YA-µCPby Edgar Barranco

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Abstract

The goal of the **YA-µCP** is to allow electronic hobbyists the ability to program two of the most popular microcontrollers in the market, the PIC by microchip and the AVR by ATMEL with one simple and easy to carry device.

Microcontrollers are everywhere. Due to their low cost, availability and flexibility they are very attractive for electronic hobbyists, especially hackers. Both the AVR and the PIC have their pros and cons. Merging the 2 microcontrollers by providing an AVR and PIC programmer in a single device will help expose people the two architectures, allowing them to decide on their own which microcontroller they like best.

The **YA-µCP** has been designed as an entry to the Hack A Day "design challenge" which requires certain specifications to be met, such as implementation of their logo, the board size (restricted to 3.5" x 2"), etc. Due to this restrictions, I decided to implemented the two ISP (*in system programming*) in to one simple, small design.

Due to the lack of time, I decided to use the well known JDM design for the PIC and the ICSP for the AVR eliminating the need for new software and extensive test. The PICs can easily be programmed using ICPROG and WinPIC, while the AVRs can be programmed using PonyProg.

There is no need to provide external power to the programmer, increasing its portability and providing a more cost effective design. The AVR section uses the 2x5 ICSP connector setup and the PIC section has the 6 pins, which enables direct connection to breadboards.

The programmer communicates with the computer through the serial port. Additionally, the compact design of my board will also support simultaneous use of the two programmers.

The board consists of two layers. The bottom layer of the PCB includes the routed signals, while the top layer displays the HACK A DAY logo, in order to comply with the contest rules. With this entry, I am also including three logos that had to be made in order to fix the artifacts, which were a result of the enlargement of the website's logo.

