G15 Shield
SHIELD-G15 Rev2.0
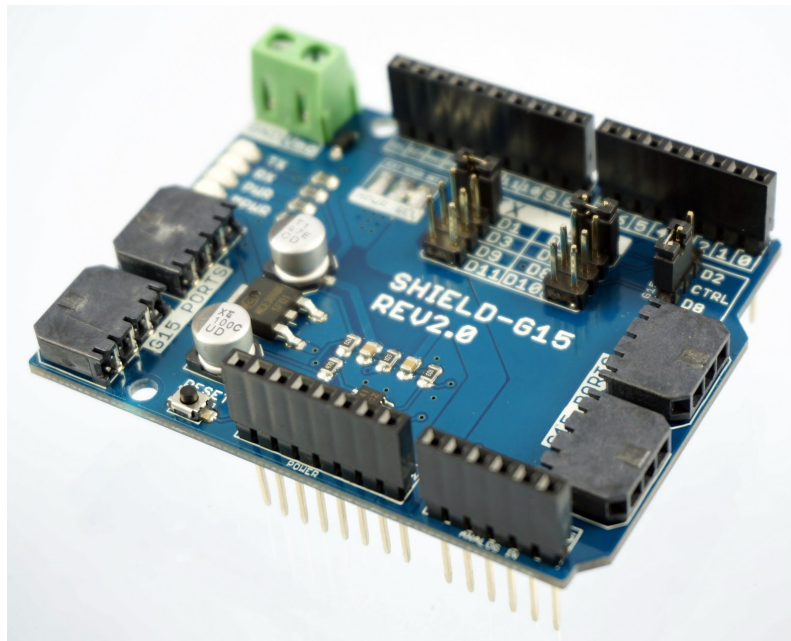
User's Manual

V1.0

April 2015

Index

1.0 INTRODUCTION

G15 Shield is an Arduino shield for controlling Cytron's G15 Cube Servo. It converts UART duplex communication to half-duplex single line communication compatible for G15 Cube Servo. It is compatible with Arduino Uno, Arduino Duemilanove, Arduino Mega2560, Arduino Leonardo and possibly other pin compatible main boards.

G15 Shield Rev2.0 has four ports for Cytron's G15 Cube Servo. The two ports for Robotis' Dynamixel AX-12 servo were removed from G15 Shield. G15 Cube Servo is serial servo which can be daisy chained for more servos. G15 Shield has external motor power port for user to supply separate power for the servos besides using the internal power from the Arduino board. G15 Shield has stackable side headers which allows for more Arduino shields to be stacked on top of it.

G15 Shield R2 comes with:

- Arduino Reset button.
- 4 x G15 Cube Servo ports, two extra on Rev2.0.
- G15 control pin selector (D2 or D8).
- External power port for servo with polarity protection.
- Stackable I/O header pin.
- Selectable Digital pins for UART communication with G15, via mini jumpers.
- 2 LEDs as logic power and servo power indicators.
- TX and RX LED indicators, new on Rev2.0.
- On pad internal and external power selectable.

