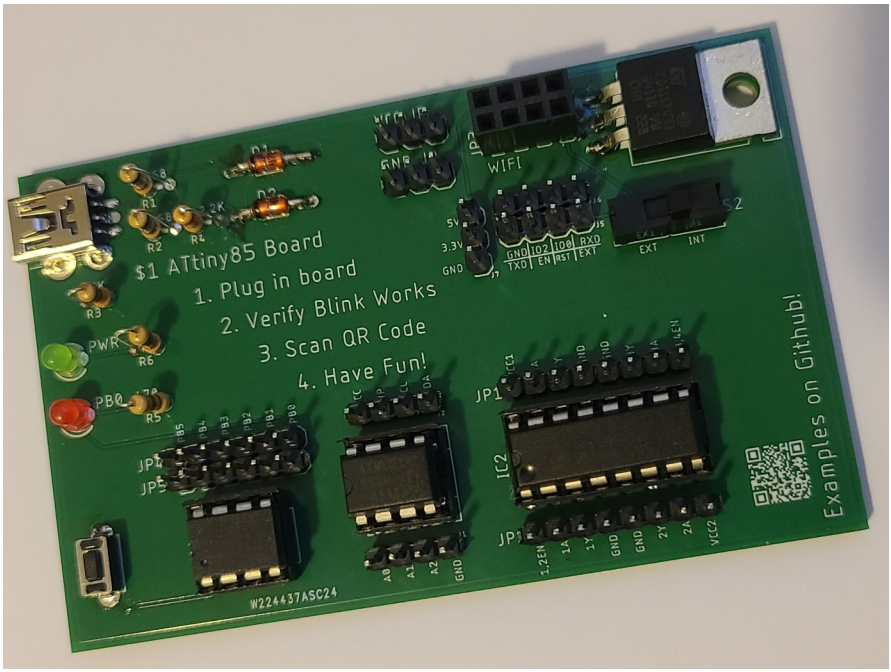
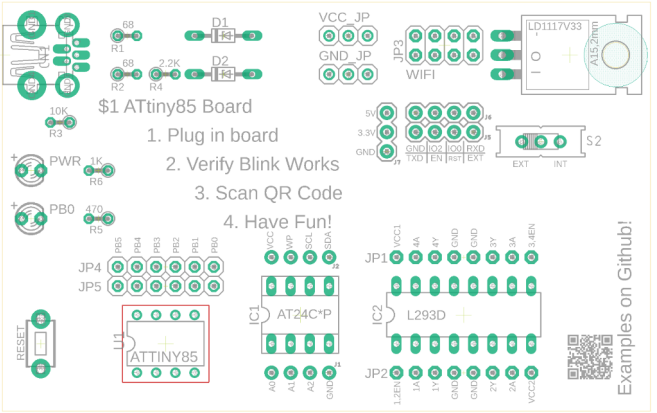
One Dollar Board

