

## PROJECT GUIDE

### ATMEGA Controller and Feedback Ammeter

#### Instruction Manual and Procedure

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#### Assembly of the ATMEGA Controller on Breadboard

##### Electrical Components

- Breadboard
- 16 MHz Crystal
- LED 5 Colors Set x2
- 5V Regulator
- Atmega328p-pu Chip
- FT232RL USB-Serial
- Wires
- 100uF Cap x2
- 3 pF x2
- Resistors
- USB Mini Cable

##### Breadboard Setup

Watch the video for step by step instructions: <https://youtu.be/N84KIO4NGJ4>

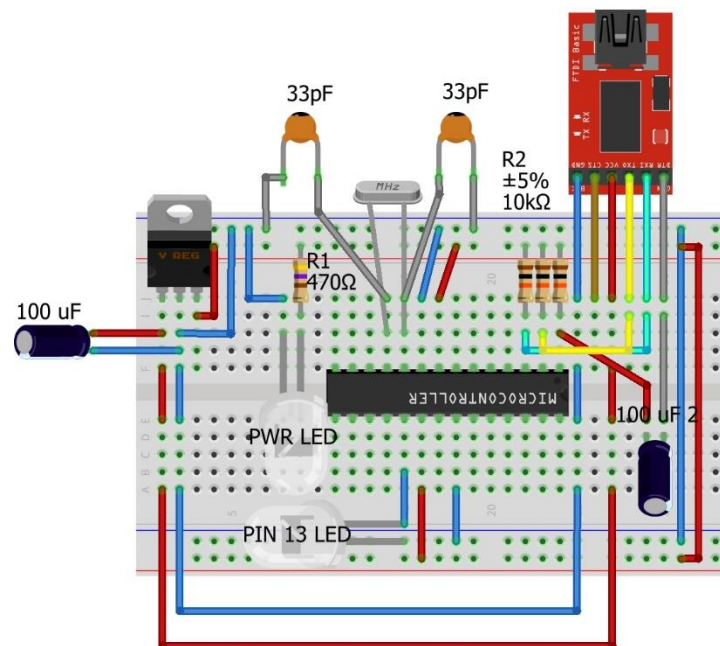


Figure 1: Breadboard Setup for ATMEGA Controller

## Downloading Arduino IDE on PC

The steps on the Arduino webpage should be easy to follow.