2.0 PACKING LIST

Please check the parts and components according to the packing lists. If there are any parts missing, please contact us at **sales@cytron.com.my** immediately.
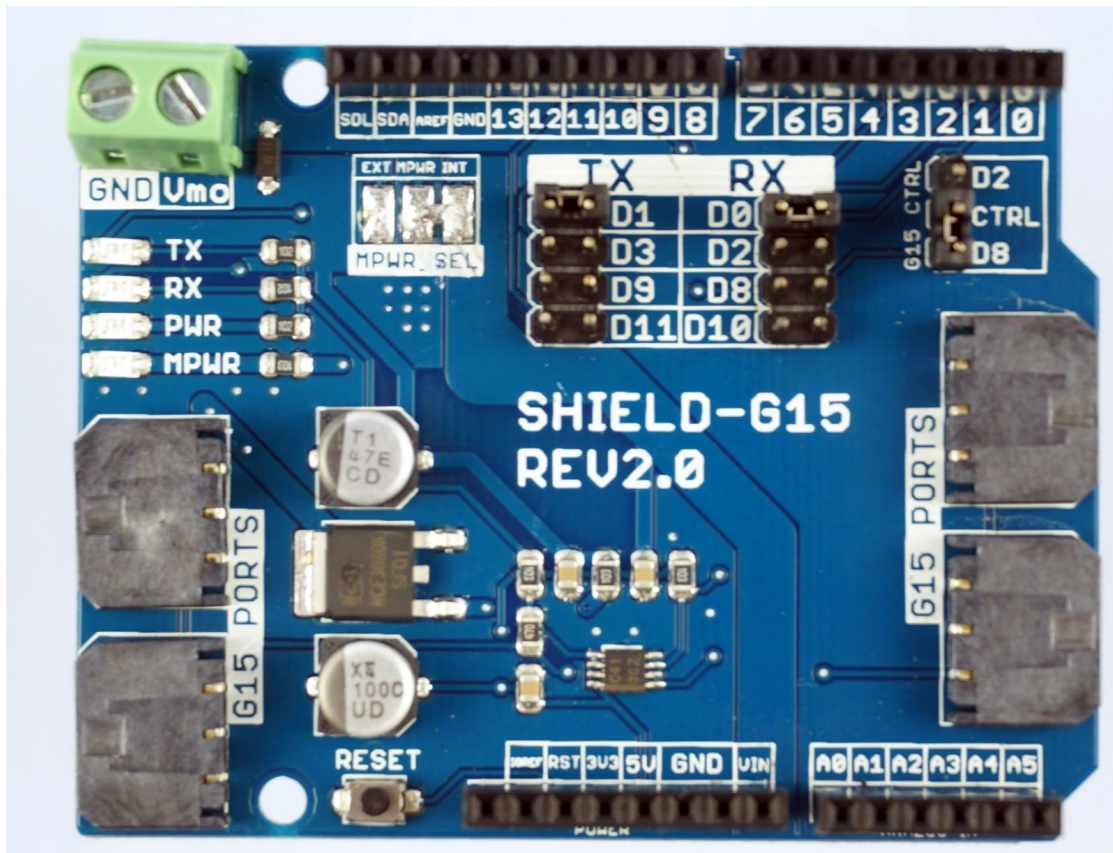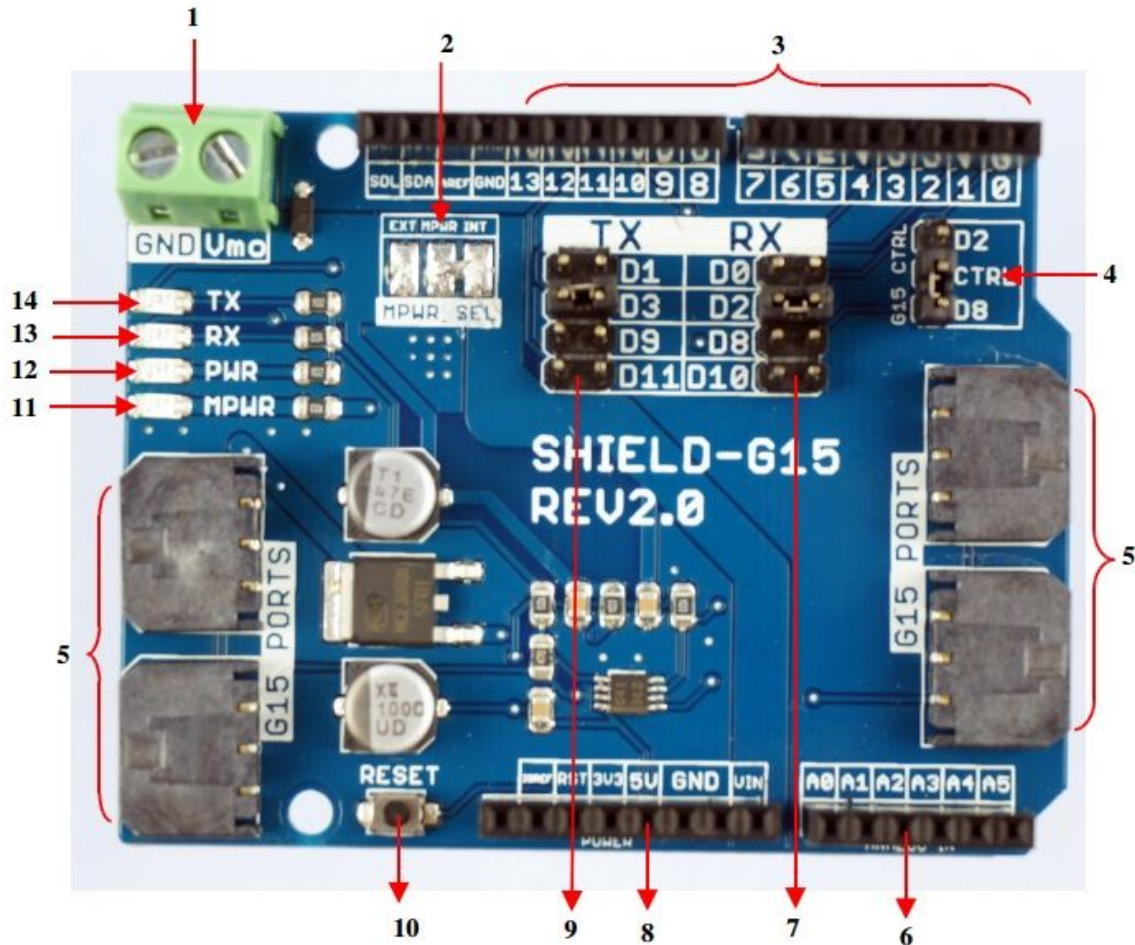

