

How to Program the AVR Butterfly

Basic programs needed

Some basic programs that are needed to program the butterfly board are AVR studio and WinAVR (pronounced when ever). Both these programs are distributed for free on the internet and can be found at these locations:

AVR studio from ATMEL

http://www.atmel.com/dyn/products/tools_card.asp?tool_id=2725

WinAVR

<http://sourceforge.net/projects/winavr>

Some other things that might be helpful:

Butterfly user guide

http://www.atmel.com/dyn/resources/prod_documents/doc4271.pdf

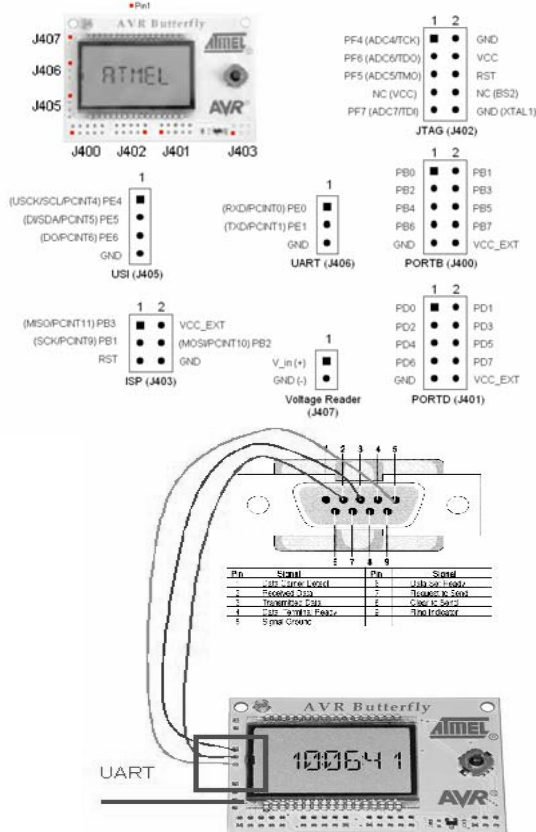
Butterfly source code

http://www.atmel.com/dyn/resources/prod_documents/AVR_Butterfly_application_rev06.zip

(links tested and working on April 2004)

Creating connection

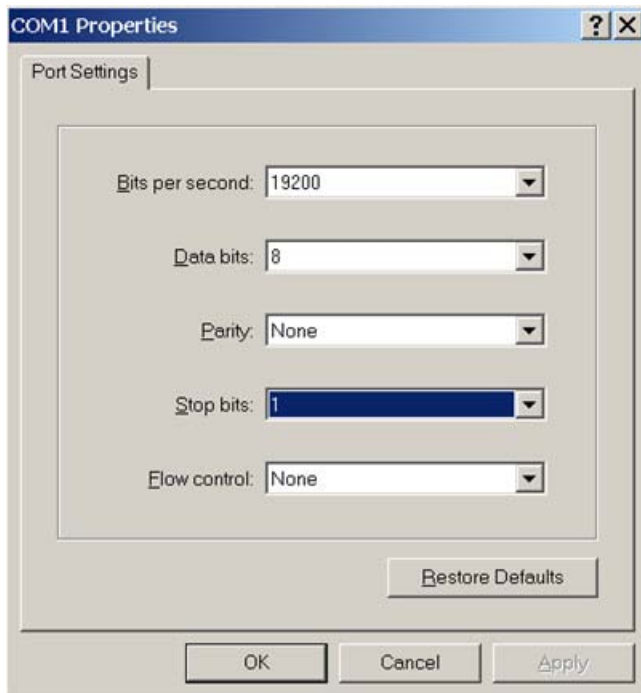
Figure 1



A connection between the AVR butterfly and a com port is needed for using the bootloader. To do this some headers will need to be soldered to the butterfly. The two headers that will need to be soldered on are the UART (J406) and the ISP (J403) to locate these refer to Figure 1. The UART port is three connections on the left side of the board, and the ISP has a few different things such as VCC RST and GND which we are interested in. The ISP port is located in the lower right side of the board.