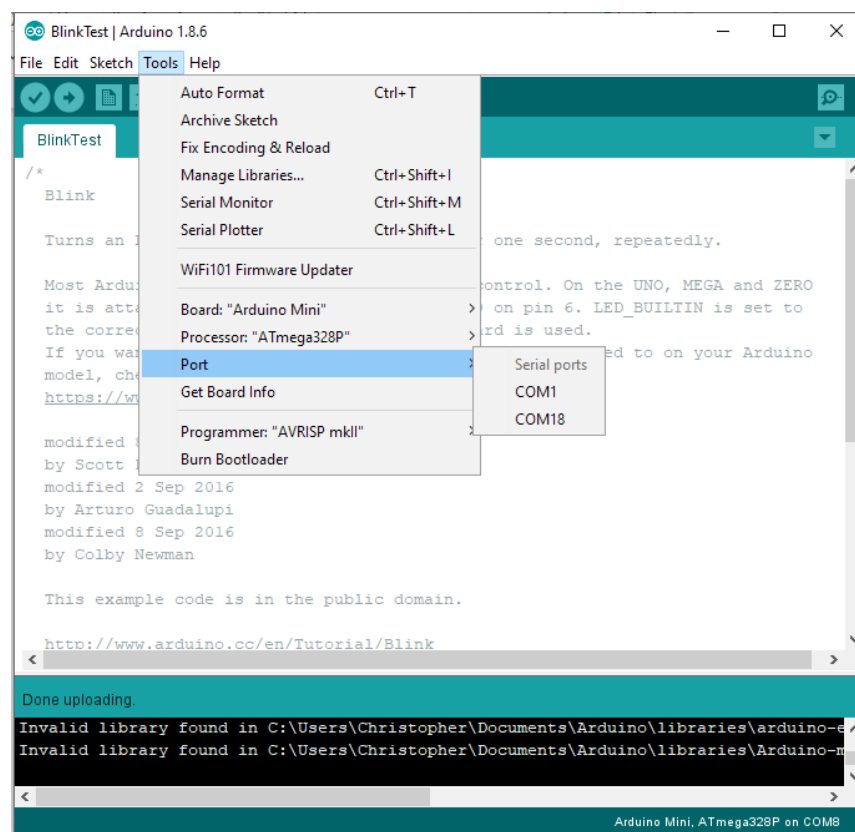
<https://www.arduino.cc/en/software>

No payment is necessary to use their software and it is open source so there are many resources on forums and YouTube describing all kind of ways to use this software on many different types of microcontrollers.

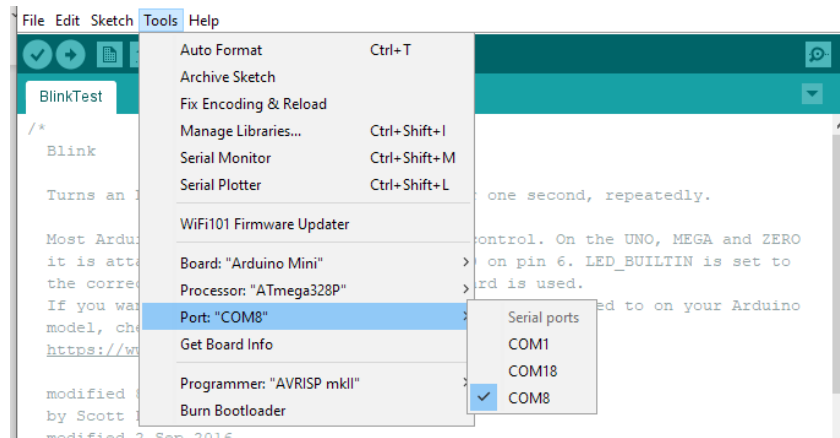
## Uploading First Program to ATMEGA Controller

### Procedure for Uploading Blink Test

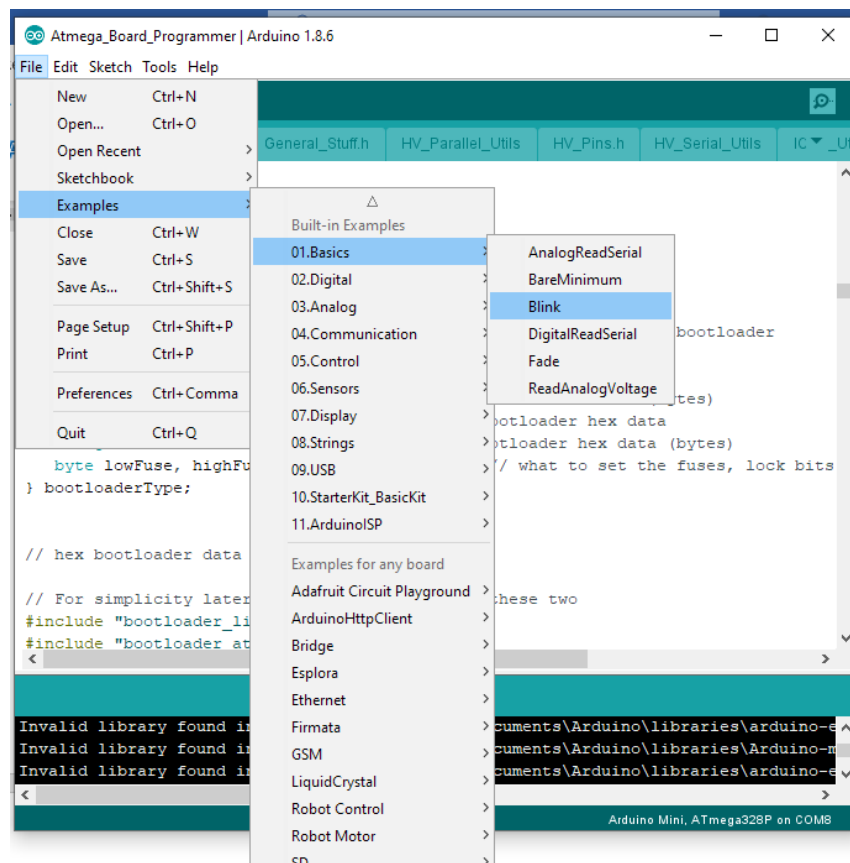
Step 1: Open your Arduino IDE and check the COM Ports attached to computer by clicking on Tools and hovering over Ports. Take note of what is already in ports so when you check again after connecting your microcontroller, you can notice which port is new.