1. 1 x G15 Shield

2. 3 x mini jumper

3.0 PRODUCT SPECIFICATION AND LIMITATIONS

Parameter	Min	Typical	Max	Unit
Logic Voltage		5		V
Servo Motor's Voltage	7	12	15	V
Servo Motor's Current			5	A

4.0 BOARD OR PRODUCT LAYOUT

1. External Motor Power (EXT_MPWR)
JP1 is for external power for the servo motor. User may choose to provide power to the servo through this connector besides using the internal Vin power from Arduino main board.

2. Motor Power Selection
MPWR_SEL is Motor power selection. Default setting for motor power is internal power for easy setup and test. It will take the power (Voltage and Current) from Arduino Vin pin. However, user may desolder internal power connection and solder the MPWR pad to external motor power pad (EXT pad) if user want external power for motor.

3. Stackable Digital I/O header
This header pin is Digital I/O pin stacked to the Arduino main board.

4. G15 Control pin
User may choose D2 or D8 as the control pin of G15's UART communication. The selection is done by changing the mini jumper selector. You will need this pin in the Arduino sketch.

5. G15 Servo port
2 ports for G15 servo motor.

6. Stackable Analog Input pin header
JP8 is stacked to the Arduino main board. Other Arduino shield can be stacked on top of this stackable header.

7. RX Pin Selector
User may select D0, D2, D8 or D10 as the RX pin from Arduino main board with the mini jumper.

8. Stackable Power Input pin header
Power Input pin is stacked to the Arduino main board. Power supply for this board is 5V and Vin. Make sure the Vin voltage to the Arduino main board is within the operating range of the servo motor.

