**Multifunctional Ethernet controller for smart home   
based on AVR Atmega328 and ENC28J60   
TuxGraphics clone**

Многофункциональный Ethernet-контроллер Умного Дома на AVR своими руками  
Make yourself: <http://ab-log.ru/smart-house/ethernet>  
Commercial: <http://www.ab-log.ru/smart-house/ethernet/megad-328>  
Forum: <http://ab-log.ru/forum/viewtopic.php?f=1&t=6>

Advantage - best algorithm ever seen. Values stored into flash. Can reconfigure password, IP address, pins as inputs outputs ADC PWM. Disadvantage - not compatible with Arduino programming. First used this, but finally modified it to be Arduino compatible.

**Similar projects using ENC28J60 chip**

TuxGraphics An AVR microcontroller based Ethernet device  
Embedded client systems, pre-loaded, ready to use  
<http://shop.tuxgraphics.org/electronic/eth-eclient.html>  
<http://tuxgraphics.org/electronics/200606/article06061.shtml>

WEB, Internet , Ethernet controlled relay board: Arduino compatible, RS485, USB.   
Ebay, KMTronic LTD  
<http://www.sigma-shop.com/product/72/web-internet-ethernet-controlled-relay-board-arduino-compatible-rs485-usb.html>

A credit card sized Ethernet Arduino compatable controller board  
<http://www.instructables.com/id/A-credit-card-sized-Ethernet-Arduino-compatable-co/>

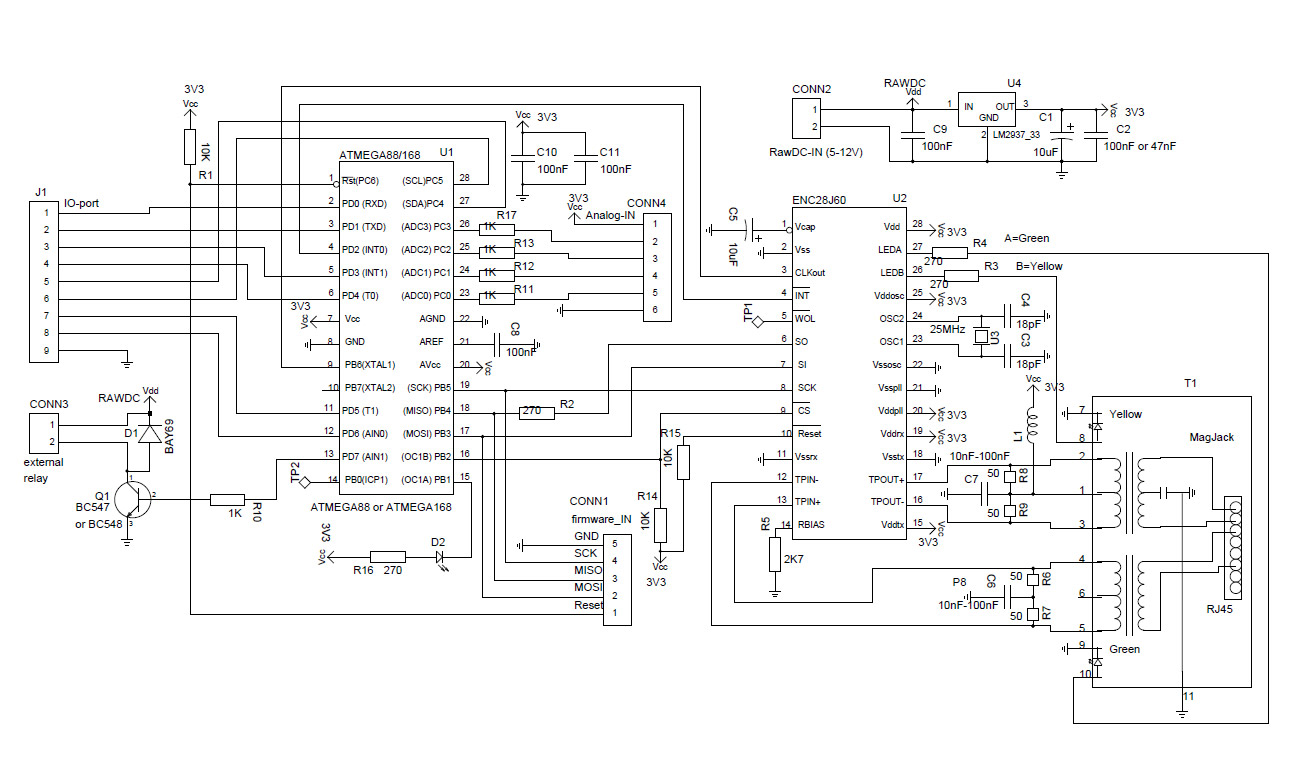
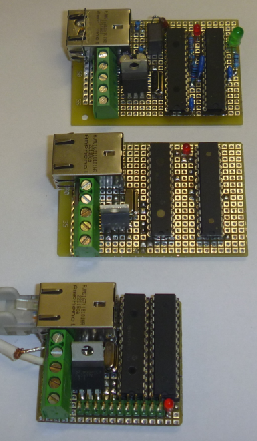
Ethernet модуль на PIC18F67J60  
<http://radioteh.nm.ru/shemes/ethernet/PicEthernet.htm>

