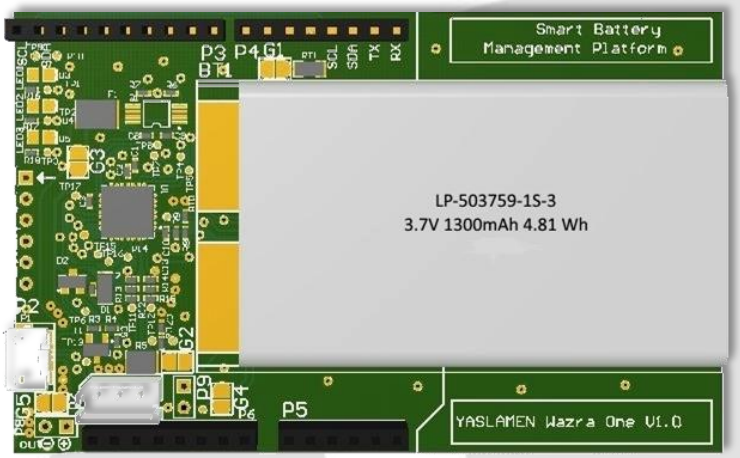
WazraOne Arduino Shield



Main Features

- Specific Battery Management Solution
- Cell Capacity : 1300 mA.h
- Protection, Charging and Monitoring
- 1% Accuracy State of Charge reporting
- Power Supply any Arduino Platform

Applications

- Mobile Applications
- Model Aircraft, Robotics, Drones
- All General Purpose Applications Including Secondary Battery

General Description

The WazraOne Arduino Shield is a Battery Management System programmable by software. Its unique electronic architecture includes all battery management functions such as charging, protection and monitoring. All functions and algorithms are implemented in a MCU.

The WazraOne Arduino Shield directly supplies any Arduino Platforms via Vin pin thanks to shields. The Micro USB VBUS pin is used us power source to charge the battery.

The WazraOne Arduino Shield uses USB and I²C to communicate status information to application. Battery State of Charge (SOC), voltage and charging current are communicated to application in a specific and easy to read data frame.

The WazraOne Arduino Shield is realized in a printed circuit board, sized 85mm x 54mm x 15mm.

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Technical Specifications

Features

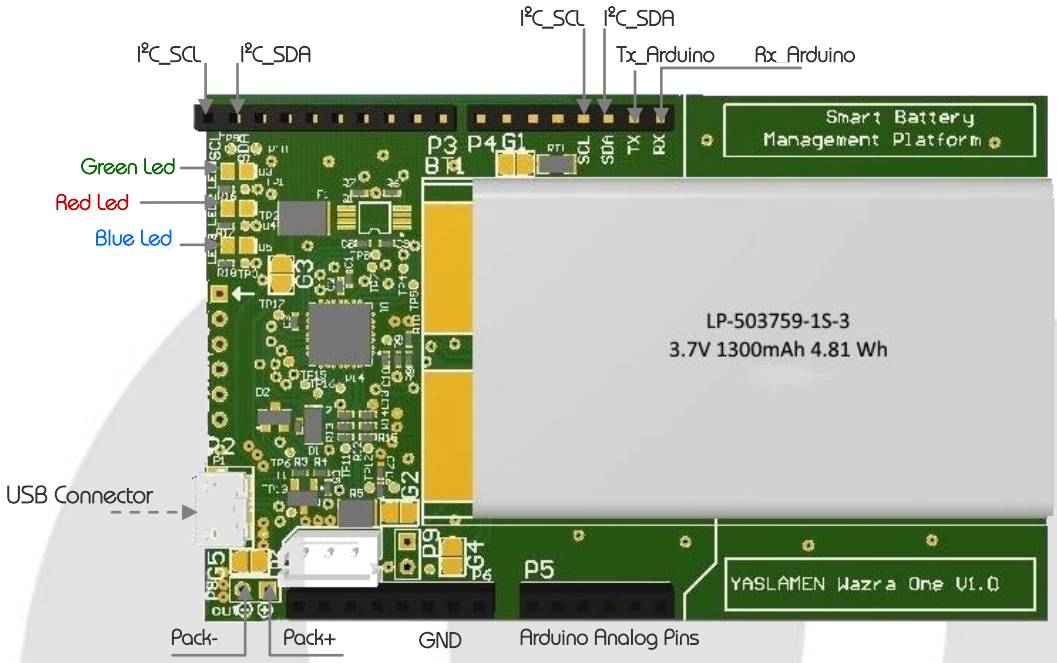
- Software Displayable Parameters
- Lithium-Ion and Lithium-Polymer Cells
- Unique Hardware Solution for LCO, LMO, LFP, NMC, NCA
- Cell Capacity : 1300 mA.h
- Protection
  - Over Voltage , Under Voltage Protection
  - Over Voltage , Under Voltage Release
  - Over Current and Short-Circuit Protection
  - Time-Off and Thermal Protection
  - Reversible Fuse Protection
- Charging
  - CC-CV Charging Method
  - Time-Of End Of Charge (EOC)
  - Current EOC detection down to 1% of Battery Capacity
- Monitoring
  - Enhanced Coulomb Counter Algorithm
  - Self-Discharge Consideration
  - Accurate Measure of SOC
- Power Supply
  - Directly Supplies Any Arduino Platform
  - Micro USB B for Battery Charging
- Communication and Information Reporting
  - USB, I^2C
  - SOC Reporting
  - Battery Voltage and Current Reporting
- LED Charging, Discharging and Monitoring Status