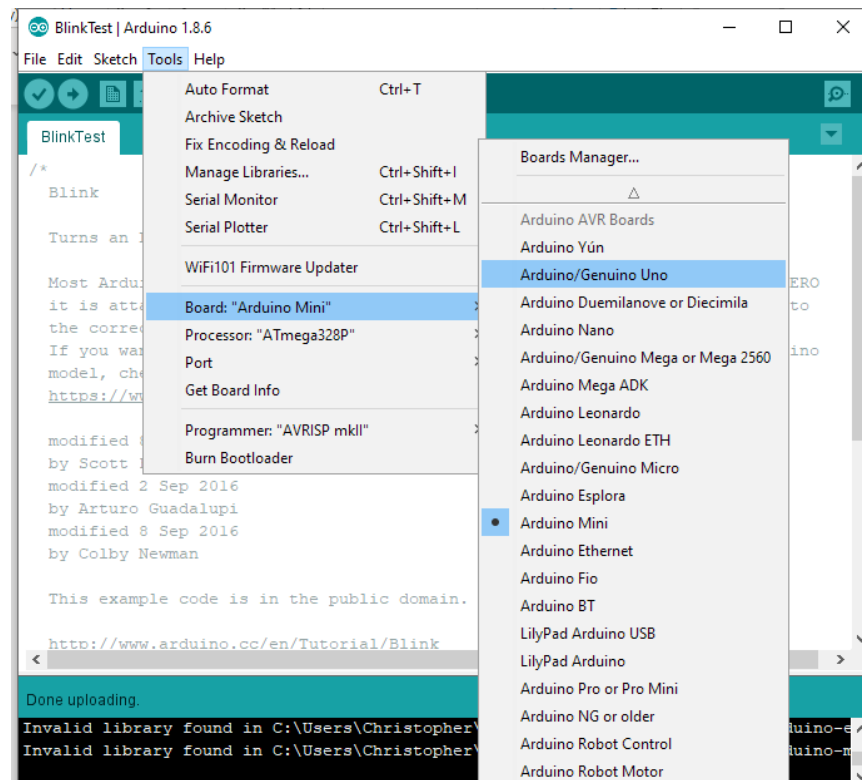
Step 2: Connect USB from your PC to your new Microcontroller device. The computer should automatically create a new COM Port for your microcontroller. Check to see what port has now appeared. In my case it was Port 8.



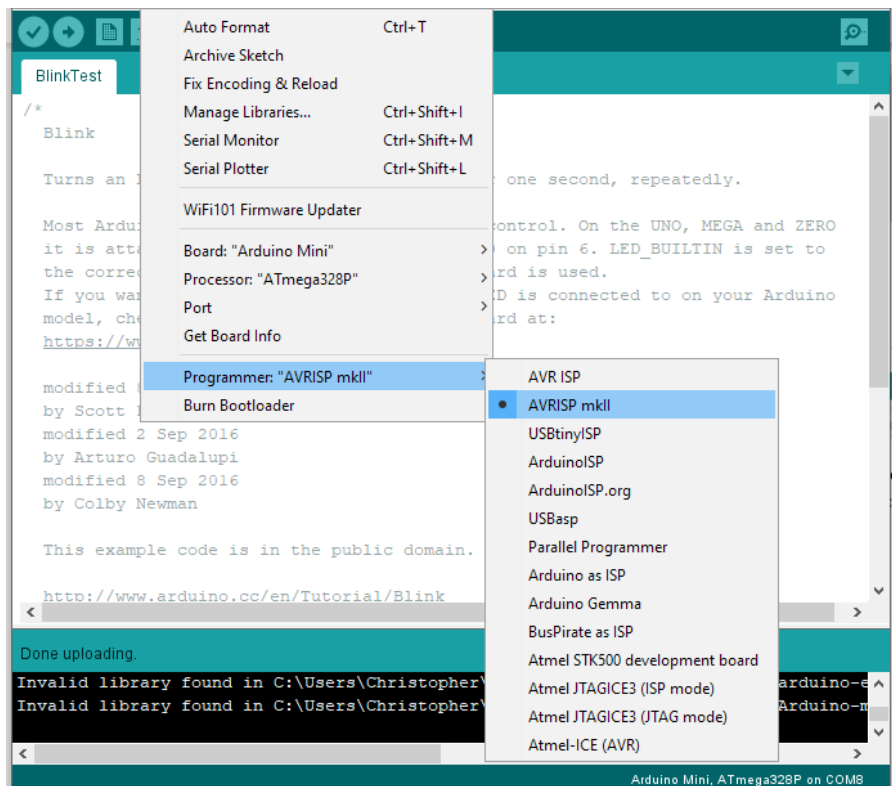
Step 3: Now find the test program called Blink to confirm the you can successfully upload to the ATMEGA controller. You can find this by clicking File followed by hovering over Examples and then Basics.