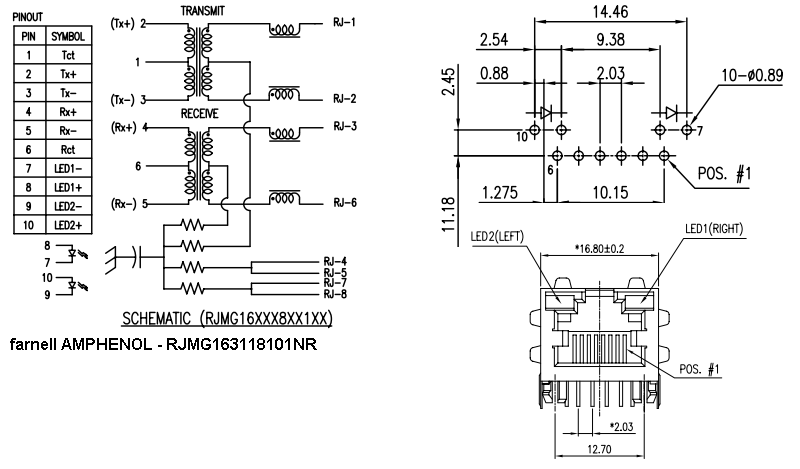
Демонстрационная плата Ethernet TRT-Ethernet  
<http://www.trt.ru/design/solutions/trt-ethernet.htm>

**Lets build this**

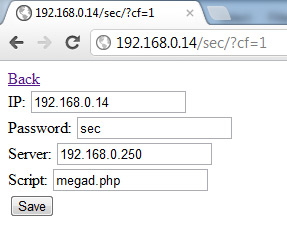
Многофункциональный Ethernet-контроллер Умного Дома на AVR своими рукам

<http://ab-log.ru/smart-house/ethernet>  
Actually this schematic is 100% identical with TUX-graphics.

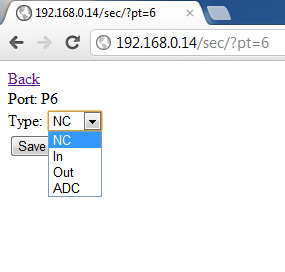




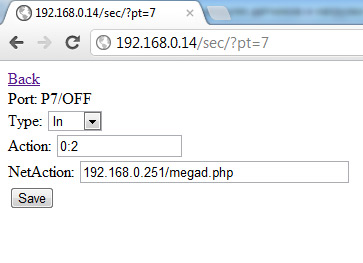
**Configuration**



**Port function selection**



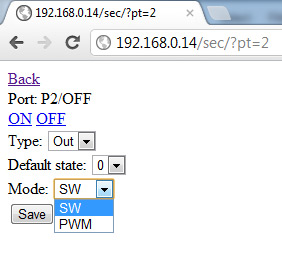
**Digital inputs**



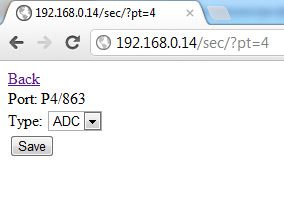
**Format for action X:Y;X:Y;X:Y. First is port and second is action. 1 –on, 0 – off, 2 –toogle**

**Timeout to connect to server is 2 sec.**

**Output. PWM only** P9 (D6), P10 (D5) и P6 (D3)



**Analog inputs**



**Server side php script megad.php**

<?

