def.inc"
;.include "tn25def.inc"
;.include "tn261def.inc"
;.include "tn44def.inc"
;.include "tn45def.inc"
;.include "tn461def.inc"
;.include "m48def.inc"
;.include "tn84def.inc"
;.include "tn85def.inc"
;.include "tn861def.inc"

;           set the SecondBootStart fuse on these AVRs:
;.include "m8def.inc"
;.include "m8515def.inc"
;.include "m8535def.inc"
;.include "m88def.inc"
;.include "m16def.inc"
;.include "m162def.inc"
;.include "m168def.inc"

;           set the FirstBootStart fuse on these AVRs:
;.include "m32def.inc"
;.include "m64def.inc"
;.include "m644def.inc"
;.include "m128def.inc"
;.include "m2561def.inc"


;           remove comment sign to exclude Watchdog trigger:
;.equ   WDTRIGGER   = 0

;           remove comment sign to exclude CRC:
;.equ   CRC     = 0

;           remove comment sign to exclude Verify:
;.equ   VERIFY      = 0

;-----------------------------------------------------------------------------
;                               Port definitions
;-----------------------------------------------------------------------------
;           set both lines equal for inverted onewire mode:

.equ    STX_PORT        = PORTB
.equ    STX             = PB0

.equ    SRX_PORT        = PORTB
.equ    SRX             = PB0
;-----------------------------------------------------------------------------
.include "fastload.inc"
;-----------------------------------------------------------------------------
```

(https://www.electroschematics.com/wp-content/uploads/2014/10/generic-avr-bootloader.jpg)

- The required BOOTLOAD.asm is located in the BOOTLOAD folder. Based on the microcontroller you are using it may become necessary to change the TX and RX pins and ports in BOOTLOAD.asm to match with your microcontroller
- You need to assemble the BOOTLOAD.asm using the assembler that comes with AVR STUDIO. This will create a final file called BOOTLOAD.hex
- AVRs have “fuses”! The only fuses that are relative to boot loaders are the BOOTSZ1,BOOTSZ0 and BOOTRST fuses. The BOOTSZ1 and BOOTSZ0 fuses specify how much of the memory should be “set aside” for the boot loader(Fast Tiny & Mega Uart Bootloader needs 256 words of space)
- The BOOTRST fuse tells the microcontroller to boot up at the beginning of your boot loader code. It is crucial to have this fuse programmed
- You need your hardware programmer to program the bootloader into the microcontroller
- You should also decide which communication protocol you want to use with your microcontroller (USB, RS232, etc). This allows you to easily select the right hardware for interfacing between the UART of the microcontroller and your computer



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→ Part 21:

Bootload an ATmega Microcontroller & Build Your Own Arduino! (https://www.electroschematics.com/10955/build-arduino-bootload-atmega-microcontroller-part-1/)

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hugofurther

I have the same question as “manish-drmzgmail-com”. I can’t find where to download the “bootloader source”.

Posted on September 27th 2017 | 3:04 pm (https://www.electroschematics.com/working-bootloaders-build-bootloader-2/#comment-1902923)

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Thanks.

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Posted on September 28th 2017 | 3:39 pm (https://www.electroschematics.com/working-bootloaders-build-bootloader-2/#comment-1902925) (/)

T.K.Hareendran

@Hugofurther: What you read at the bottom part of the article. As clearly stated there “we are using “Fast Tiny & Mega Uart Bootloader” from Danni at AVRFreaks (http://www.avrfreaks.net/projects/fast-tiny-mega-uart-bootloader (http://www.avrfreaks.net/projects/fast-tiny-mega-uart-bootloader))”!

Posted on September 27th 2017 | 10:21 pm (https://www.electroschematics.com/working-bootloaders-build-bootloader-2/#comment-1902924)

manish-drmzgmail-com

where i can download bootloader source…??

Posted on December 15th 2016 | 12:13 pm (https://www.electroschematics.com/working-bootloaders-build-bootloader-2/#comment-1901857)

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media1328

That’s good but I am new in such a job. I know electronic well but in micro controller I am not so professional. now try to get more experiences on it.
appreciate you for this article.

Posted on March 05th 2016 | 12:24 pm (https://www.electroschematics.com/working-bootloaders-build-bootloader-2/#comment-1897256)

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