DESCRIPTION

The Saleng – Uno microcontroller board is an Arduino-compatible board based on the 8-bit ATmega328P microcontroller. The microcontroller has a RISC architecture and runs at the maximum clock speed of 16MHz. It has 32KB of flash memory for code space and 2KB SRAM with an additional 1KB of general purpose EEPROM. There are a total of 20 GPIO's on board with an additional 2 analog inputs, all broken out into standard 2.54mm-pitched pin headers.

Its design is nearly identical to the Arduino Uno R3 but with several enhancements. It is compatible with the Arduino Software / IDE and should work with almost any application, hardware or program/sketch meant for the Arduino Uno. This means all the standard features of the Arduino Uno are implemented on the Saleng Uno, only that the Saleng Uno offers more features.

The Saleng Uno board is part of Layad Circuits' Saleng series of innovation-starter products.

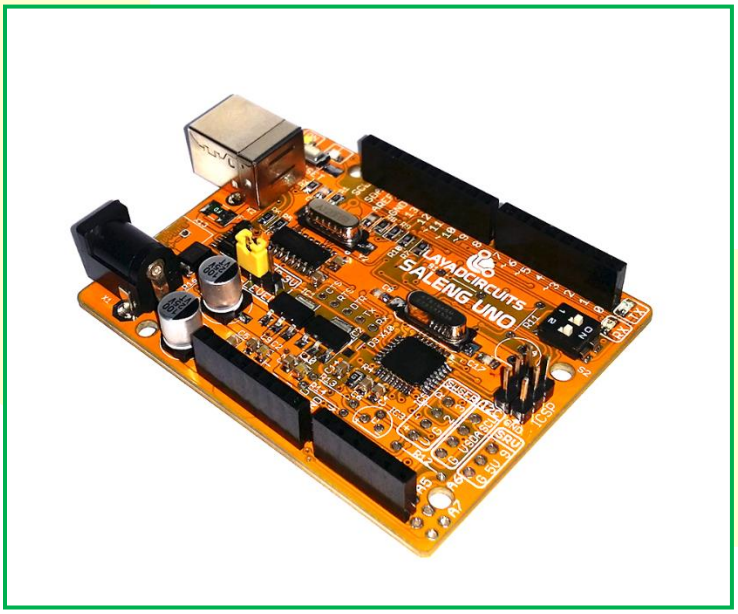

Figure 1: The Saleng Uno

SPECIFICATIONS

- Microcontroller : ATmega328
- Operating Voltage: 5V or 3.3V (Jumper Selectable)
- Input Voltage (recommended): 7-9V
- Input Voltage: 6-12V
- Digital I/O Pins 14 (of which 6 provide PWM output)
- Analog Input Pins: 6 (A0-A5) + 2(A6,A7)
- DC Current per I/O Pin: 40 mA
- DC Current for 3.3V Pin: 800mA
- Flash Memory 32 KB (ATmega328) of which 0.5 KB is used by bootloader
- SRAM: 2 KB
- EEPROM: 1 KB
- Clock Speed: 16 MHz
- Programming Interface: USB
- Board Dimensions: 55 x 70mm

SERIAL PORT DRIVER

The Saleng Uno uses the popular CH340G chip as its USB-UART interface controller. Saleng Uno users will need to do a one-time installation of the driver for the computer to recognize the Saleng Uno as a serial port. To install, follow these steps:

1) Download the driver installation files from the following links:
   Windows Users: http://www.wch.cn/downfile/5
   Mac OS Users: http://www.wch.cn/downfile/178
2) Uncompress the downloaded file
3) Go to the CH341SER folder
4) Run setup.exe
5) On the window that pops up, click on the Install button
6) Wait until installation is complete. Note that if you previously installed the driver, the installation may

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report a "failed" installation. If there is a need to reinstall, please uninstall first then reinstall.

7) Reboot the computer

8) After reboot, insert the Saleng Uno into one of the USB ports of the computer. The computer should now recognize the board.