if ( $\_GET['pt'] == "6" )

{

// do something

echo "1:1";

}

?>

**Server line to read**

<?  
$state = file\_get\_contents('http://192.168.0.14/sec/?pt=4&cmd=get');  
?>

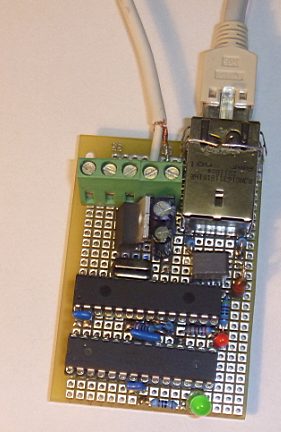
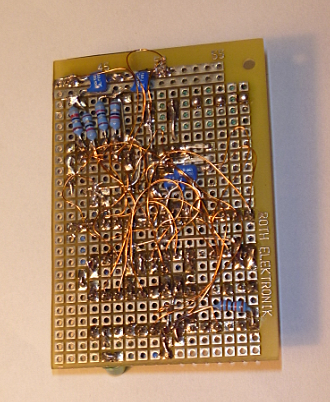
**Assembling Version 1**

No surface mount components. In principle could assemble on plug-in solderless breadboard if Ethernet connector pins extended.

I prefer soldered using enameled wire. If iend of wire is kept at soldering iron for 10 sec the enamel will melt and one can solder wire. Of course some practice needed.

Took 5 hours to assemble as needed to understand Ethernet connector pinout. I do not use choke coil at all.

Did not solder programmer pins. Did not solder all ports to external connectors.

To flash ATMEGA328 it is removed from board and AVR chip programmer is used.

avrdude -c avrispmkII -P usb -p m328p -F -e -U flash:w:megad-328.hex

Ip\_manager2 is for home build board with schematics on the previous page.  
<http://ab-log.ru/files/File/ip_manager2/ip_manager2_20120123_hex.zip>

megad-328\_302.zip is the version for commercial board. Most advanced. I flashed it. Works with same schematics, just different port numbers.The version ip\_manager3 that I compiled myself had a bug. Password was not recognized. Flashed hex file from forum.

<http://www.ab-log.ru/forum/viewtopic.php?f=1&t=6&start=720>

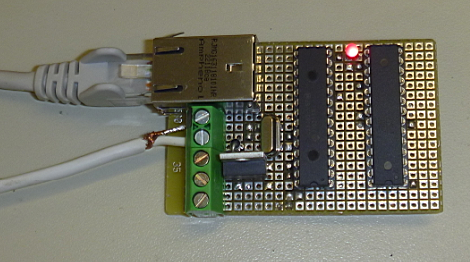
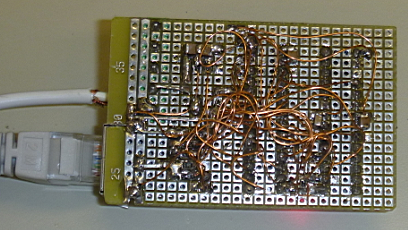
SRC: <http://ab-log.ru/files/File/ip_manager3/megad-328_302.zip>  
HEX: <http://ab-log.ru/files/File/ip_manager3/megad-328_302_hex.zip>