With headers attached to the board a cable needs to be created to connect the RS232 cable and the headers on the board. Looking at the end of the cable (male end) with the 5 pin row on top connect the butterfly. Counting from left to right with the upper left most pin being 1, connect pin 2 with the middle header on the board (PE1). Connect in 3 with the top header (PE0) and pin 5 with the bottom header (GND). With this completed u should have a connection from the RS232 to the butterfly board.

Testing the connection



With the butterfly connected to the computer start HyperTerminal. For most Windows based computers HyperTerminal can be found by clicking on Start > All Program > Accessories > Communication > HyperTerminal. In HyperTerminal set up to use 19200 baud, 8 data bits, no parity, one stop bit and **NO HANDSHAKE** (flow control). Then setup you butterfly to receive communication through the com port. Press the joystick up ("SCROLL UP") to wake the AVR Butterfly. If "AVR BUTTERFLY" is not scrolling over the display, press the joystick to the left ("EXIT SUB-MENU") until it does. "UP" also leaves the bootloader code that is activated after power cycle and reset. Press the joystick down ("SCROLL DOWN") three times, so the string "NAME" is displayed. Press the joystick to the right ("ENTER SUB-MENU"). If this is the first time a name is entered, the string "ENTER NAME" will be displayed,

otherwise the name already entered will be displayed and you have to press the joystick to the right ("ENTER SUB-MENU") once more. When the "ENTER NAME" is displayed press the joystick down ("SCROLL DOWN"), and "DOWNLOAD NAME" will be displayed 4. Press center push ("ENTER") to activate the UART, and the text "WAITING FOR INPUT ON RS232" will be displayed. Type your name in the terminal window on the PC (up to 25 characters) and save the name by pressing enter on your PC-keyboard. The name you typed should now be displayed in the AVR Butterfly display. If not go back and check your connection with the computer and your HyperTerminal settings.

The Auto Power Off feature is default enabled. It will turn off the LCD after default 30 minutes. This timeout can be changed or turned off. To wake the AVR Butterfly from SLEEP, press the joystick in the UP-position.

Installing programs Needed

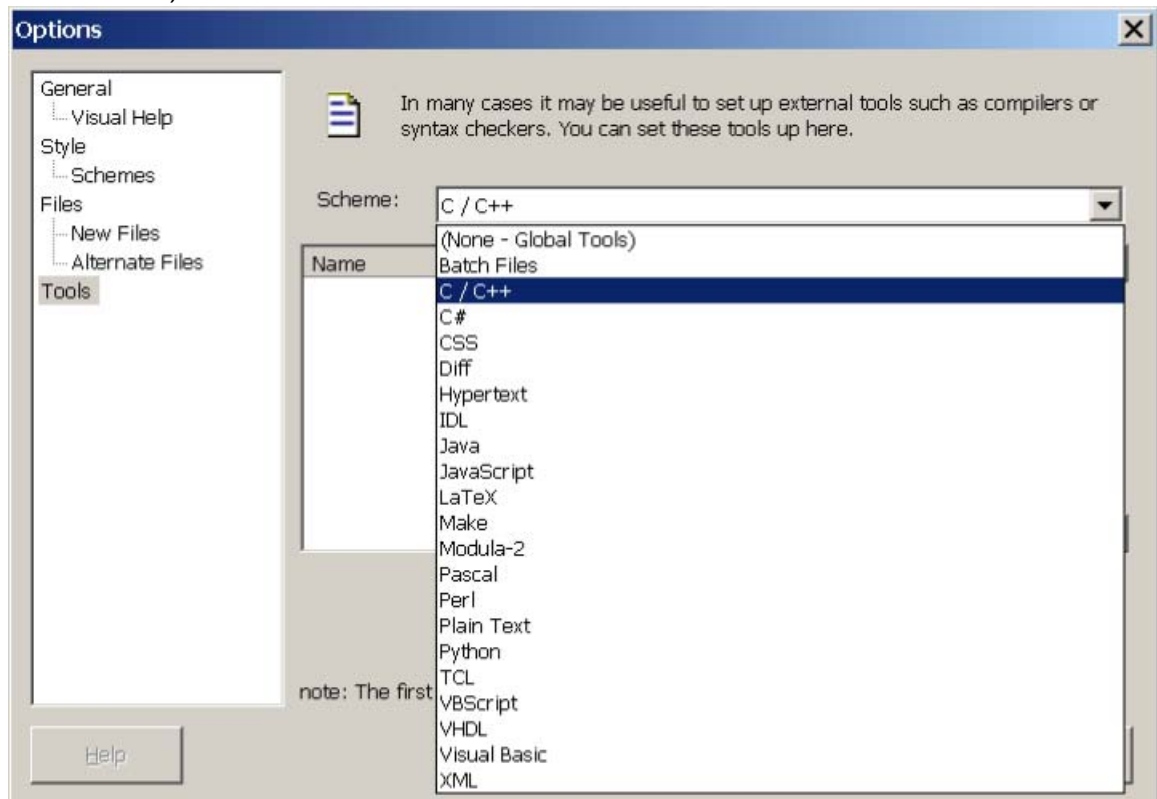
To program and upload code two programs are needed to be installed. The links are listed above and normal install should be fine. When WinAVR is installed it will install a few programs. Programmers Notepad is the one that is needed. Open Programmers Notepad and open the main.c file from the source you should have downloaded already.

```
main.c
//*****
//
// File.....: main.c
//
// Author(s)..: ATMEL Norway
//
// Target(s)..: Atmega169
//
// Compiler...: IAR EWAVR 2.28a
//
// Description.: AVR Butterfly main module
//
// Revisions...: 1.0
//
// YYYYMMDD - VER. - COMMENT                - SIGN.
// 20030116 - 1.0 - Created                  - KS
//*****

#include <inavr.h>
#include <io169v.h>
#include smacros.h
#include io169.h
#include "main.h"
#include "LCD_functions.h"
#include "LCD_driver.h"
#include "button.h"
#include "RTC.h"
#include "timer0.h"
#include "ECD.h"
#include "usart.h"
#include "sound.h"
#include "AOC.h"
```