The following images will show the top and bottom layers of the routed board. These images were screen shots that were captured while using Eagle.
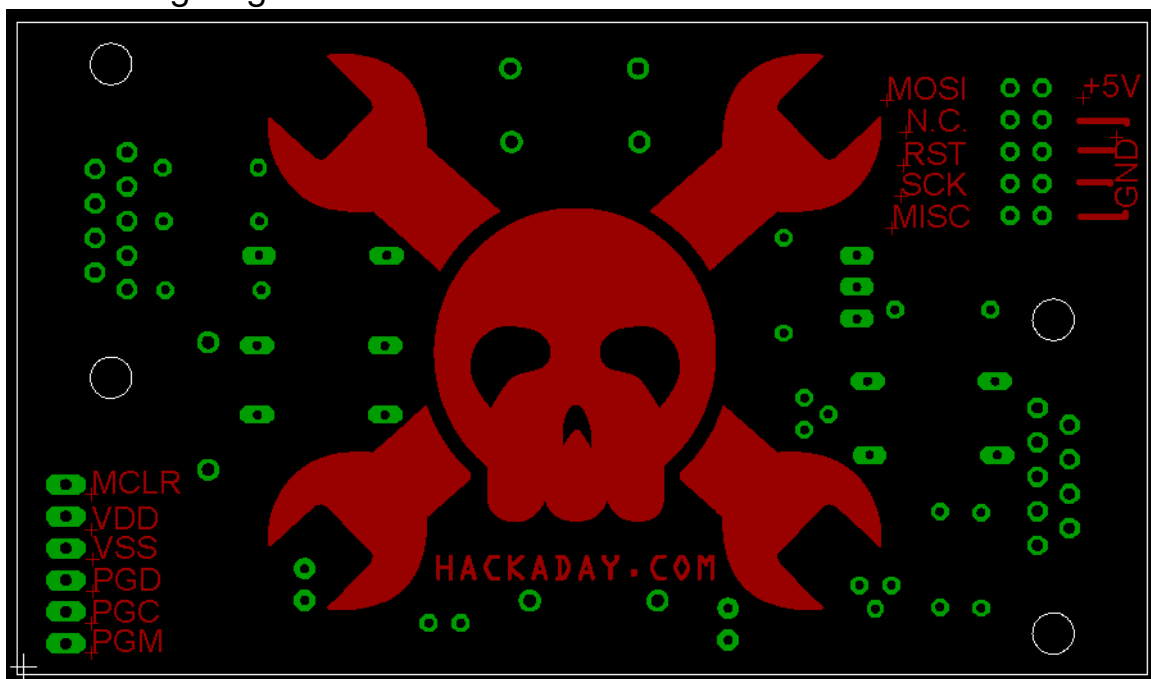
TOP
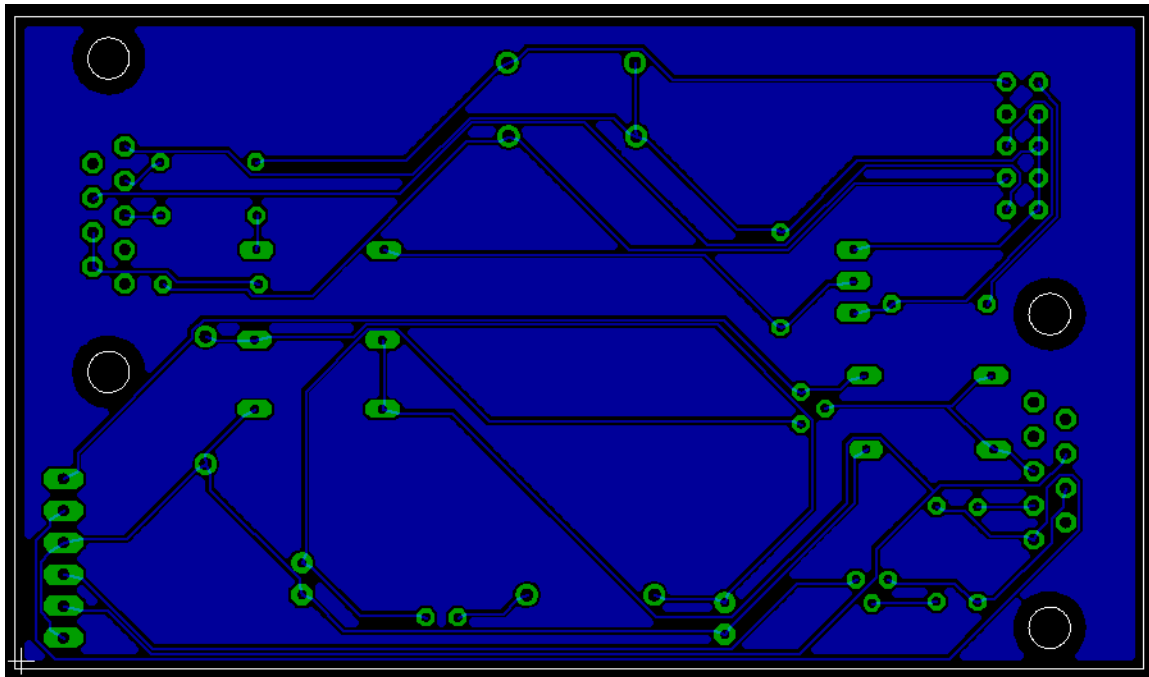
Bottom

The materials needed to build the project:

Part	Value	Device	Package	Description
C1	100u/16VDC	CPOL-USE2.5-7	E2,5-7	POLARIZED CAPACITOR, American symbol
C2	100u/16VDC	CPOL-USE2.5-7	E2,5-7	POLARIZED CAPACITOR, American symbol
D1	1N4148	1N4148	DO35-10	DIODE
D2	1N4148	1N4148	DO35-10	DIODE
D3	1N4148	1N4148	DO35-10	DIODE
D4	1N4148	1N4148	DO35-10	DIODE
D5	1N4148	1N4148	DO35-10	DIODE
D6	BZV55C5V1	BZV55C5V1	DO41Z10	Z DIODE
D7	BCV55C5V1	BZV55C5V1	DO41Z10	Z DIODE
D8	BZV55C5V1	BZV55C5V1	DO41Z10	Z DIODE
D10	6.2V	Zener Diode	DO41Z10	Z DIODE
LED1		LED5MM	LED5MM	LED
Q1	BC337	BC337	SOT54A	NPN TRANSISTOR
Q2	BC337-40	BC337	SOT54A	NPN TRANSISTOR
Q3	BC546B	BC546B	TO92-EBC	NPN Transistor
R1	10K	R-US_0204/7	0204/7	RESISTOR, American symbol
R2	4.7K	R-US_0204/7	0204/7	RESISTOR, American symbol
R3	4.7K	R-US_0204/7	0204/7	RESISTOR, American symbol
R4	33K	R-US_0204/7	0204/7	RESISTOR, American symbol
R5	10K	R-US_0204/7	0204/7	RESISTOR, American symbol