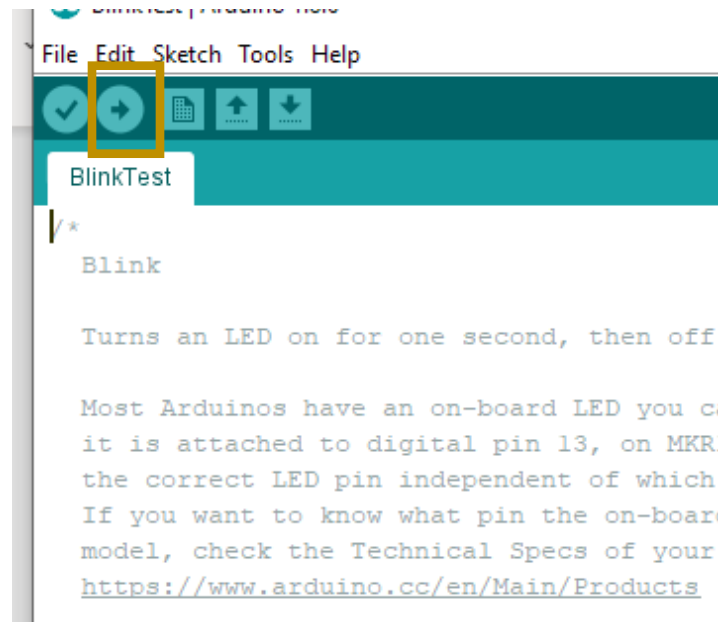
Step 4: There are now a few features to double check before uploading the code. The first is the board type. Depending on the bootloader pre-installed on the microcontroller the board type could be either Arduino Mini or Arduino/Genuino Uno. If one doesn't end up working, try the other.



Step 5: Double check the COM Port and make sure it is now on the COM for your Microcontroller as discovered in steps 1 & 2. Also, make sure that the Programmer says “AVRISP mkII” or change it also.