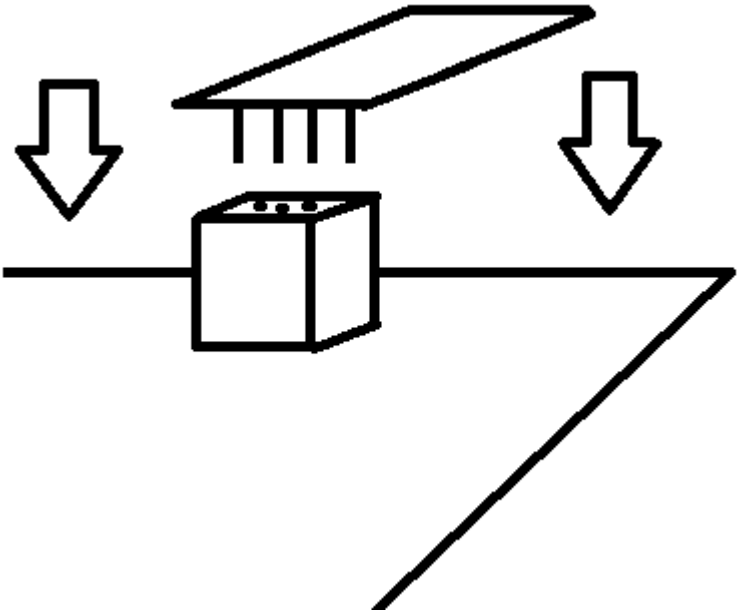
Standalone ATtiny85 Development Kit



USER LEFT ⟵ ⟶ USER RIGHT



WIFI Installation



Bill of Materials

(1) PCB

(2) 8 pin IC socket

(1) 16 pin IC socket

(1) ATtiny85

(1) AT24C16D

(1) L293D

(1) Red LED

(1) Green LED

(1) USB Micro Female

(2) 3.6v Zener diode

(1) LD117V33

(1) Push Button Switch

(1) 3 Pole Slide Switch

(2) 2.54 Header Male

(1) 2.54 2x4 Header Female

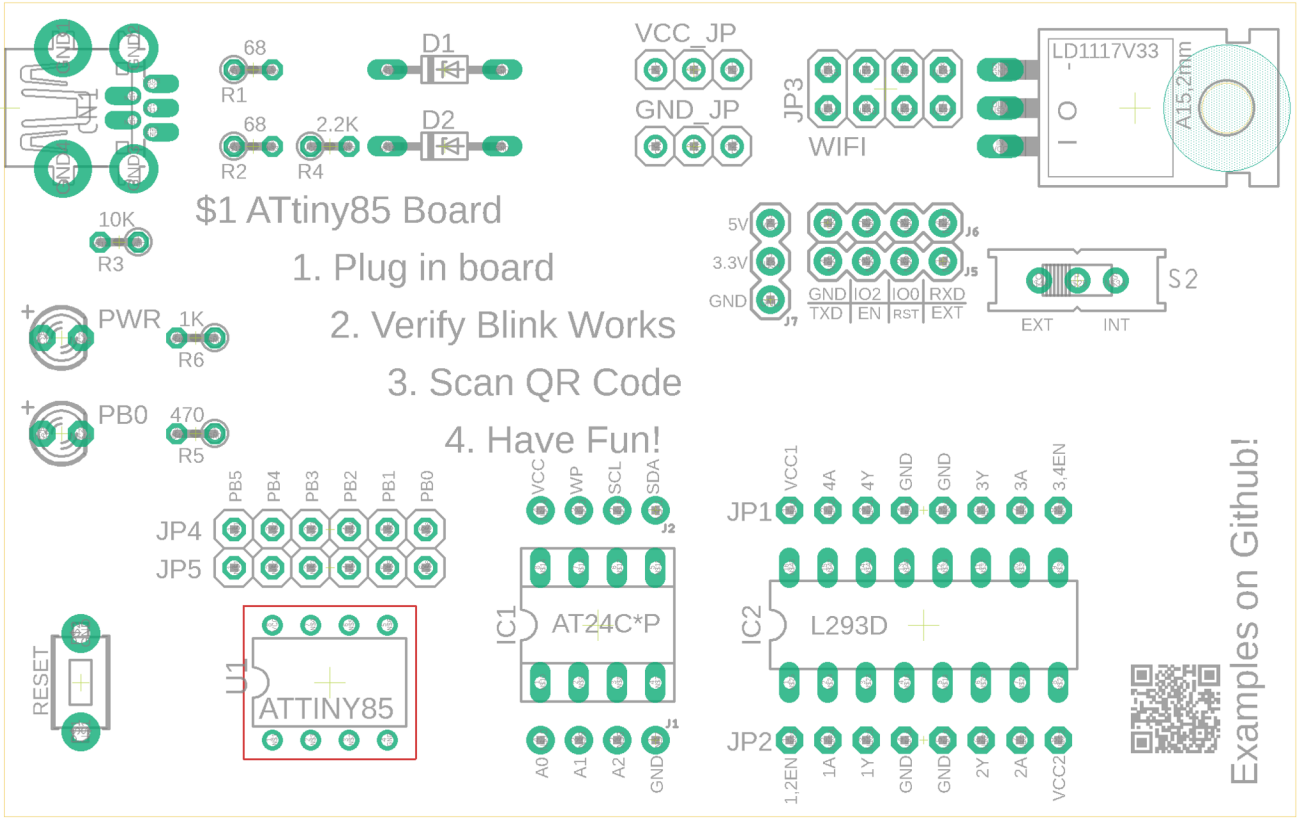
(2) 68 ohm Resistor

(1) 2.2 kohm Resistor

(1) 1 kohm Resistor

(1) 10 kohm Resistor

(1) 470 kohm Resistor


$1 ATtiny85 Board
1. Plug in board
2. Verify Blink Works
3. Scan QR Code
4. Have Fun!
Examples on Github!
CN1
GND
GND
GND
GND
R1
68
R2
68
R4
2.2K
D1
D2
R3
10K
PWR
R6
1K
PB0
R5
470
RESET
JP4
JP5
PB5
PB4
PB3
PB2
PB1
PB0
U1
ATTINY85
VCC_JP
GND_JP
JP3
WIFI
LD1117V33
A15.2mm
5V
3.3V
GND
J7
J6
J5
GND
IO2
IO0
RXD
TXD
EN
RST
EXT
S2
EXT
INT
IC1
AT24C*P
VCC
WP
SCL
SDA
J2
A0
A1
A2
GND
J1
JP1
VCC1
4A
4Y
GND
GND
3Y
3A
3.4EN
IC2
L293D
JP2
1,2EN
1A
1Y
GND
GND
2Y
2A
VCC2

This kit requires basic soldering skills and equipment!

1. Start by soldering in the three (3) IC sockets. Be sure to have the index notch pointed **USER LEFT!!** I find the easiest way to solder these is to place them on the board, then flip the board over. Solder one (1) corner pin on each socket. Next, holding the board with your non-soldering iron hand, place your index finger (AVOID THE CORNER PIN AREA) on each socket one at a time while heating up that socket's soldered pin slightly. This will align the socket just right. Finish this step by flipping the board upside down again and finish off the soldering for the sockets.

2. Solder the resistors. To install these, take one lead and bend it around until it is pointing the same direction as the other lead, like a lowercase 'n'. There is no wrong way to install these resistors, as they have no polarity. However, I do like to install the resistors with the resistor package resting on the circle of its silkscreen.

3. Bend and install the Zener diodes. To do this, use your thumbnail and index finger to bend the leads about 3mm out from the package and down into a right angle. You should not be bending the leads right up against the package, or you will find installation difficult.

4. Install the power and GPIO LEDs. Take careful note of the leads. The longer lead is the positive lead, and the negative side of the LED will also be molded slightly flat like the silkscreen shows. Keep in mind that LEDs are fairly delicate, so do not linger on a lead for more than 2 seconds with the iron.

