

2016 Advanced Arduino

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GYEONGGI SCIENCE HIGH SCHOOL

Arduino

Massimo Banzi:

How Arduino is open-sourcing imagination

TEDGlobal 2012 · 15:46 · Filmed Jun 2012

26 subtitle languages ?

[View interactive transcript](#)



Watch later



Favorite



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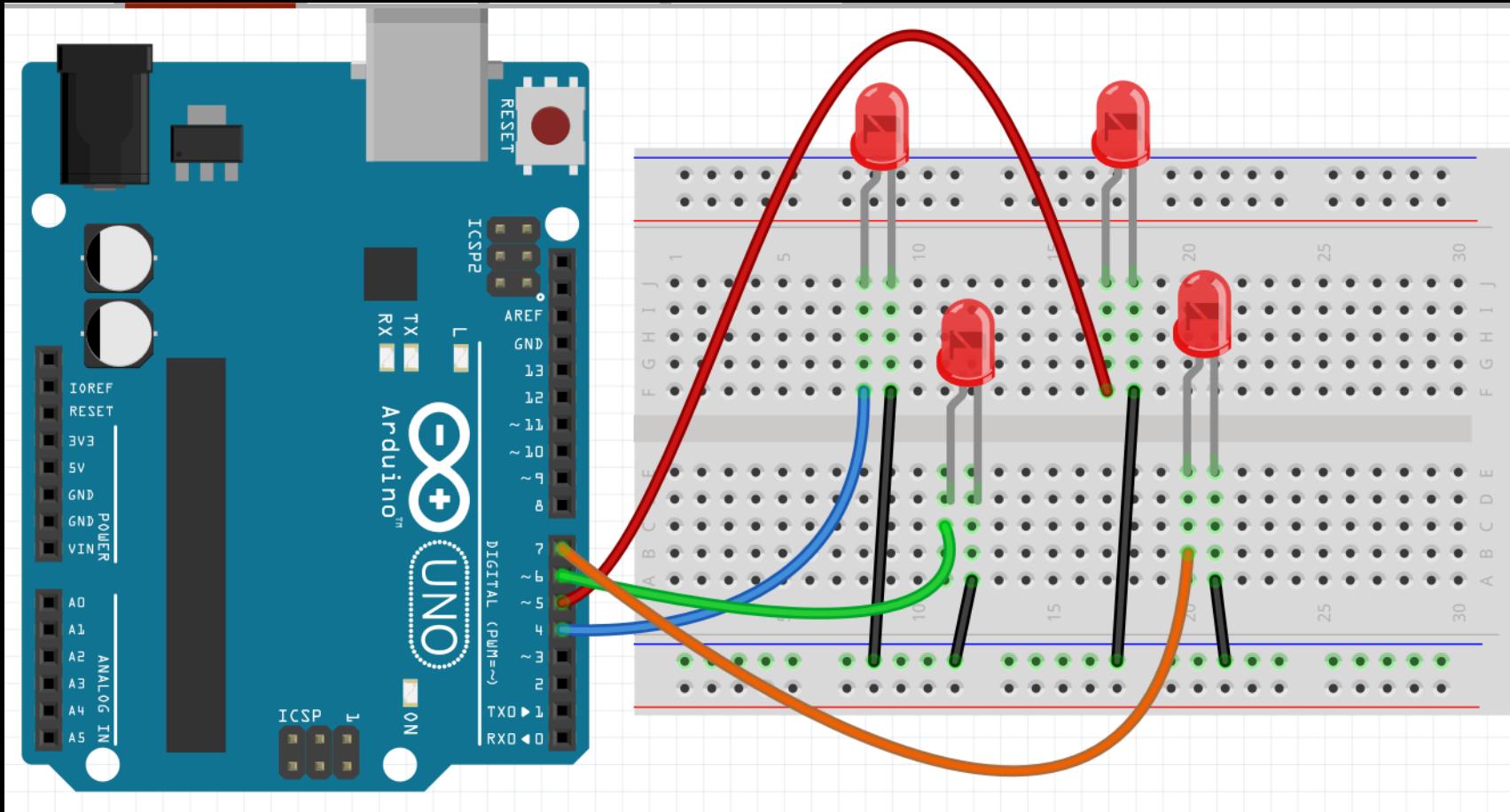
Rate

- http://www.ted.com/talks/massimo_banzi_how_arduino_is_open_sourcing_imagination

Massimo Banzi

- Massimo Banzi helped invent the Arduino, a tiny, easy-to-use open-source microcontroller that's inspired thousands of people around the world to make the coolest things they can imagine — from toys to satellite gear. Because, as he says, "You don't need anyone's permission to make something great."