R6	1.5K	R-US_0204/7	0204/7	RESISTOR, American symbol
R7	10K	R-US_0204/7	0204/7	RESISTOR, American symbol
SV1	ICSP-AVR	ML10	ML10	HARTING
SV2	ICSP-PIC	MA06-1	MA06-1	PIN HEADER
X1	Serial Fem	F09H	F09H	SUB-D
X2	Serial Fem	F09H	F09H	SUB-D

As for assembly, I would recommend starting with the AVR section of the programmer. First install the DB9 female connector, then, proceed with the pin header and then the rest of the components. After testing repeat the same with the Pic section. The schematics could also be distributed to help locate the components and the values. If the board is built using the SILK screen, the assembly will be easier; however, the price of manufacturing will increase.

The following screen capture is of the board with all the layers turned on:
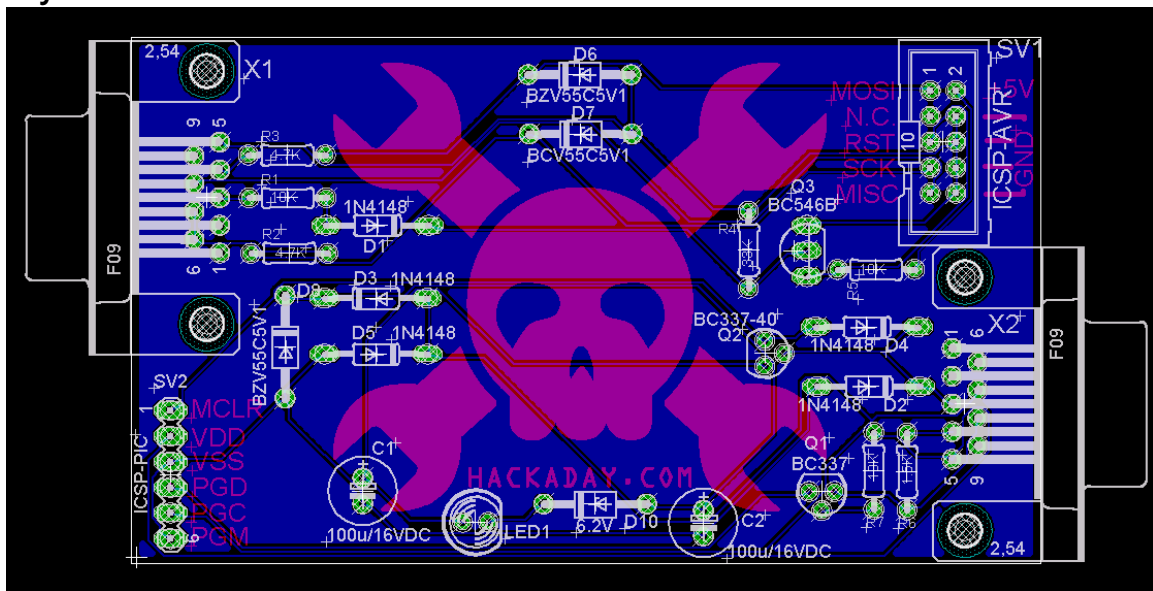
One last thing: **YA-µCP** stands for: Yet Another Microcontroller Programmer.