SOFTWARE DEVELOPMENT

As the Saleng Uno conforms to all the requirements of the Arduino IDE and Arduino Web Editor. It is thus programmed in the same way as any other Arduino board. Download and then install the official Arduino IDE release from:

https://www.arduino.cc/en/Main/Software

PROGRAMMING LANGUAGE

Arduino programs or "Sketches" are written in C/C++ programming language with some modifications made specifically for the Arduino hardware. The official Arduino website provides a set of guides and references you may want to start with:

Guide to the Arduino IDE:
https://www.arduino.cc/en/Guide/Environment

Arduino "Language" quick reference:

https://www.arduino.cc/reference/en/

A beginners reference "notebook"

https://playground.arduino.cc/uploads/Main/arduino_notebook_v1-1.pdf

SALENG UNO ENHANCEMENTS

While the Saleng Uno has exactly the same microcontroller as the Arduino Uno, there are significant enhancements made on the Saleng Uno:

1. **3.3V pin can output up to about 800mA** compared to the 50mA of the Arduino. This provides added current allowing certain 3.3V circuits requiring more than 50mA (such as the ESP8266) to be directly powered off the Saleng Uno without additional regulators.
2. **Operating Voltage may be switched between 3.3V and 5V**. It may be practical in some cases when there are several 3.3V devices involved to simply use a 3.3V MCU. This can be done in the Saleng Uno by switching the V-LEVEL jumper to 3.3V side. This provides 3.3V in all digital and analog pins and the 5V pin of the Saleng Uno effectively outputs 5V. Switch V-LEVEL jumper to 5V to return to the default 5V operation.
3. **Additional headers & Breadboard friendly**. Each of the 4 pin headers at the sides of the board have parallel pads for extra connections. You may install male or female headers, at the top or bottom side. The additional headers pads on the Saleng Uno from pins 0 to 13 to SCL are equally spaced at one pin distance (2.56mm) avoiding problems caused by the half-pin-space between pin 7 and 8 of the main headers. This results in a breadboard friendly board and easier connection to matrix PCB's or custom shields.
4. **Available Terminal Block slot as Power Connector**. Aside from the standard DC jack already installed on the board, the user may install a 5mm terminal block or pin headers on the slot labeled X13 to facilitate connection by simple wire without need for a DC barrel plug. This port is in parallel with the DC jack.
5. **One extra 5V pin at the power header**. An additional 5V pin is provided beside the 3.3V pin. There are also other extra 5V pads. Install female or male 2.54mm headers and you may get additional 5V and GND pins.
6. **Clock source uses a crystal**. Instead of ceramic resonator, the Saleng Uno board uses the

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higher accuracy crystal oscillators for the best timing performance.

7. **Uses a 5A Schottky Diode instead of 1A**. The Schottky diode between the DC Jack and VIN pin is normally rated at 1A in other board, the Saleng Uno uses 5A! The extra tolerance means it is useful when using the VIN pin to power other devices such as shields and other external circuits, even a 2A GSM shield/module will not be a problem if its power is taken from the VIN pin.
8. **USB interface uses the widely used CH340G** as a dedicated USB-to-Serial converter chip. After Extensive evaluation of this chip, we found no significant performance difference against other more expensive solutions. This helped to keep the price of the Saleng Uno to a minimum.
9. **Pins 0 and 1 may be temporarily disconnected** from the ATmega328P using the onboard switch. This is useful to prevent upload problems/conflicts when some circuit or device is connected to pin 0 and/or 1. Simply switch it off before uploading code and then turn it back on after uploading.
10. **LED's have been moved to the board edges for better visibility.** In cases where a shield or other hardware obstructs view of the center of the board, the LEDs will still be visible from the side as they have been moved to the board boundaries.
11. **The bottom side of the headers are labeled**. Unlike regular boards, the Saleng Uno has its pins properly labeled on both top and bottom allowing visibility even when a shield is installed.
12. **Slot for Temperature IC.** A regular TO-92 temperature IC such as the LM35/LM36 or DS18B20 may be installed in the slot labeled IC3. The datapin connects to A0 of the Saleng Uno. If a pullup resistor is required such as in the case of the DS18B20, install the resistor at R12 (4.7K for a DS18B20 chip)
13. **Slot for additional builtin LED.** When the builtin LED wired to pin 13 is not enough, a second LED may be installed at the footprint labeled L2. A standard 5mm or 3mm LED may be installed while. Choose a resistor between 330 and 1K ohm and install in R11 to serve as current limiting resistor.
14. **A servo motor port at header SRV.** This header provides a quick connector for a small servo motor such as an SG90 or MG90**.** The signal line connects to pin 9 of the Saleng Uno.
15. **Extra I2C header**. While the Saleng Uno follows the R3 design with extra I2C ports after the AREF pin, it also has an extra header in parallel with the I2C port of the ATmega328P. Use the header labeled I2C to quickly connect I2C devices such as I2C controllers for LCD's, RTC's like DS1307 or DS3231 or perhaps ADXL345.
16. **A Software serial port header compatible with 3.3V serial devices.** The header labeled SWSER allows the user to connect a 3.3V serial device such as HC-05/HM-10, SIM900/SIM800 or ESP8266 be safely interfaced to a software serial port programmed at pins 2 (Rx of Saleng Uno) and 3 (Tx of Saleng Uno).
17. **Slot for a 12mm buzzer.** The saleng UNO can accommodate a 12mm buzzer in the pads labeled B1. This is directly driven by pin 6 of the Saleng Uno. Select a 5V buzzer with peak current that does not exceed 40mA as this slot is directly connected to the microcontroller GPIO and is without a series resistor. Common 5V Active, ~12mm buzzer usually work fine.