Electrical Specifications

The WazraOne Arduino Shield can be charged via the USB connection. Power can come either from an USB AC-to-DC adapter or a computer's USB.

Electrical Specifications	
USB Power Supply	5 Volts
Nominal Charging Current	500 mA
Battery Total Capacity	1300 mA.h

WazraOne Arduino Shield Board

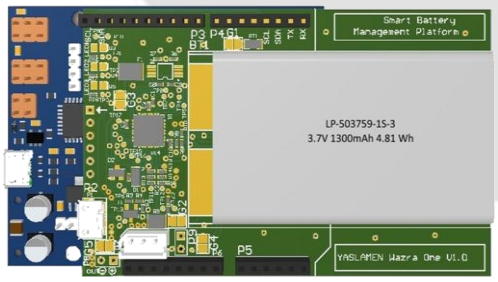


How to Use WazraOne Arduino Shield

Powering Your Application

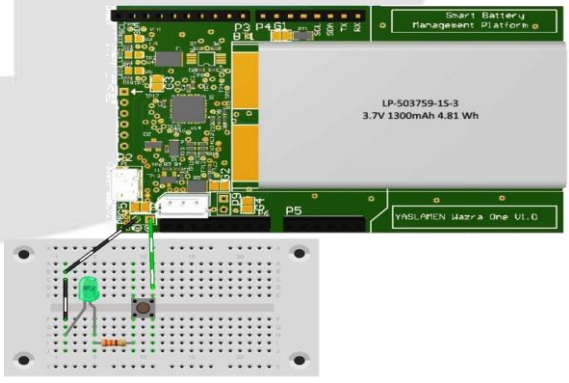
Powering an Arduino Board:

The WazraOne Arduino Shield offers you the ability to power your Arduino without using any wires. Connect the WazraOne Arduino Shield to your Arduino as shown below:



Powering any Application:

You can also power any other application using the Pack+ and Pack- pins as shown below:

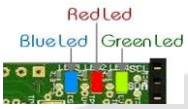


Battery Parameters Communication

The WazraOne Arduino Shield offers a variety of options to follow the battery. It has a number of facilities for communicating with a computer, an Arduino board, or other boards.

Via Led

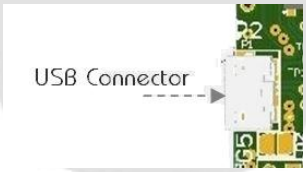
The WazraOne Arduino Shield LEDs indicate the state of the battery. The table below summarizes the main indications.