5. Install the voltage regulator. I find that by taking a small pair of needle nose pliers, one can bend the leads around 45-50 degrees to the component package. Then, you can easily slide the regulator into its holes. Look at the finished board picture for a visual. Line up the screw hole with the hole in the PCB before soldering in.

6. Solder in the headers. I find that the easiest way to do this is similar to the sockets. Solder one end pin of a header into place, then use your index finger to press the header flush against the board as you reheat the solder joint. Once aligned, go back and solder the rest of the header pins.

7. Solder in the switches. The RESET switch should snap in place and you can even solder this component without flipping the board over. Soldering the 2 position switch should be like the headers; solder one pin, press to align, and reheat the joint.

8. Install the micro-USB port. Place this gently on the footprint and fill one of the four (4) ground contacts with solder. You will now be able to flip the board around and finish the soldering of this component. Keep in mind that the data pins will barely poke through the circuit board when aligned properly. Finish soldering the three (3) ground contacts.

Install the chips!
Slightly bend the package pins of the ICs inward to perpendicular with the surface of the package. I do this by taking the chip on its side and gently pressing it against a table or book. Be sure the index notch is facing **USER LEFT** when the chip is installed into its socket. Be sure no pins are being bent or twisted, go slow!

Plug in the board. The onboard micronucleus firmware should start the bootloader, and after 8 seconds the pin 0 LED should blink!

Let's head over to the Git to set up your **drivers** and IDE!

https://github.com/ProgrammingCube/OneDollarBoard

Powering the ESP-01 Wifi Board

The slide switch on the board next to the ESP module controls where the power comes from. Because the wifi module is powered by 3.3 volts instead of the USB 5 volts, you can slide the switch to the **RIGHT**, to the **INT** position. This uses the on-board voltage regulator to power the board.
If you have the switch slid to the **LEFT**, to the **EXT** position, power will be taken in by the **EXT pin** on the header. You will need to supply your own power into the board. This is handy if you are taxing your USB power supply.