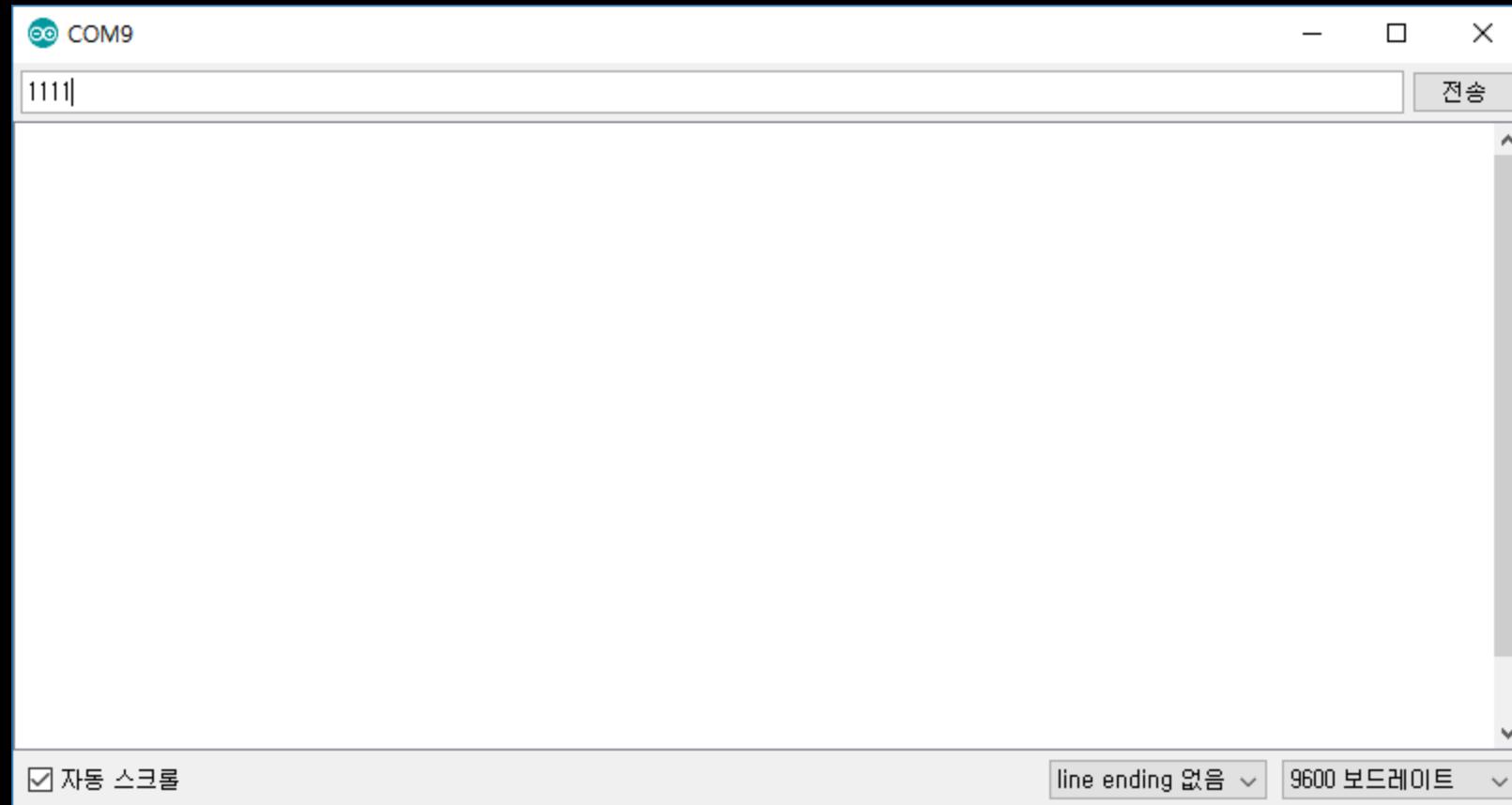
Serial LED Blink - Hard Ware



Serial LED Blink – Software

- https://github.com/suakii/2016AdArduino/blob/master/Chapter1/gs_1_SerialLEDBlink/gs_1_SerialLEDBlink.ino

Serial LED Blink -Serial Monitor



LED Control Using Processing

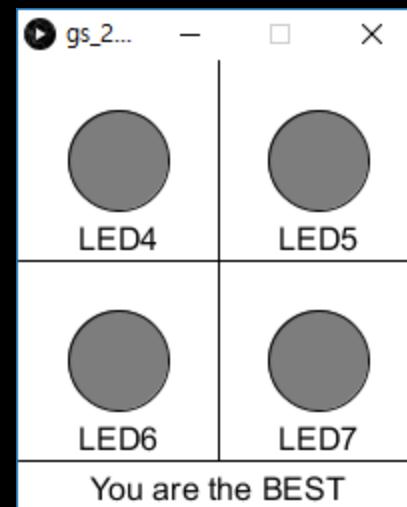
- First upload this code to Arduino
- https://github.com/suakii/2016AdArduino/tree/master/Chapter 1/gs_2_LED_control_arduino

LED Control Using Processing

- Type this code to Processing
- https://github.com/suakii/2016AdArduino/blob/master/Chapter1/gs_2_LED_control_processing/gs_2_LED_control_processing.pde