	Blue Led	Red Led	Green Led
Battery fully charged	OFF	OFF	ON
Battery fully discharged	OFF	ON	OFF
Battery Voltage Under Nominal Voltage	OFF	Blink	OFF
The battery level is 25% multiplied by Blinks number and Application is powered	ON	OFF	Blink

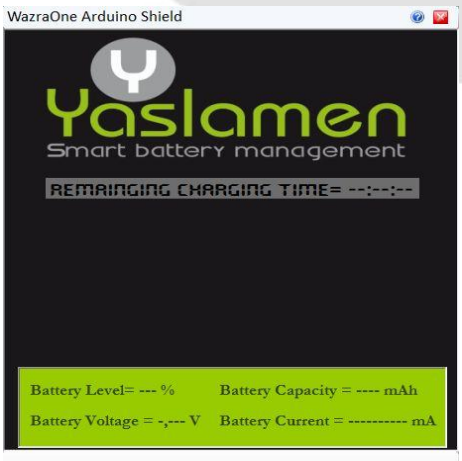
Via USB

The platform can be connected using a MicroUSB to USB cable to any computer includes Windows as operating system. The WazraOne Arduino Shield's software allows the following of the battery electrical parameters which are: the battery voltage, the battery charging current, the battery capacity and the battery level.

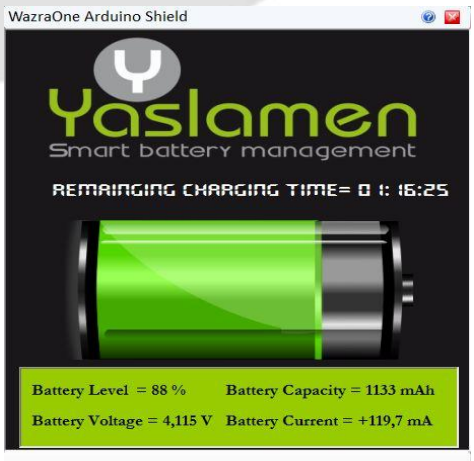


USB Specifications	
USB Version	USB2.0
Debit	48MHz

WazraOne Arduino Shield Software is a Windows program. Check on Yaslamen site for downloading the WazraOne Arduino Shield package.
Once you have downloaded and installed the WazraOne Arduino Shield Software, you can plug the platform to your Computer via USB cable.
When the platform is not connected to the computer the application gets disabled.



The WazraOne Arduino Shield is not connected to the computer



The WazraOne Arduino Shield is connected to the computer

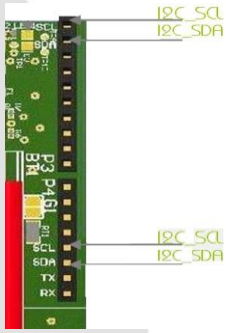
The WazraOne Arduino Shield allows the use of battery parameters in any project using Arduino board or even other boards. This is via an I²C protocol offered by the platform.

Data Frame from slave to master

0	1	2	3	4	5	6	7	8	9
Battery Voltage (mV)				Current Value (mA)				State of Charge	

10	11	12	13	14
(%)	Battery Capacity (mA.h)			

I²C Specifications	
WazraOne Arduino Shield Slave Address	9
Serial Port Clock Frequency	125 KHz
Data Length	15 Bytes



Sample Arduino Code

```
#include <Wire.h>

int  adress_slave = 9 ;
int data_bytes = 15 ;
int i = 0 ;
char tab[] = {'0','0','0','0','0','0','0','0','0','0','0','0','0','0','0'} ;

void setup()
{
  Wire.begin();      // join i2c bus
  Wire.setClock(125000);  // set i2c clock to 125 KHz
  Serial.begin(9600);  // start serial for output
}

void loop()
{
  Serial.print("Battery Parameters" );
  Serial.print(":\n");

Wire.requestFrom(adress_slave, data_bytes);    // request 15
bytes from slave device #9
while (Wire.available() == 0) ;
for(int i=0;i<14;i++)
{
  char c = Wire.read();
  tab[i]=c;
}
Serial.print('\n'); Serial.print("Vbat=");
Serial.print(tab[0]); Serial.print(tab[1]);
Serial.print(tab[2]); Serial.print(tab[3]);
Serial.print("mV"); Serial.print('\n');

Serial.print ("Ibat="); Serial.print(tab[4]);
Serial.print(tab[5]);   Serial.print(tab[6]);
Serial.print(tab[7]);    Serial.print("mA") ;

Serial.print('\n');

Serial.print ("SOC="); Serial.print(tab[8]);
Serial.print(tab[9]); Serial.print(tab[10]);
Serial.print ("%");  Serial.print('\n');

Serial.print ("Battery Capacity=");
Serial.print(tab[11]);  Serial.print(tab[12]);
Serial.print(tab[13]);  Serial.print(tab[14]);
Serial.print ("mAh") ;  Serial.print('\n');

delay(2000);
}
```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