9. TX Pin Selector
User may select D1, D3, D9 or D11 as the TX pin from Arduino main board with the mini jumper.

10. Reset button
Reset button is for convenience of user to reset the Arduino main board.

11. Motor Power LED
Power indicator LED for motor power. The LED will turn on when power for motor is supply either through internal or external power option.

12. Power LED
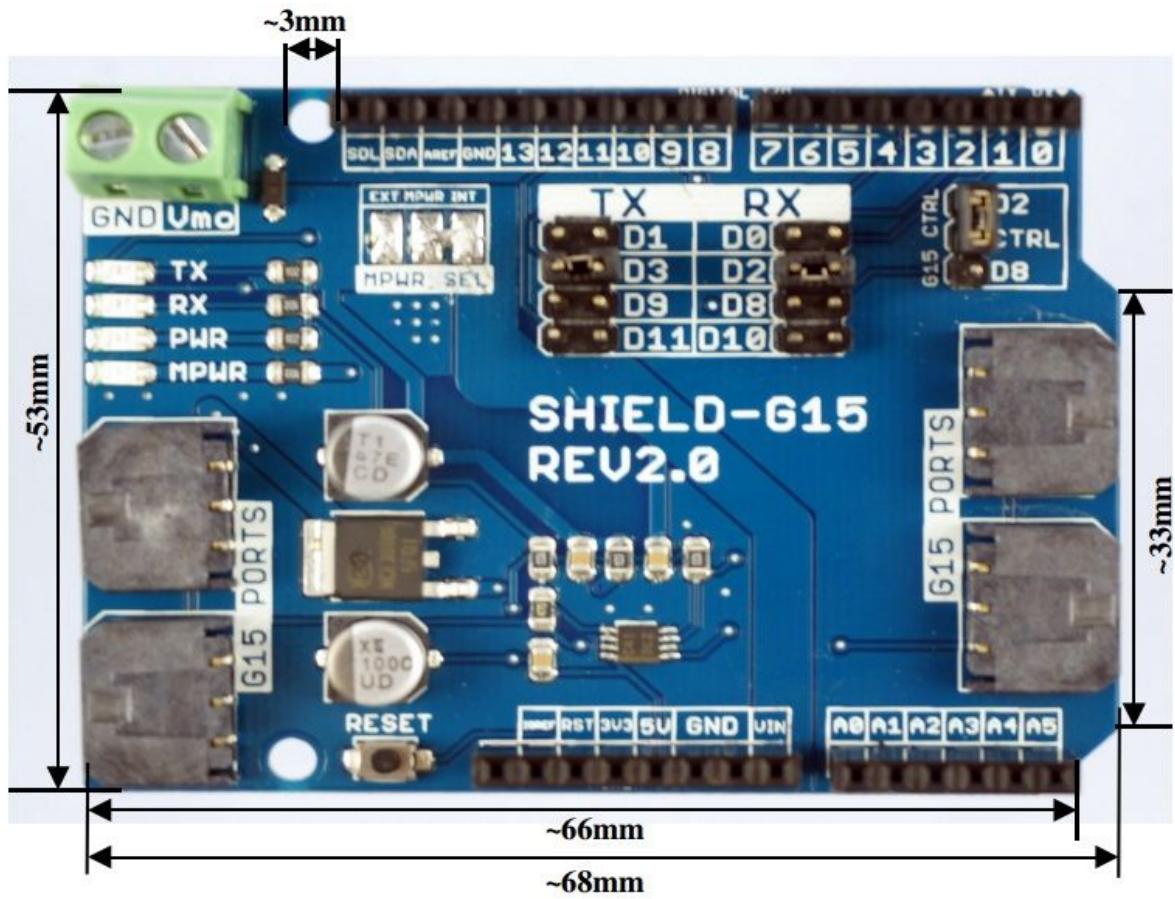Power indicator LED for logic power (5V). The LED will turn on when 5V power is supplied to this board.