*sometimes you can skip these next few steps depending on were you downloaded
Programmers Notepad from

Goto Tools < Options, under options and select tools from the bar to the left and select (None - Global Tools)



With this selected click add. In this window input the following information to make it look like figure 2. Then do this 3 more times making one look like figure 3, figure 4, and figure 5.

Figure 2

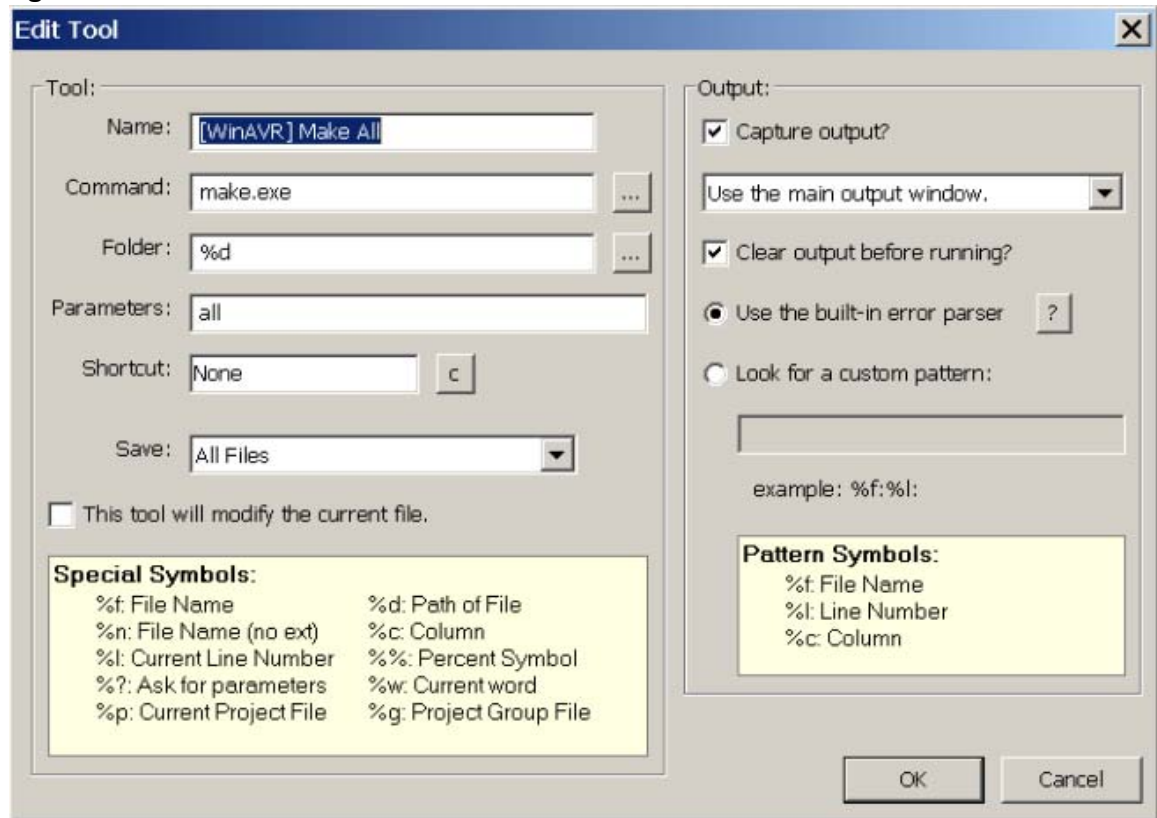


Figure 3

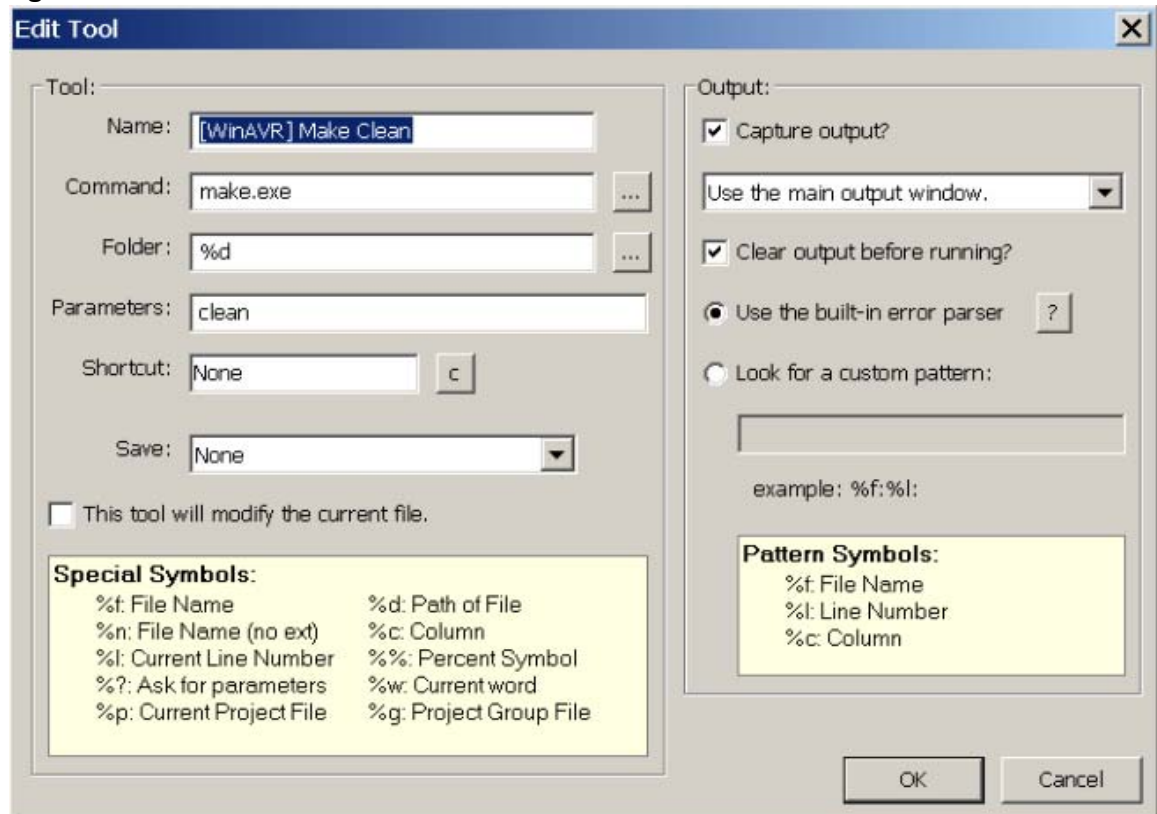


Figure 4

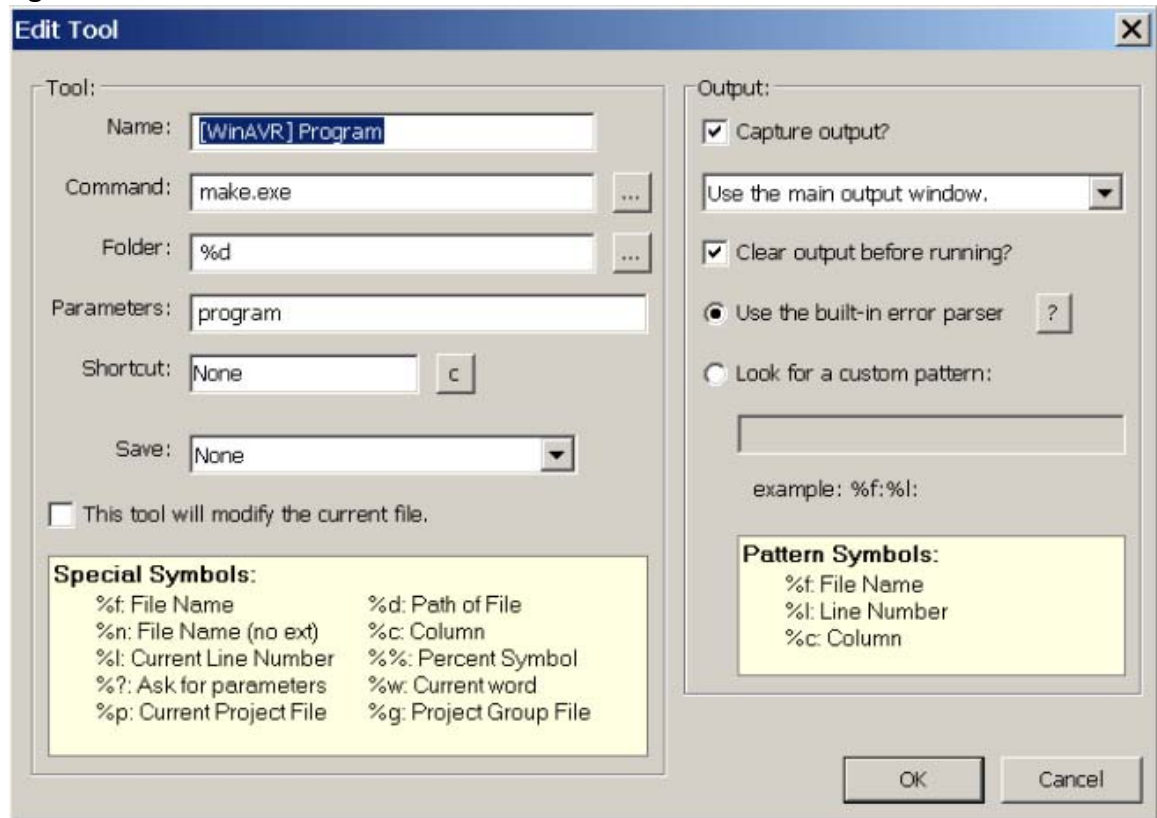
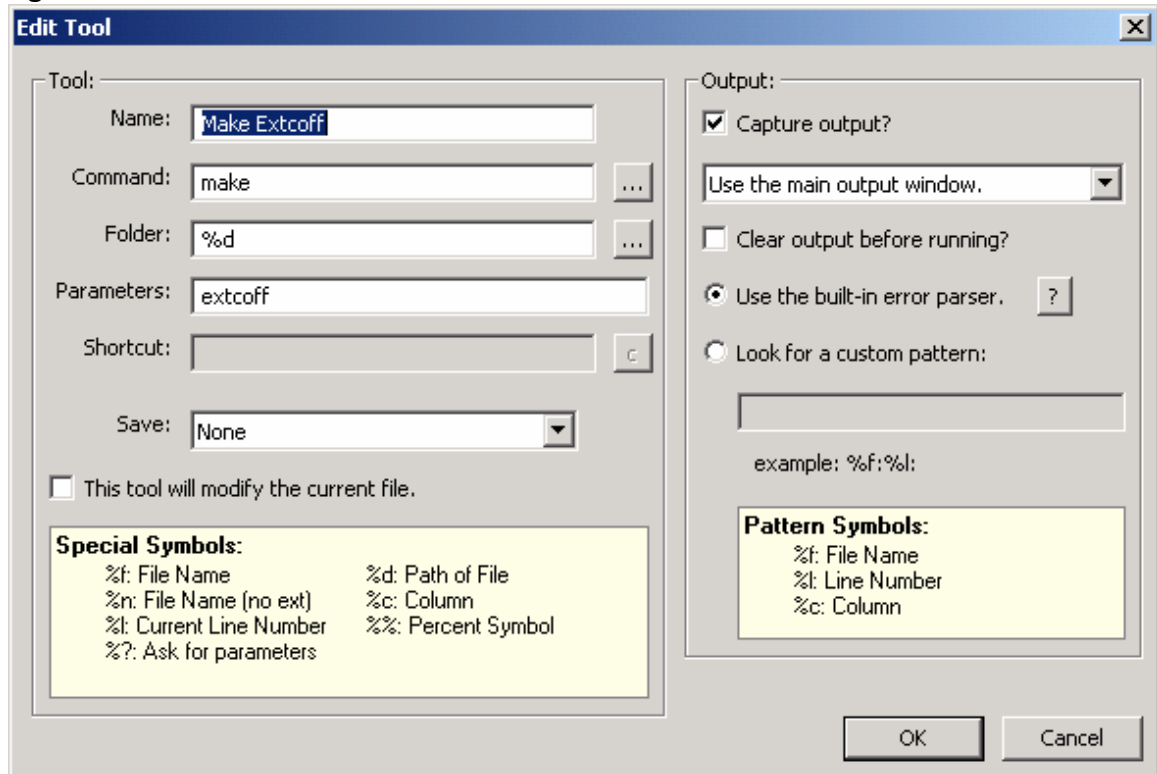