LED Control Using Processing

- You are the BEST



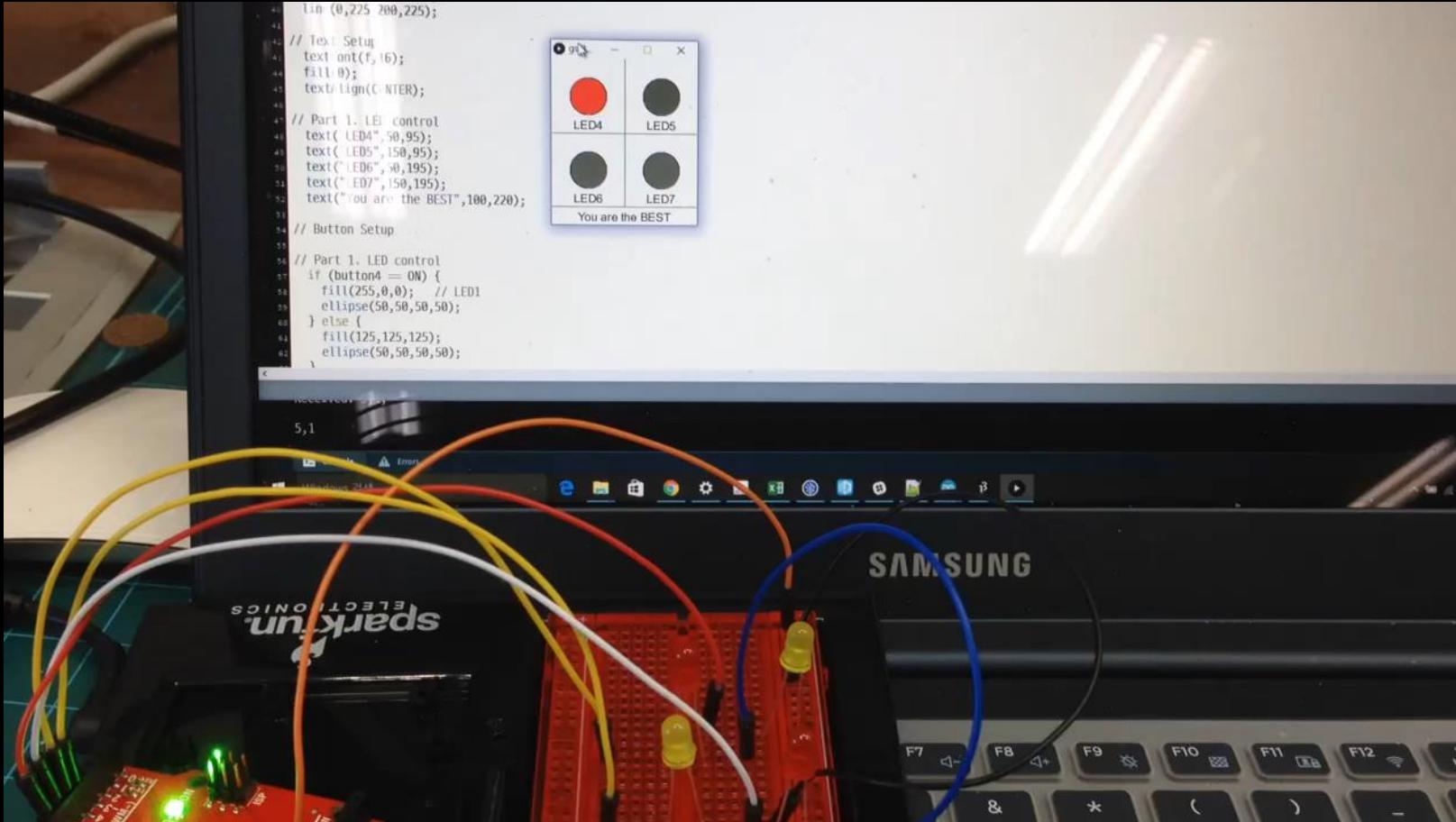
Reverse : Arduino send to Processing

- Arduino Code
- [https://github.com/suakii/2016AdArduino/blob/master/Chapter1/gs_3 LED control arduino/gs_3 LED control arduino.ino](https://github.com/suakii/2016AdArduino/blob/master/Chapter1/gs_3_LED%20control%20arduino/gs_3_LED%20control%20arduino.ino)

Reverse : Arduino send to Processing

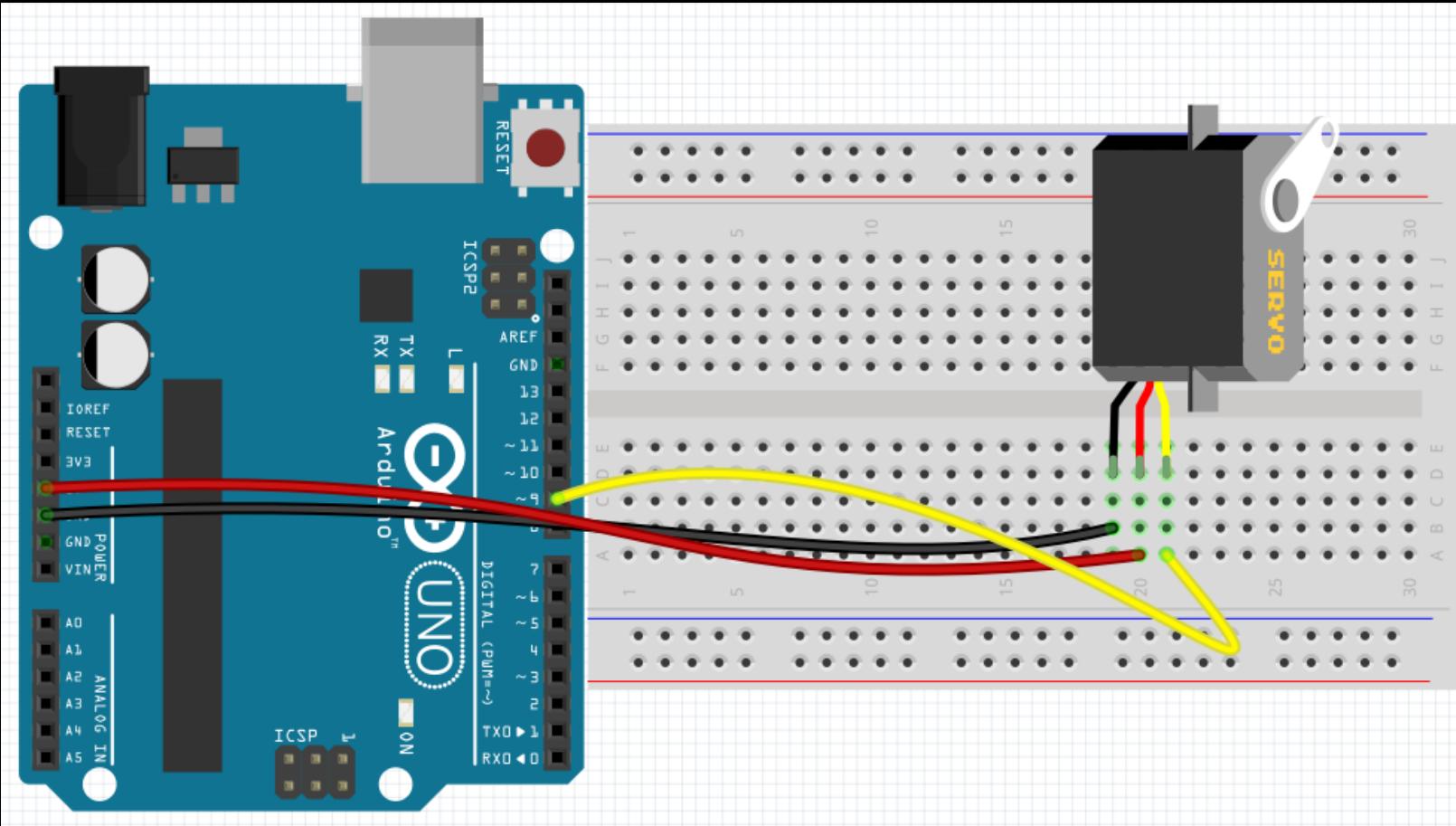
- Processing Code
- https://github.com/suakii/2016AdArduino/blob/master/Chapter1/gs_3_LED_control_processing/gs_3_LED_control_processing.pde