RESET Circuit

The RESET circuit is extremely simple on this board. The RESET push button switch simply pulls PB0 of the ATtiny85 down to GND. There is no debounce nor a pulldown/pullup. If you search other schematics, like the Digispark board, there is a pullup to power on the reset line. I have found that a board this simple does not need a pullup.
When pressed, the Micronucleus bootloader will enter the bootloader for 8 seconds. In this state, it can respond to data on the USB connected lines. This is when you need to upload your code. By using the launcher.exe provided by the Arduino board library, you will be prompted to plug in your board during upload. It is at this time you should press the RESET button, as it is much simpler than unplugging/replugging your board.
The RESET pin is not connected to any other chip on this board.

ISP (In System Programming)

If you need to reflash the Micronucleus bootloader or desire to use an ISP, you can use an Arduino as an ISP!

Disconnect the USB from the ATtiny85 board. You will now power this board from an Arduino Uno or equivalent. Please connect the pins like so:

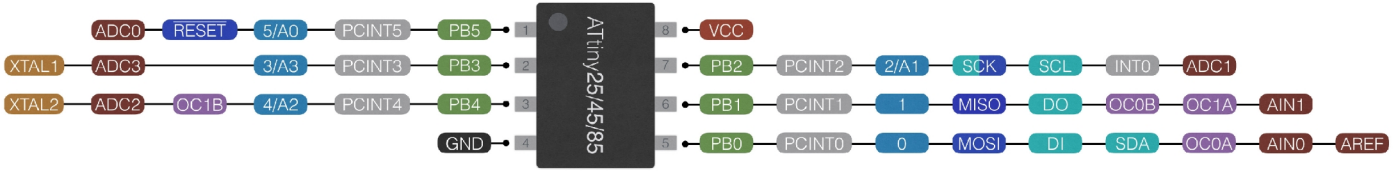
```
Arduino--> ATtiny85

5V            Vcc

GND           GND

Pin 13        PB2

Pin 12        PB1

Pin 11        PB0

Pin 10        PB5/Reset
```

From here, use the Arduino IDE to flash the ArduinoISP sketch to your Arduino. From here, connect an **electrolytic capacitor (10-22uF) between GND and RESET**. This prevents the ArduinoISP device from resetting before it can write code to your ATtiny95 board.
From here, choose the Digistump 16.5mhz default board option as the target, and instead of uploading code via the normal Upload button, you need to choose **Ctrl-Shift-U** or **Sketch >> Upload Using Programmer…** You need to also have the ArduinoISP programmer selected under **Tools >> Programmer**. Make sure your COM port is also selected correctly to your Arduino.

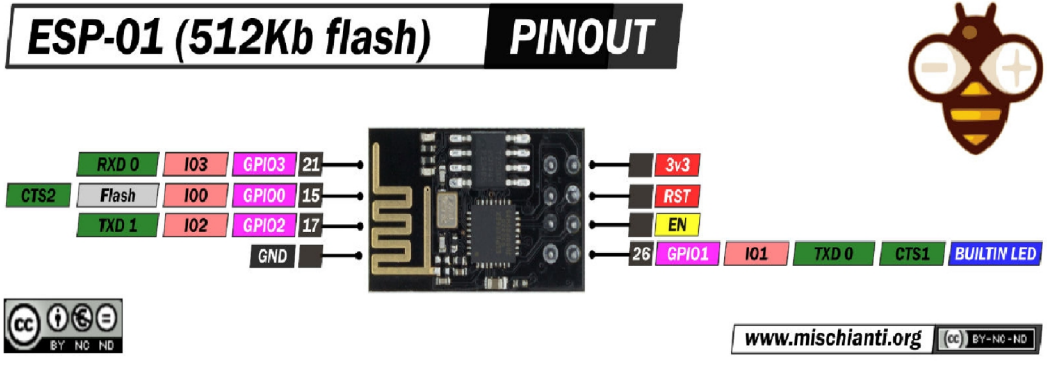
Using an ISP instead of the Micronucleus bootloader will allow you to use the full 8192 bytes of flash memory, instead of the Micronucleus's ~6.3kb.