Summary of Comparison between Saleng Uno vs Arduino Uno:

- All specifications pertaining to the microcontroller are exactly the same because both use the **same** chip.
- Bootloader is the **same**

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- Software compatibility is the **same**. In fact, when using the Arduino IDE, choose Arduino

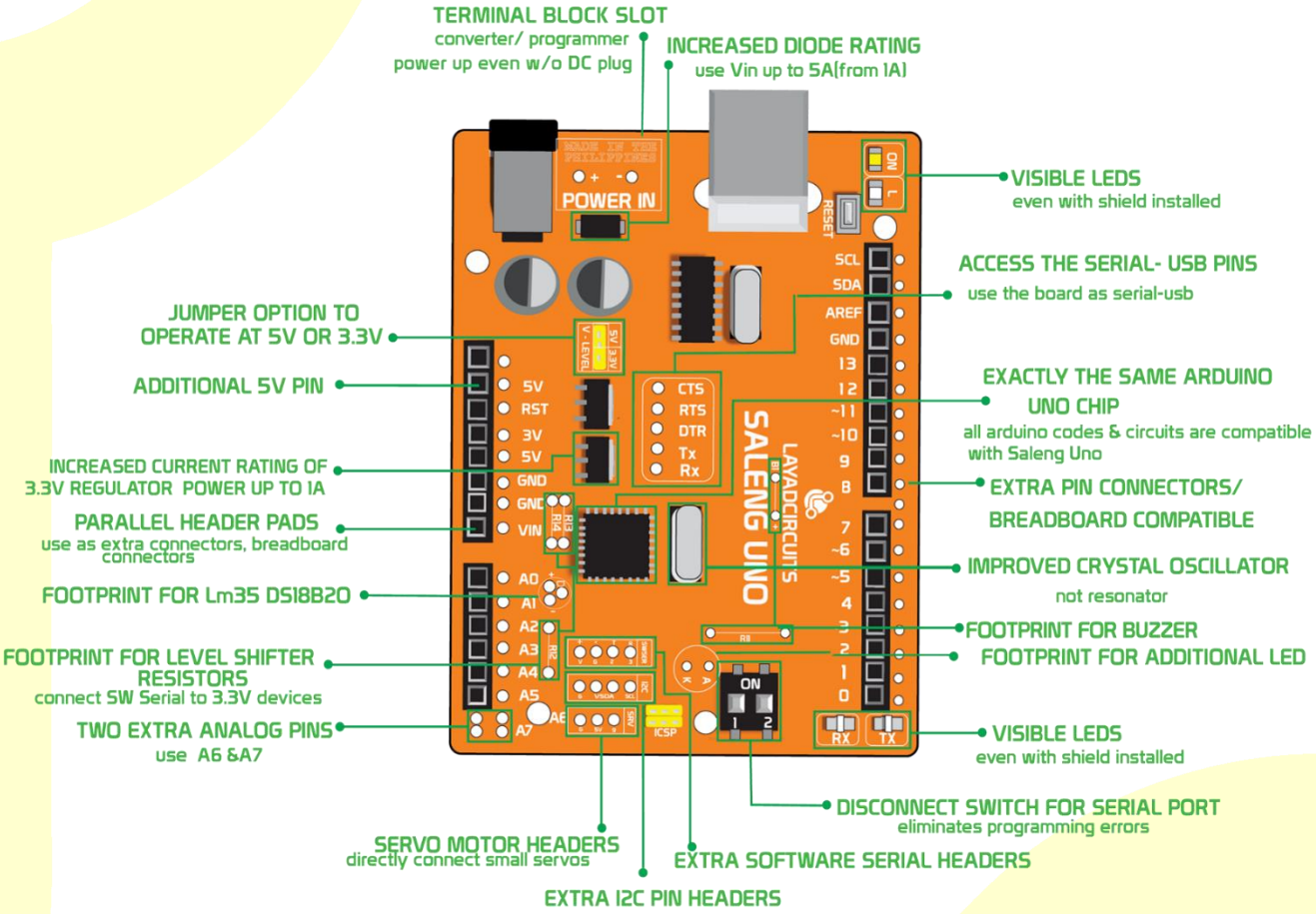

Figure 2: Enhancements to the Saleng Uno

- Uno under Tools>Boards to program the Saleng Uno.
- All power specifications are the same except for the better maximum current that the 3.3V regulator can offer in the Saleng Uno board
- The Saleng Uno introduces several improvements as listed under the Enhancement section of this document.
- The Saleng Uno is locally designed and assembled in the Philippines.

FREQUENTLY ASKED QUESTIONS

Q1: Is the Saleng Uno compatible with the Arduino Uno ?

A1: Yes. It has the same microcontroller, header and ports placements and bootloader. It may be programmed using the Arduino IDE in the same way as in an Arduino Uno.

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Q2: Will projects including hardware and code available in the internet based on the Arduino Uno work with the Saleng Uno?

A2: Yes it will.

Q3: Can I use a shield meant for Arduino Uno in the Saleng Uno?

A3: Yes you may.

A4: Does the difference in USB-serial circuit affect the programming or usage of the microcontroller?

Q4: No. The USB-serial circuit interfaces the microcontroller's UART to the computer. This is done using the CH340 in the Saleng UNO and with another chip in the Arduino Uno. Functionally, both circuits are the same.

A5: Since the Saleng Uno has a larger "current" for the 3.3V pin, will this damage devices that require less current?

Q5: Absolutely not. This feature is an upgrade rather than a downgrade. The 800mA current rating listed in this document is the maximum current rating that the 3.3V pin can deliver. However, this does not mean it will deliver that amount to the circuit connected to it. The actual current will depend on the demands of the circuit connected to the pin. If that circuit requires 350mA (such as in the case of the ESP8266), then only that amount is delivered as and when the circuit demands for it. Hence, the increase in the 3.3V current rating allows for more devices to be connected to the 3.3V pin.