Reverse : Arduino send to Processing



Continue Warming UP

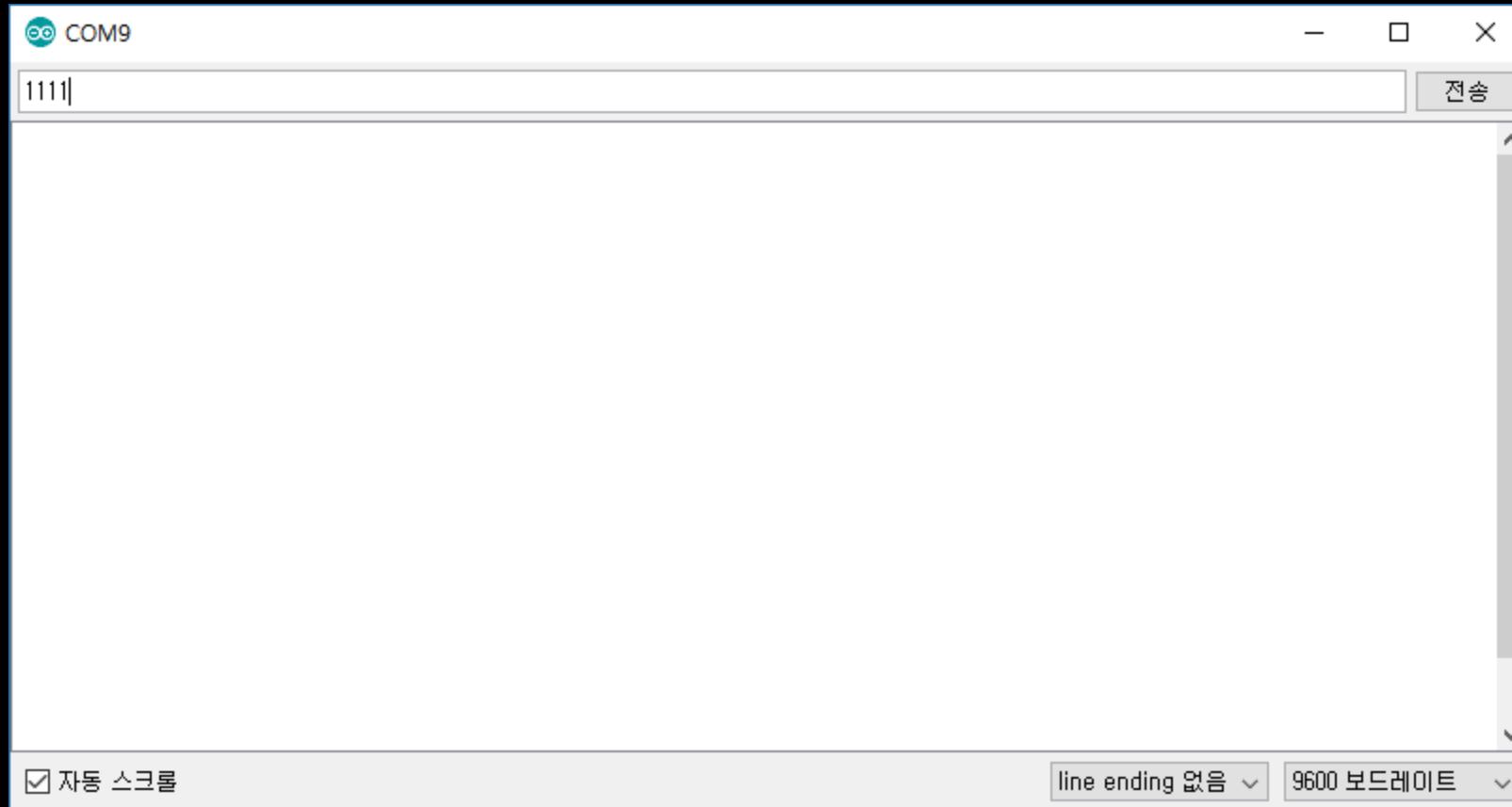
Servo Test - Simple



Servo Serial using Serial Monitor

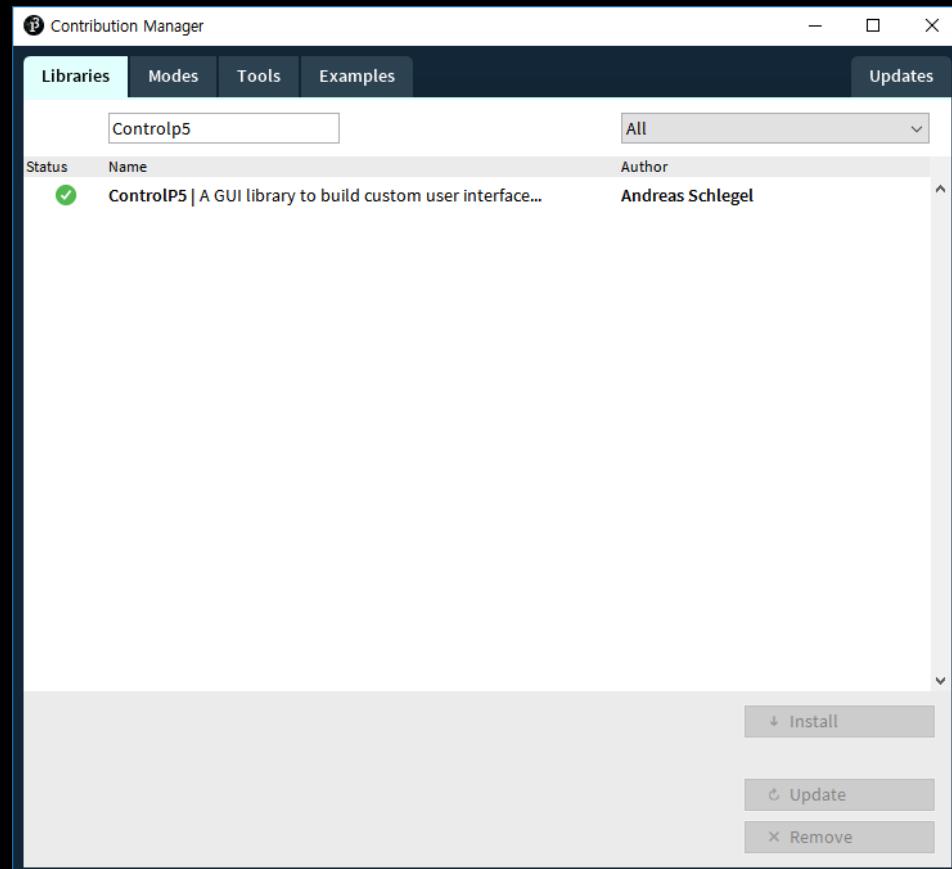
- https://github.com/suakii/2016AdArduino/blob/master/Chapter2/gs_2_ServoSerial_arduino/gs_2_ServoSerial_arduino.ino
- //What is code?

