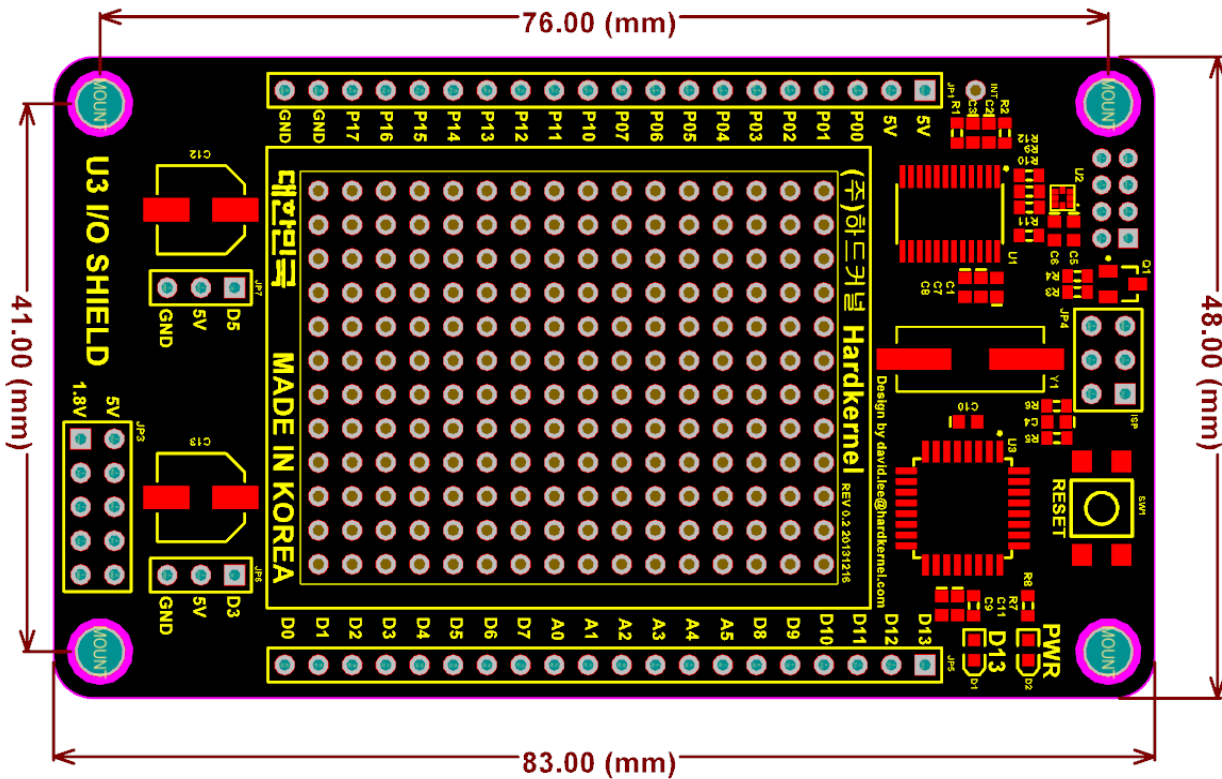
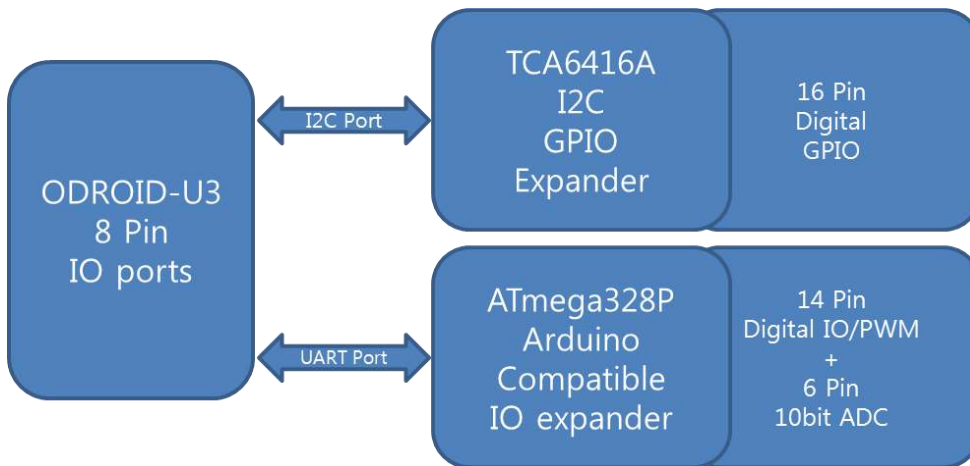


SCHEMATICS : [Download](#)

## BOARD DETAIL



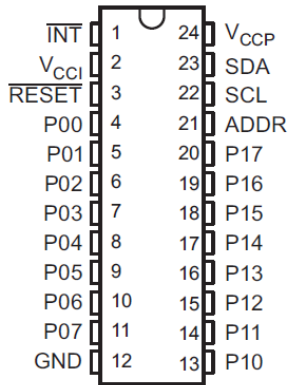
The IO shield has 2 blocks. "I2C IO expansion block" and "Arduino Compatible block"



### Block #1: I2C IO expander: 16 x GPIO

TI's TCA6416A I2C to Parallel Port Expander is used in this block.