13. RX Indicator LED
RX LED as indicator for RX signal.

14. TX Indicator LED
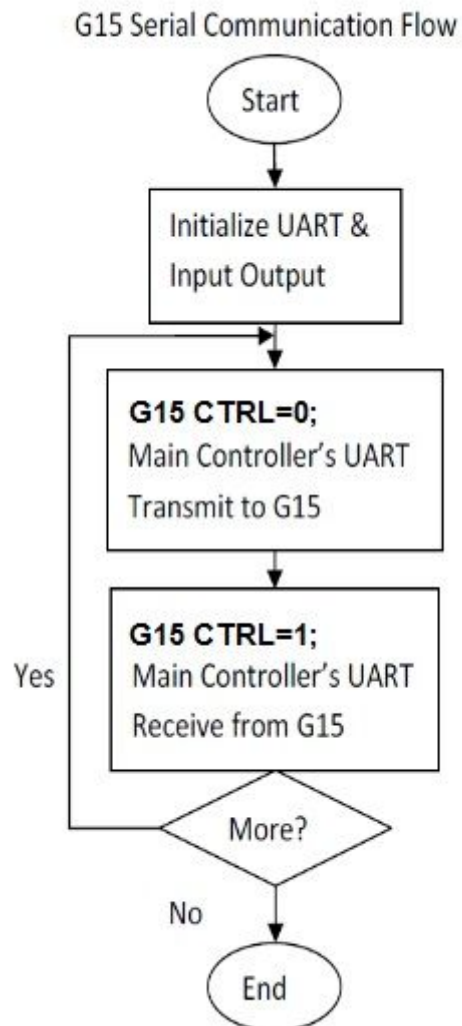TX LED as indicator for TX signal.

5.0 DIMENSION

6.0 HALF DUPLEX SERIAL COMMUNICATION

G15 Cube Servo is using half duplex serial communication. The communication is standard UART with 8 bit data, 1 stop bit and no parity. There is only one data pin for the half duplex communication instead of 2 pins of normal UART communication. Thus, the main controller as the master will need to have one control pin to switch between transmit and receive mode as shown by the figure below. Besides TX and RX pin, main controller will need one digital output pin as the control pin. The implementation is as shown by the logic circuit below. TX and RX bus is merged into one single data bus.

On G15 Shield, there are options to select either pin D2 or D8 as the control pin(G15 CTRL). Choose the pin by moving the mini jumper to the corresponding headers. If the state of control pin is 1 (logic high), it is in receive mode (Arduino receives data from G15). Else if control pin is 0 (logic low), it is in transmit mode (Arduino transmits data to G15).
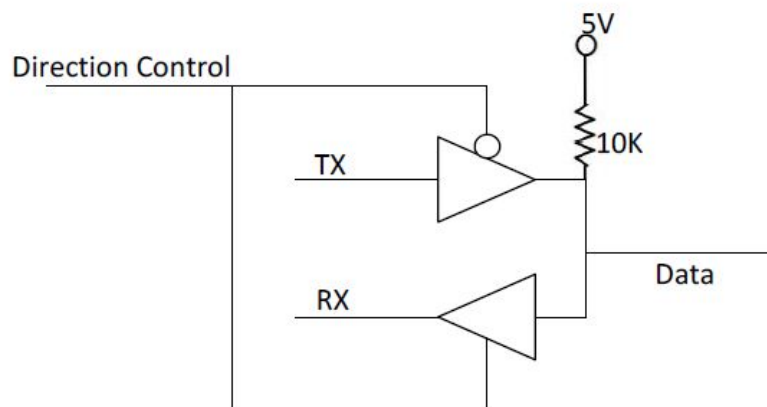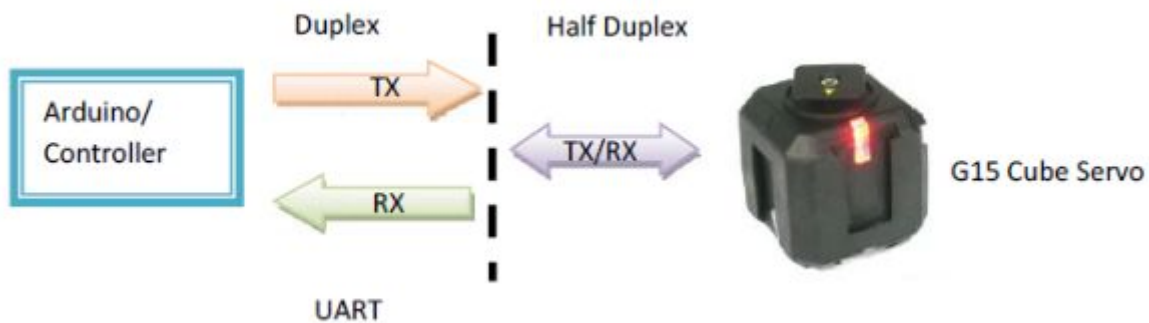
The following flowchart shows the communication flow for G15 Cube Servo. The control pin can be either D2 or D8. For the communication protocol, please refer to G15 Cube Servo User's Manual.