Send Rotate value to Arduino



ServoSerial Processing

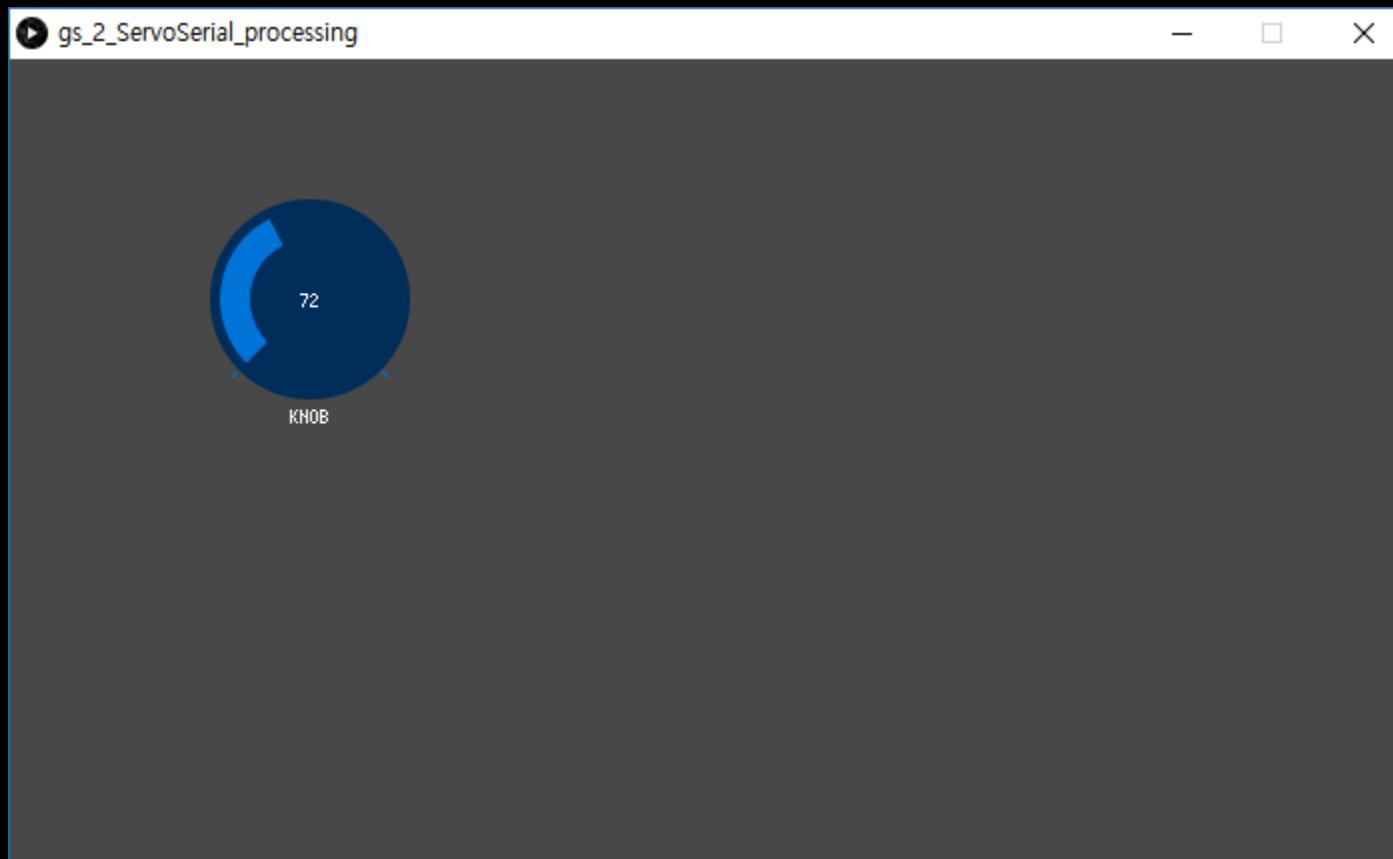
- First Install ControlP5 for UI at Processing