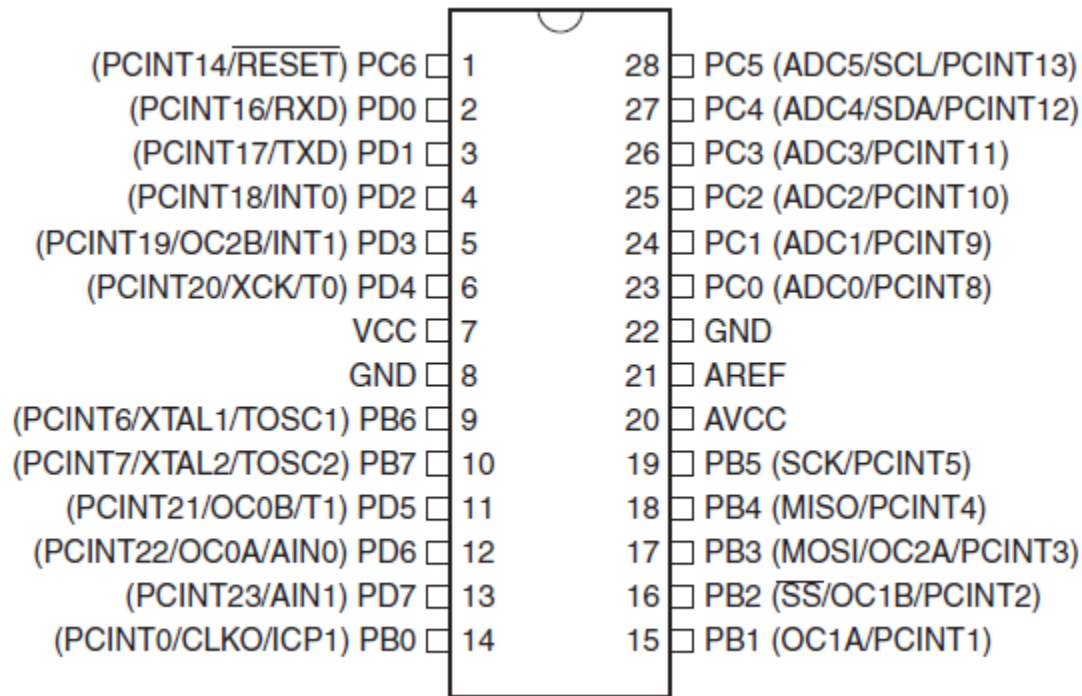


Step 6: Last but not least, upload the program by pressing the arrow button near the top left of the window. When the program is finished uploading it will say 'Upload Complete' in the lower right side of the window. If the program does not upload after a minute or two unplug and change the board type in Step 4, then try again. If the microcontroller does not blink, there maybe a wiring issue and you should review the schematic.



Step 7: If you have not used this software before, save the program under a new name and try adjusting the values and test the results by uploading it to the microcontroller. Also, search the web for examples and follow some tutorials posted online. Many of them reference the Arduino Uno which uses the same microcontroller within the circuit you have just put together. Reference the pins shown below when following other tutorials.

## ATMEGA Controller Pins



## Additional Information

If problems occur with the upload, double check that the procedure was followed, try both the Arduino Uno board option and the Arduino Mini board option, and if neither works then contact us through our website or email.

## Soldering to Prototype Board

The soldering iron and the solder must be purchased separately. Watch the YouTube tutorial video to see an approach you can take to solder your ATMEGA circuit to the board.

## Assembly of the Feedback Ammeter on Breadboard

### Electrical Components

- Breadboard
- LM358P Op AMP x2
- Wires
- Resistors

### Breadboard Setup

Watch the video for step by step instructions: <https://youtu.be/2oiLOcbeetw>

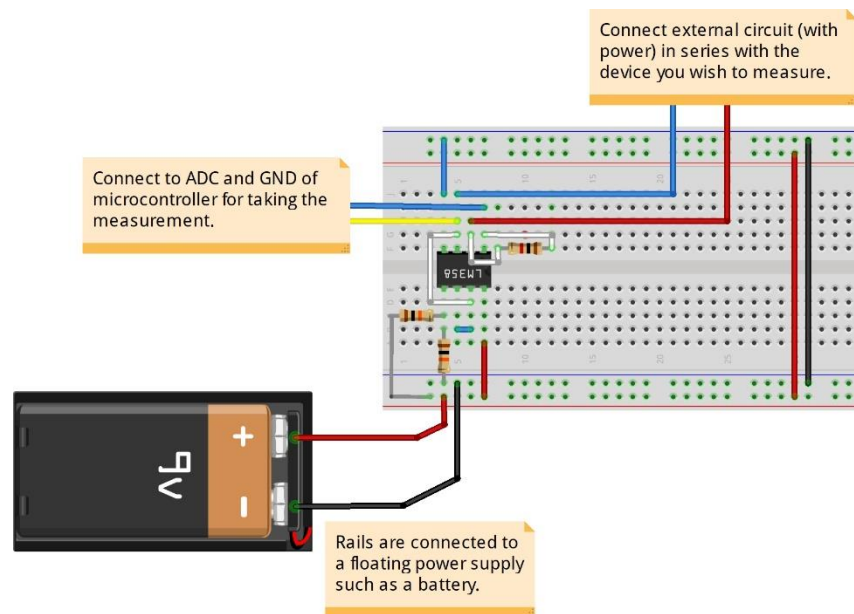


Figure 2: Breadboard Setup for Feedback Ammeter