**Troubleshooting**

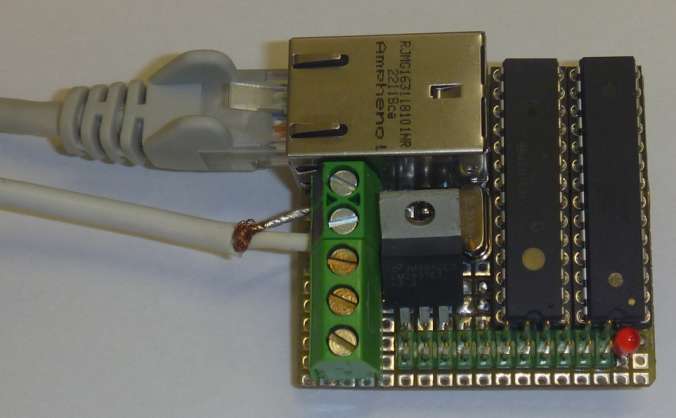
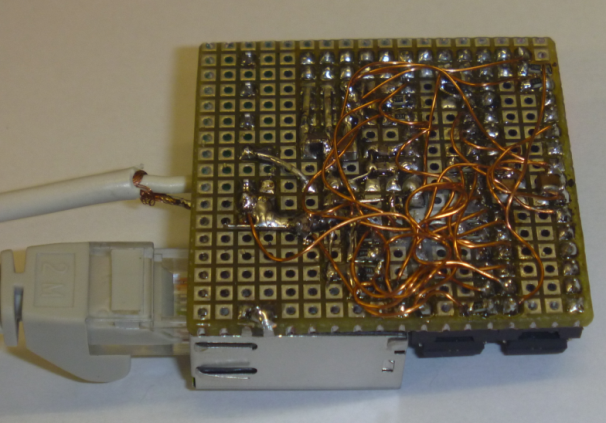
First check 3.3.V.  
On Ethernet connector one green LED should be on if cable connected.  
Check with multimeter that on all pins voltages are OK.   
If qartz runs o one pin is 0.6 V and on other ca 1V.  
If still don’t not get working, need an oscilloscope. Check with oscilloscope if Ethernet RX TX signals present. The signals shoul look like spikes be opposite for + and – lines. Check signals between Atmega and ENC chip. Shoul be something going on.

http:// 192.168.1.14/sec Worked!

**Version 2**Next evening assembled 2 more boards with surface mount passive components. Took 3 hours to assemble.

**Version 3**Most compact setup. Took 3 hours to assemble and get running. Soldering is not more difficult.

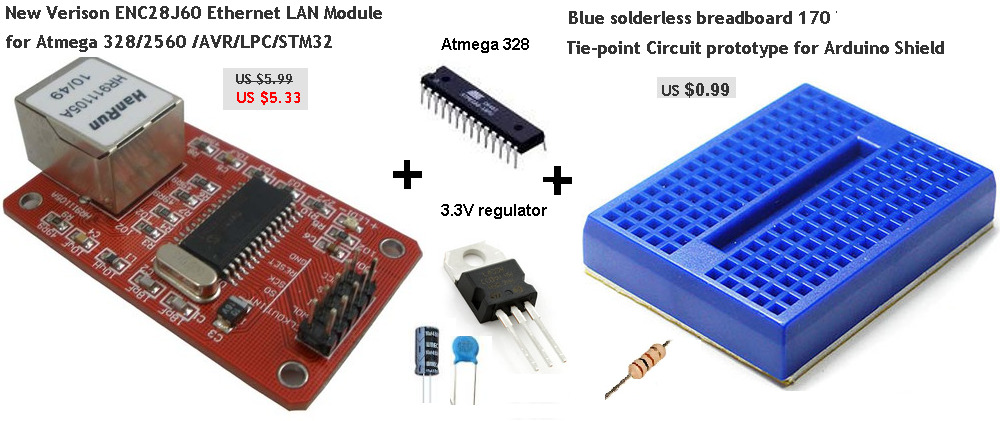
 

**Version 4**Would be all SMD circuit board. Reasonable if larger number of boards needed. Layout exists<http://www.ab-log.ru/forum/viewtopic.php?f=1&t=6&start=780>

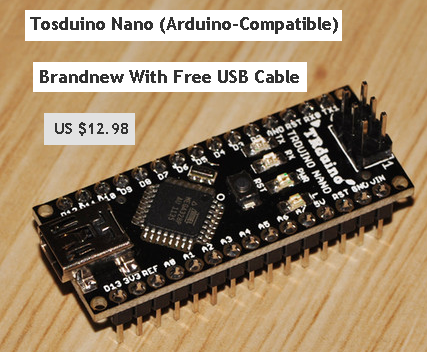
**Outlook**

Cheap ENC28J60 boards exist. (Cheaper then ordering individual parts).  
No 3.3 V regulator onboard. Can use 2 diodes in series to make ca 3.3 V from 5V or 3.3V regulator. Taking 3.3V from FTDI chip makes thing unreliable.   
Can connect with ATMEGA328 chip on a breadboard to make this home automation server.

Some example of usage:   
<http://voltsandbytes.com/simple-sensor-webserver/>







Another option is to use Arduino nano. That gives USB connection, for programming. Do not need to solder. But would need to rewrite the nice ab-log.ru algorithms with saving into flash.

Unfortunately presently there are no cheap prices boards with both Atmega 328 and ENC28J60 chips, but may be in a year or so might appear on the Ebay.