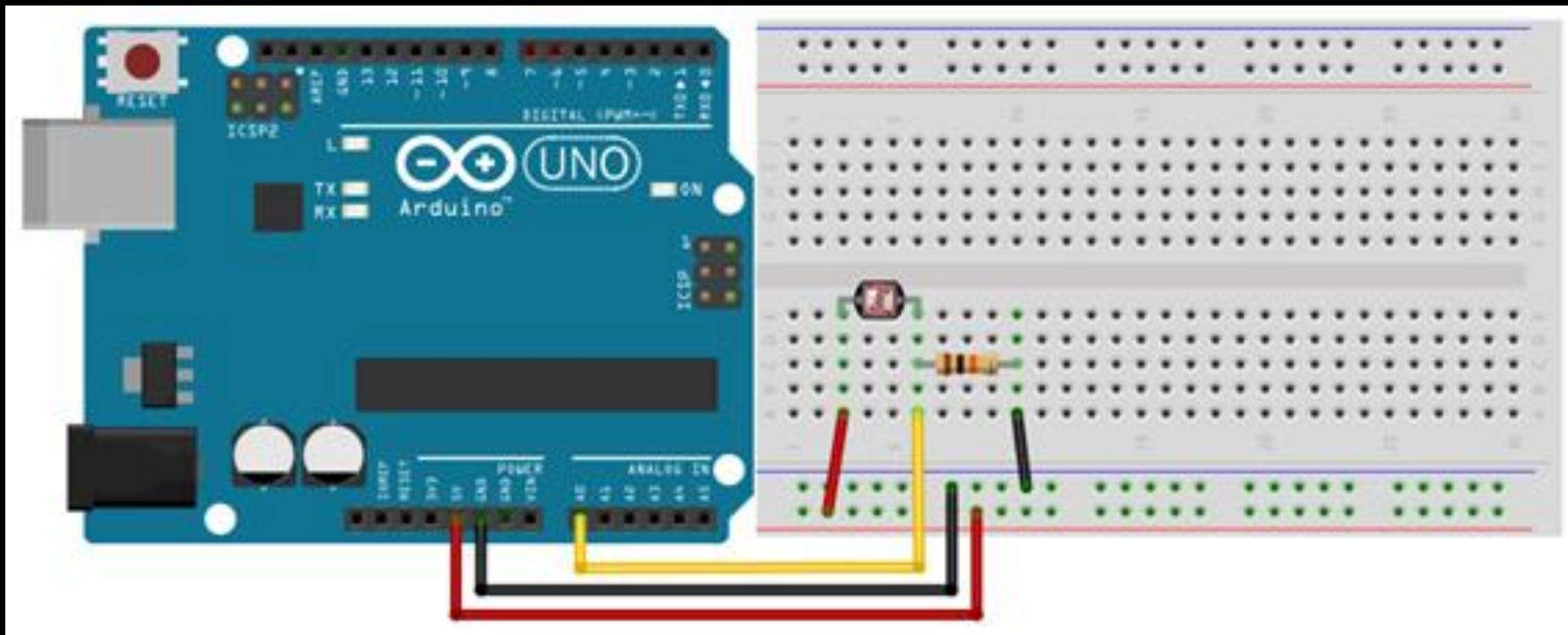
ServoSerial Processing

- https://github.com/suakii/2016AdArduino/blob/master/Chapter2/gs_2_ServoSerial_processing/gs_2_ServoSerial_processing.pde

ServoSerial Processing - Cool



ServoTwoLDR – Light Tracking Simple



ServoTwoLDR – Light Tracking Simple

- https://github.com/suakii/2016AdArduino/blob/master/Chapter2/gs_4_ServoTwoLDR/gs_4_ServoTwoLDR.ino

CU Later....