A6: I get errors while trying to upload code on the Saleng Uno when something is connected to pins 0 and 1, what should I do?

Q6: This happens in the Arduino and Saleng Uno since pins 0 and 1 are the UART pins used by the microcontroller to communicate with the PC. Circuits connected to this may have to be disconnected first before uploading code. In the Arduino, you would have to disconnect the external circuit manually. In the Saleng Uno, use the DIP switches provided to temporarily disconnect the headers of pins 0 and 1. Close them back to the ON position after upload.

A7: Does Layad Circuits provide technical support?

Q7: Yes. General technical support is always free. See our technical support terms and conditions for its limitations.

A8: Where can I purchase Saleng Uno and related products?

Q8: You may contact Layad Circuits via info@layadcircuits.com for general queries, sales@layadcircuits.com for actual purchase. You may also contact us by phone at +63916-442-8565 or through our FB page at facebook.com/layadcircuits . Or simply drop by our store front at B314 lopez Bldg "B"., Session rd. corner Assumption rd., Baguio City, Philippines.

Q9: Do you do shipping?

A9: Yes. We can ship anywhere in the Philippines via popular couriers. International buyers are advised to contact Layad Circuits first before placing order as there may be shipping restrictions to your country.

Q10: Why Saleng Uno?

A10: Layad Circuits continues to commit to its goal of providing easy-to-use, quality but affordable products. This has translated in the Saleng Uno. The wide popularity of the Arduino open source hardware and software is inherited by the Saleng Uno yet it has been designed with some innovations and low price without compromising quality and usability. We provide free general technical support and consultations on our Layad Circuits-branded products. Moreover, supporting Layad Circuits products allows Layad Circuits to continue innovating and providing products and services that meet the requirements of the local Philippine market.

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