The major benefit of this device is its wide VCC range. It can operate from 1.65 V to 5.5 V on the P-port side and on the SDA/SCL side separately. It allows bidirectional voltage-level translation GPIO Expansion between 1.8V SCL/SDA(VCCI) and 5Volt Port(VCCP).



How to access the 16 pins in the command line?

16 Ports are mapped to gpio#289~#304. Here is an example to access a GPIO.

Note that you need to load the driver first with a modprobe command.

```
# modprobe gpio-pca953x
# echo tca6416 0x20 > /sys/devices/platform/i2c-gpio.4/i2c-4/new_device
# echo 289 > /sys/class/gpio/export
# cd /sys/class/gpio/gpio289
/sys/class/gpio/gpio289# echo "in" > /sys/class/gpio/gpio289/direction
/sys/class/gpio/gpio289# cat direction
in
/sys/class/gpio/gpio289# cat value
1
```

You can use any generic C/C++ or Python libraries to access the 16 GPIOs in your program.

### Block #2: Arduino Uno compatible IO

Atmel's ATMEGA328P is used as a slave CPU to expand the IO port.

You can use the Arduino IDE on ODROID-U3 to build & upload your sketches to this Arduino-compatible block, without additional/external cable connections.

Just choose the "/dev/ttyACM99" in the Menu >> Tools >> Serial Port configuration. ATMEGA328P is a slave device on UART bus and ODROID is a master.

Like the Arduino Uno, it has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs which provides 10 bits of resolution.

They operate at 5 volts range.

We tested the Firmata(<http://firmata.org/>) to make an interactive interface between ODROID-U3 and ATmega328P.

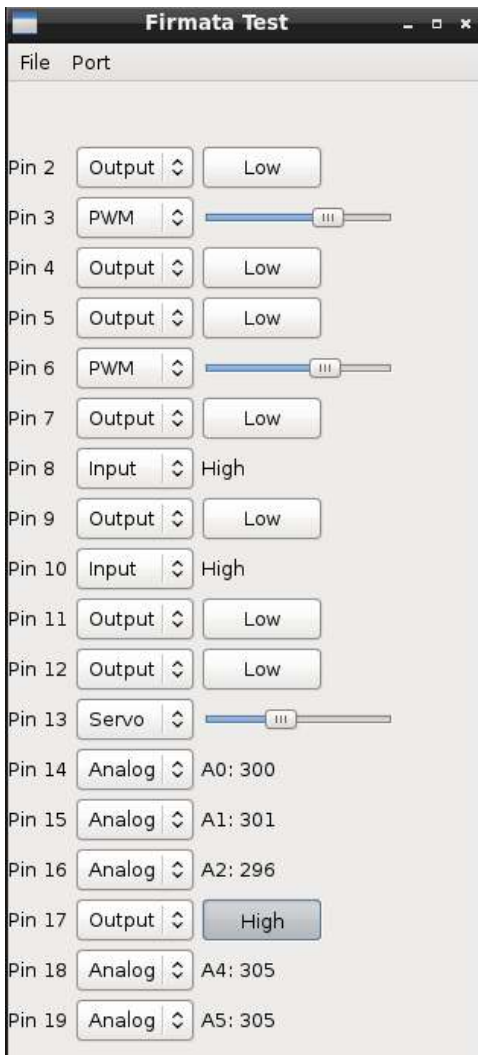
The Firmata is a generic protocol for communicating with microcontrollers from software on a host computer.

Note that the ATmega328P in the IO Shield board is shipped with the Arduino IDE compatible boot loader optiboot-v5.0a and a simple LED blinking example.

If you need to quickly test your hardware, this stand-alone program can access all pins.

Here is the source code of this test suite. [http://www.pjrc.com/teensy/firmata\\_test/firmata\\_test\\_OSL.tgz](http://www.pjrc.com/teensy/firmata_test/firmata_test_OSL.tgz)

Please install the StandardFirmata Ver2.3 firmware first.



C/C++ example code can be found in the ODROID Magazine Issue #2 (February-2014).

<http://magazine.odroid.com/>