2016 Advanced Arduino

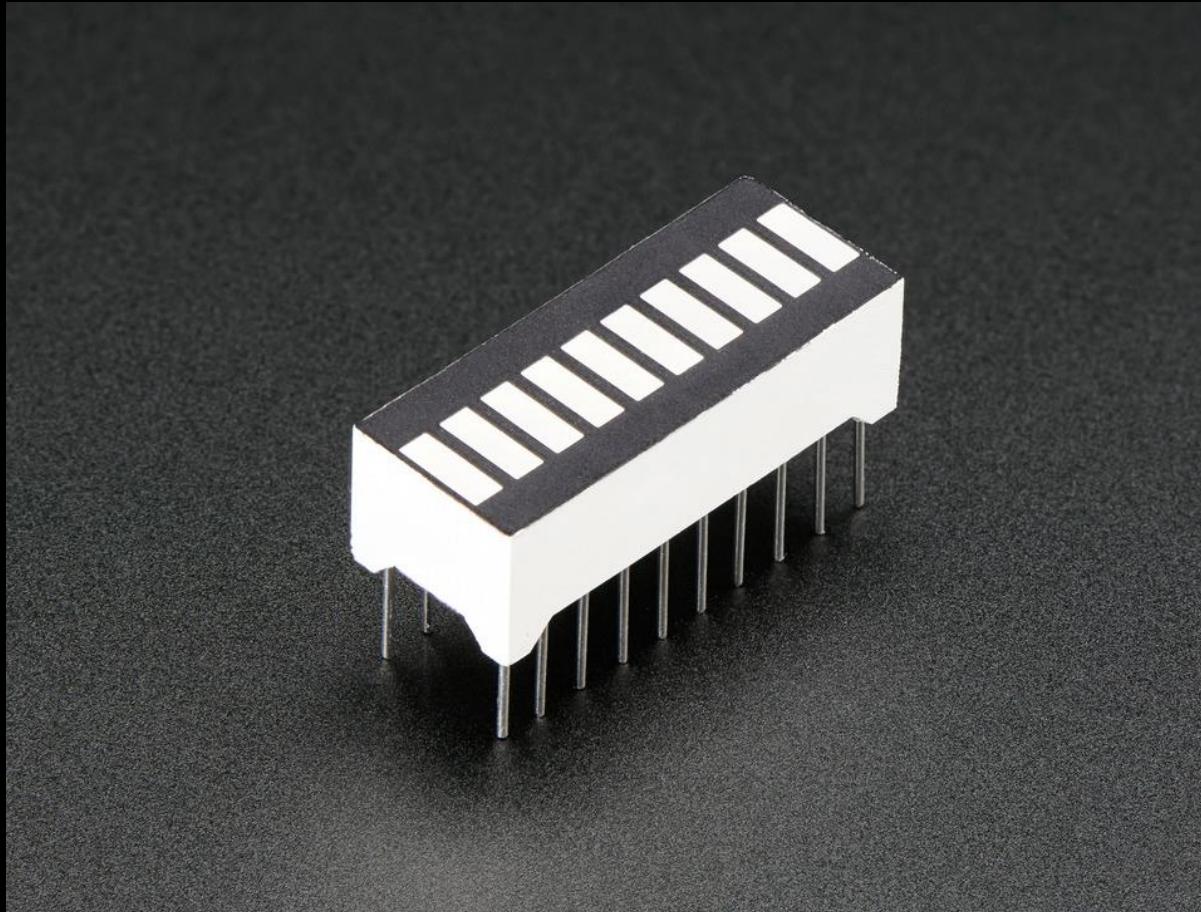
#2

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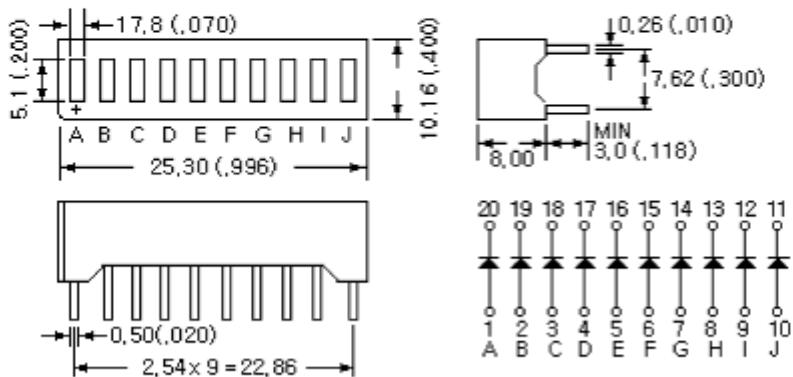
How about using LED Array



Simple DataSheet

FEATURES

- 1.High brightness
- 2.Low power consumption; directly drive with I.C
- 3.Sold state stability; Long operation life
- 4.Could be jointed two or more units
- 5.Easily identifiable cathode index



Using LED Array

- No Code
- Try it Yourself
- https://github.com/suakii/2016AdArduino/blob/master/Chapter3/gs_1_LedBar/gs_1_LedBar.ino

Simple is Best...

- Do u know Shift Register?



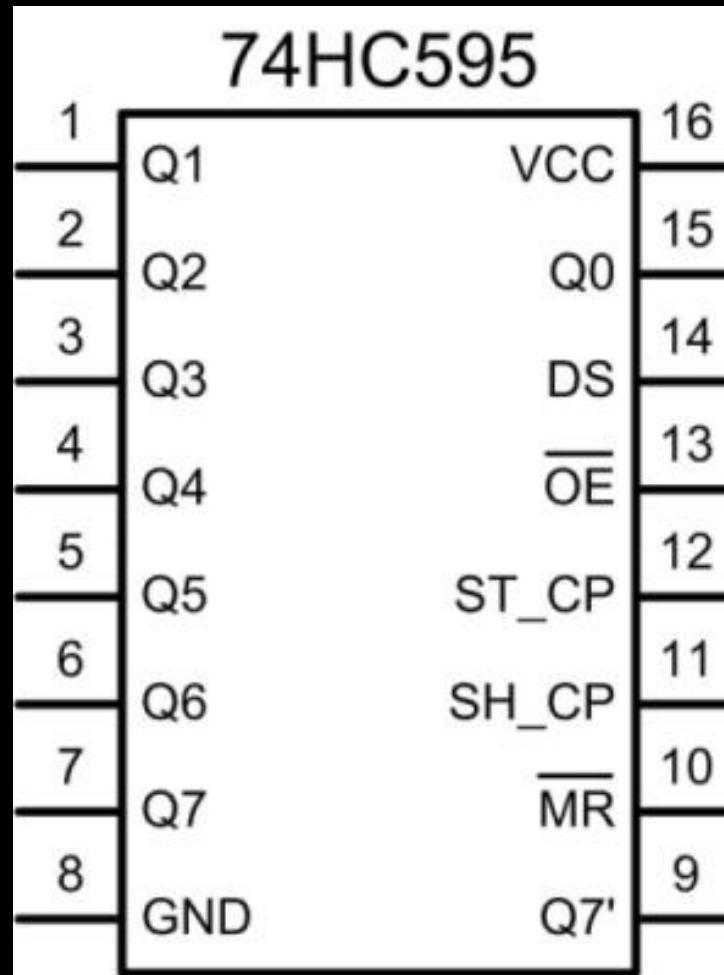
Shift Register

- We just need 3 pin of Arduino and Shift register to control 8 LED. :)

74HC595 Shift Register

The 74HC595; 74HCT595 is an 8-bit serial-in/serial or parallel-out shift register with a storage register and 3-state outputs. Both the shift and storage register have separate clocks. The device features a serial input (DS) and a serial output (Q7S) to enable cascading and an asynchronous reset MR input. A LOW on MR will reset the shift register. Data is shifted on the LOW-to-HIGH transitions of the SHCP input. The data in the shift register is transferred to the storage register on a LOW-to-HIGH transition of the STCP input. If both clocks are connected together, the shift register will always be one clock pulse ahead of the storage register. Data in the storage register appears at the output whenever the output enable input (OE) is LOW. A HIGH on OE causes the outputs to assume a high-impedance OFF-state. Operation of the OE input does not affect the state of the registers. Inputs include clamp diodes. This enables the use of current limiting resistors to interface inputs to voltages in excess of V_{CC} .