Figure 5

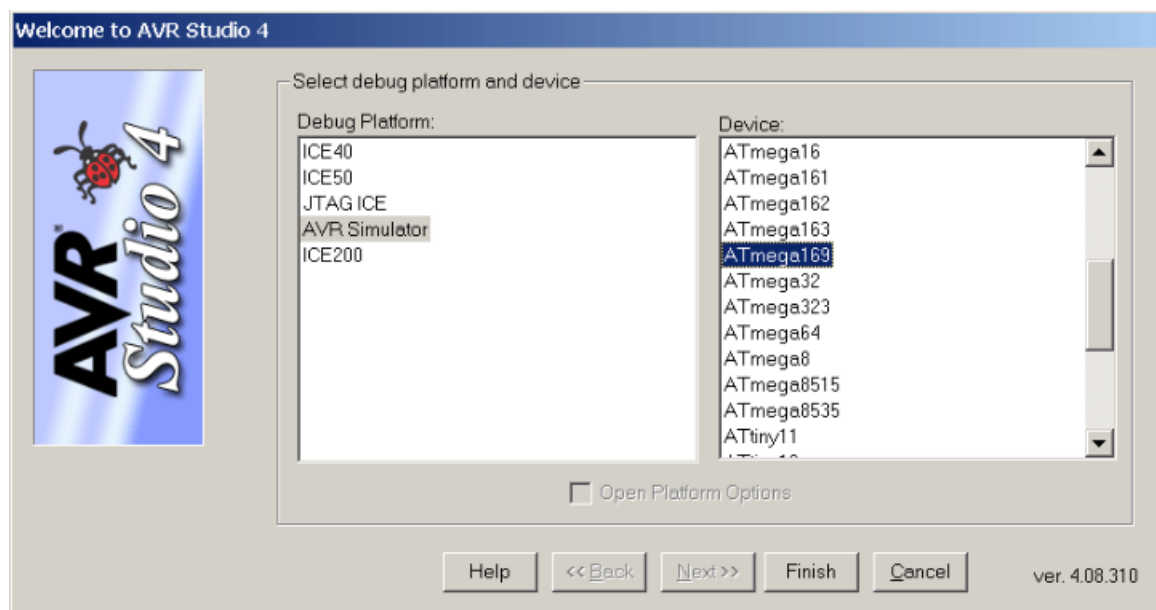


Compiling Program

With this setup you are ready to make your first program. You can use PN (Programmers Notepad) to write your program or any other editor, such as notepad so long as it does not add extra formatting to the file and save it as main.c. With your main.c open in PN you are ready to compile, go to tools < Make Extcoff. This will make the necessary .hex file needed to send to the butterfly. (for this butterfly.hex was created) Make all makes the hex file and a bunch of other files that can be used for other things, Make clean deletes all the files made by PN and Make Program is used while using the STK500 board with the butterfly.

Transmitting .hex File

Open AVR studio, hit open and find the hex file you just created. (for the use of this demonstration butterfly.hex will be used) Then select AVR Simulator from the left and ATmega169 from the list on the right and click finish.



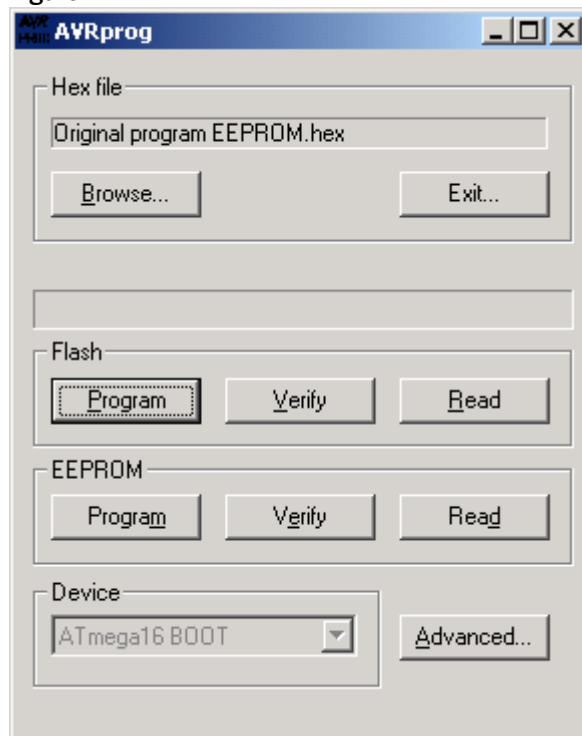
This will load the project into AVR Studio, you can simulate and build the project here but since we are using a .hex file this can not be done (maybe in later version of AVR Studio according to the web). Connect the butterfly to the com port, and then short out pins RST and GND on the ISP connector you installed earlier. This should

the bottom right most 2 pins. Now your board is ready to program. Now while pushing down on the direction pad and selecting tools < AVR Prog... from AVR studio. If something like figure 6 comes up you have done something wrong either in your connection or the shorting of pins. If done correctly you should see a window like figure 7, and you can release the direction pad.

Figure 6



Figure 7



Here your .hex file should already be selected if not click Browse and open it. With the Hex file selected hit Program under Flash. This will send the program through the RS232 port and program the butterfly. It also verifies the program after it has been sent to make sure it has been sent correctly. If not you will get an error message. Now you have successfully programmed the AVR butterfly.

A few things, one you can not overwrite the bootloader program this way so no fear if you screw up and write some dumb code you can just short the pins and program the board again. Two once you replace the original program with yours the board no longer has power a power save function on it so it is running all the time. This can drain a battery overnight so after you are done make sure to take out the battery, or write the power save function into the code.