POWER
GROUND
PORT PIN
ARDUINO PIN
ANALOG
SERIAL INTERFACE
ISP INTERFACE
TIMER / PWM PIN
INTERRUPT

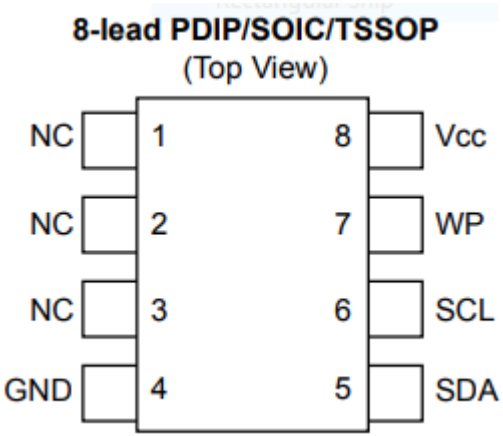
ATtiny25/45/85 pinout



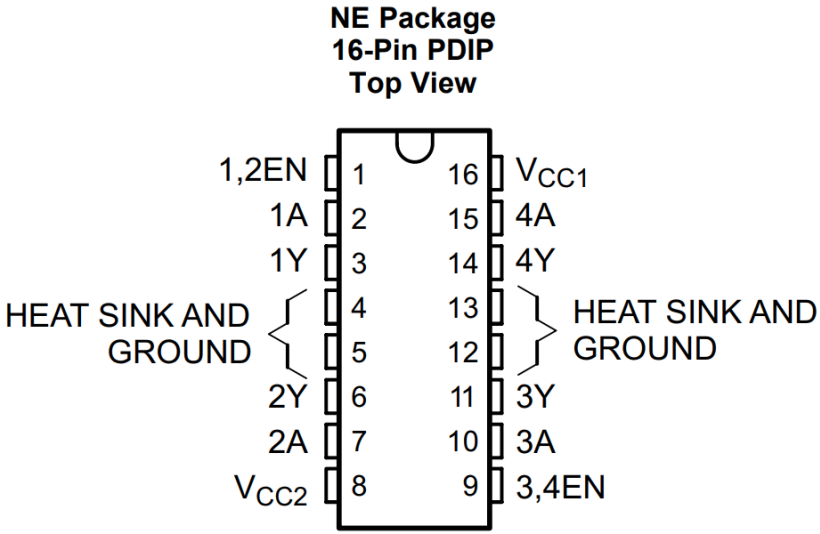
http://github.com/SpenceKonde/ATTinyCore



AT24C16D



L293D



FAQ

-The PWR LED doesn’t turn on!!!

- Check to make sure the **power LED is installed the right way round**. The molded flat plastic should be facing **USER RIGHT**.
- Double-check your USB connector solder joints. This LED is a direct power to ground connection, so if this doesn’t turn on, something simple is wrong.
- If your computer pops a message saying **Overcurrent Detection**, you may have a short in the upper-left quadrant of your board, or a short on the **ATtiny85 IC socket**. Ensure that all solder joints are isolated.

-The PB0 LED doesn’t blink!!!1!

Unfortunately, there can be many causes for this problem.

- Check if the **LEDs are installed the right way round**. The molded flat plastic should be facing **USER RIGHT**.
- Be sure that the **ATtiny85** is installed correctly. Its **index notch** should be facing **USER LEFT**. Also, make sure its pins aren’t bent or sticking out from the socket.
- Double-check your **soldering** of the **ATtiny85 IC socket**. You wouldn’t believe how many times veteran hobbyists forget to solder entire chips!

-When I start using the other chips, nothing works!

- Check to see if there are shorts on the **IC sockets**.
- Check if the **LD117V33 regulator** is installed correctly. Refer to the images.
- Be careful on where you plug power and data cables. By design, this board is EXTREMELY flexible. I have tried to do my best to make the silkscreen clear, but it is still possible to accidentally switch around power and data pins. Refer to the pinout diagrams.

Patrick Jackson
2024