G15 Serial Communication Flow

Start

Initialize UART & Input Output

G15 CTRL=0;
Main Controller's UART Transmit to G15

G15 CTRL=1;
Main Controller's UART Receive from G15

More?

Yes

No

End

7.0 HARDWARE INSTALLATION

This section will show example installation of G15 Shield with Arduino Uno as a main controller to control G15 Cube Servo. Besides Arduino UNO, other Arduino main boards such as Arduino Duemilanove, CT-UNO, Arduino Mega2560 and CIKU are also compatible with this shield.

7.1 Arduino Uno

Arduino is an open-source physical computing platform based on a simple I/O board and a development environment that implements the Processing/Wiring language. G15 Shield can be used together with Arduino Uno to control G15 Cube servo motor. Figure below shows example hardware connection between Arduino Uno and G15 Shield; it is simply stacking up the shield onto the main board.

1. Set TX,RX and CTRL pin for Shield-G15. The selection is done by using mini jumper on board. Please be cautious to initialize the correct Arduino's digital pin according to the selected control pin for the communication. We recommend user to use software serial (D3-TX,D2-RX) instead of hardware serial.
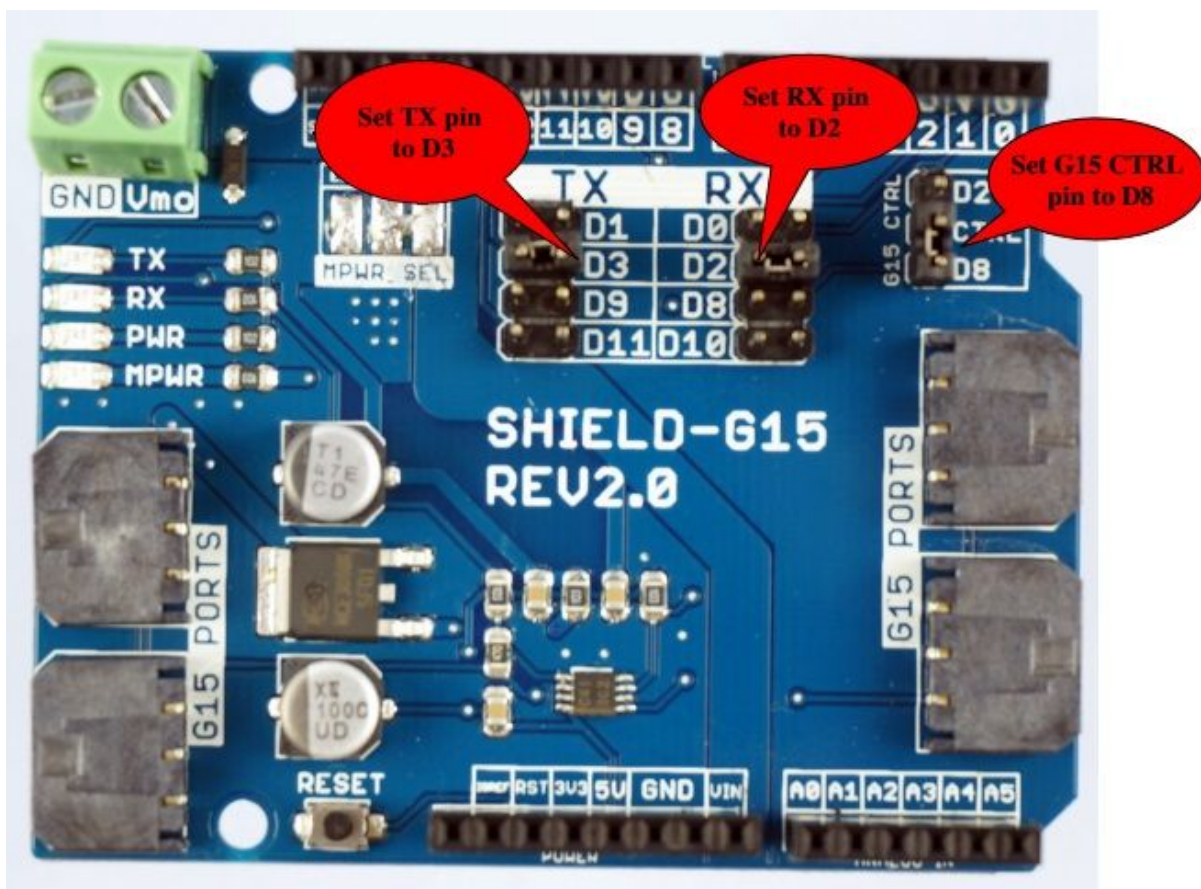
2. Stack G15 Shield on Arduino Uno. Ensure that the pins alignment is correct.
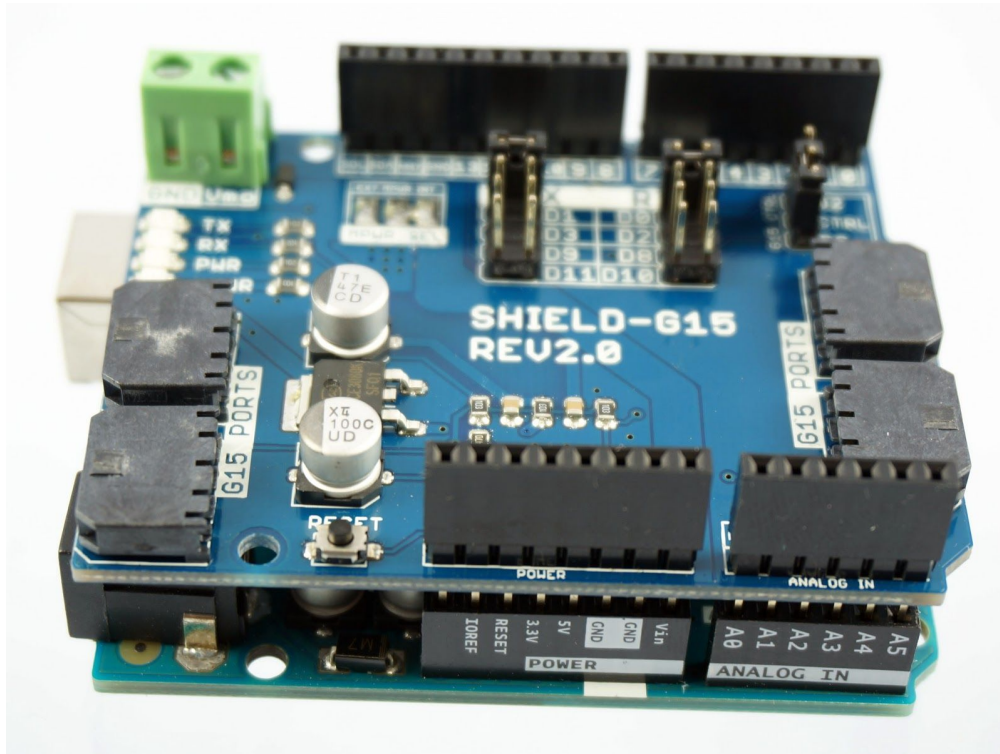
3. Supply power to Arduino main board. The PWR LED will light up in green colour. Connect G15 Cube Servo after loading user firmware to the Arduino main board as shown in the figure below.
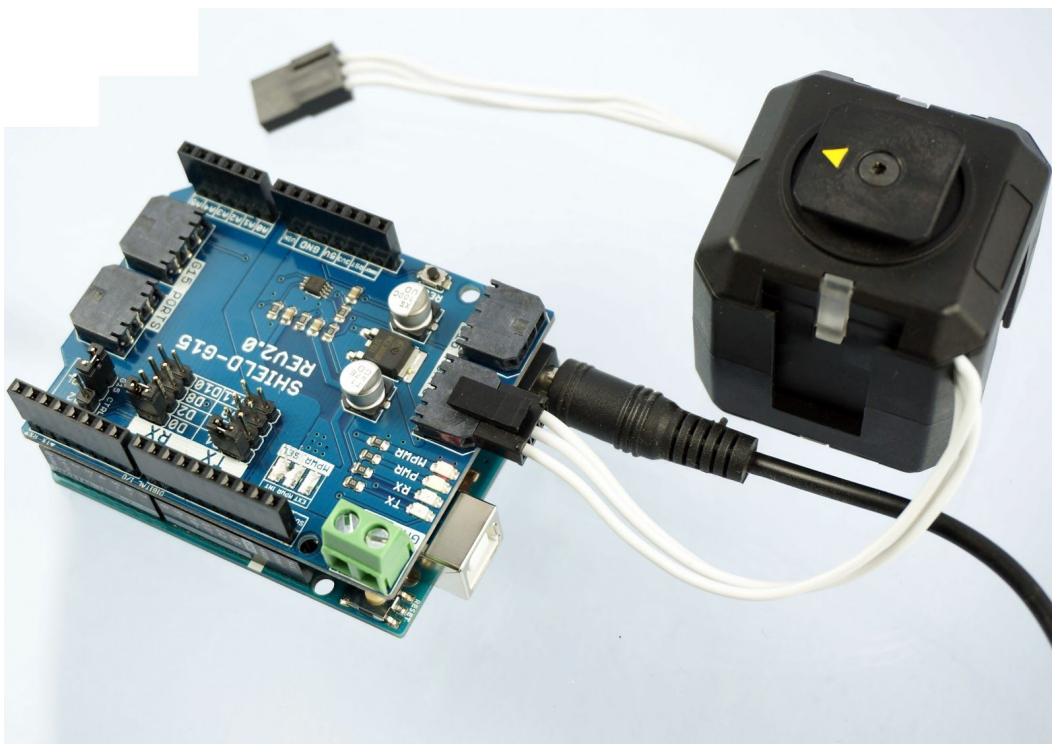
8.0 GETTING STARTED

User may follow this tutorial link to getting started with G15 and Shield-G15. The tutorial is using Shield-G15 Revision1.

http://tutorial.cytron.com.my/2012/11/27/getting-started-withcube-servo-g15/
http://tutorial.cytron.com.my/2014/07/17/testing-your-cube-servo/

9.0 WARRANTY

- Product warranty is valid for 6 months.
- Warranty only applies to manufacturing defect.
- Damaged caused by misuse is not covered under warranty
- Warranty does not cover freight cost for both ways.

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