74HC595

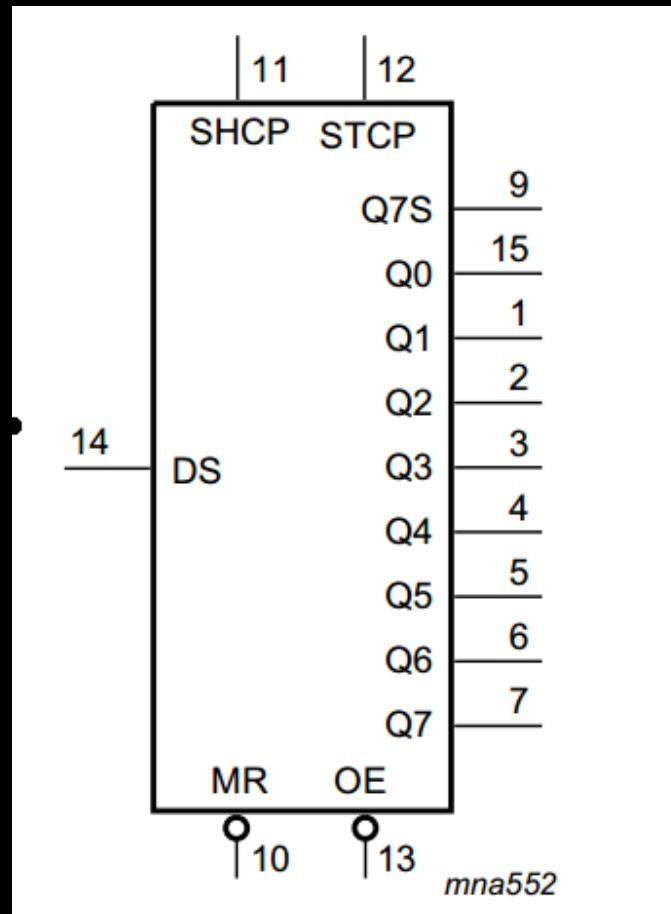


74HC595 Pin Mapping

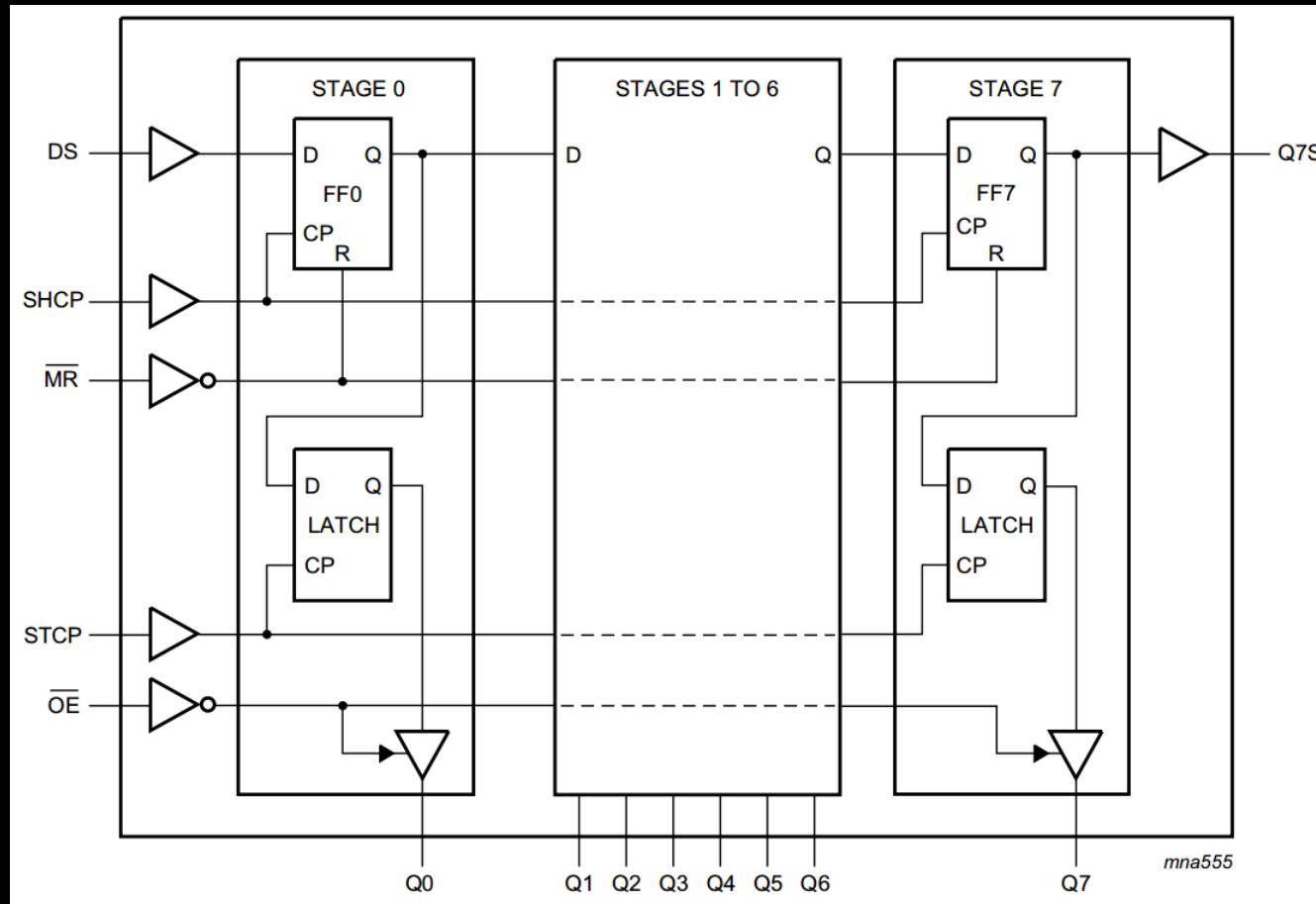
Table 2. Pin description

Symbol	Pin	Description
Q0, Q1, Q2, Q3, Q4, Q5, Q6, Q7	15, 1, 2, 3, 4, 5, 6, 7	parallel data output
GND	8	ground (0 V)
Q7S	9	serial data output
MR	10	master reset (active LOW)
SHCP	11	shift register clock input
STCP	12	storage register clock input
OE	13	output enable input (active LOW)
DS	14	serial data input
Q0	15	parallel data output 0
V _{CC}	16	supply voltage

Pin Mapping



Inner of Shift Register -Simple

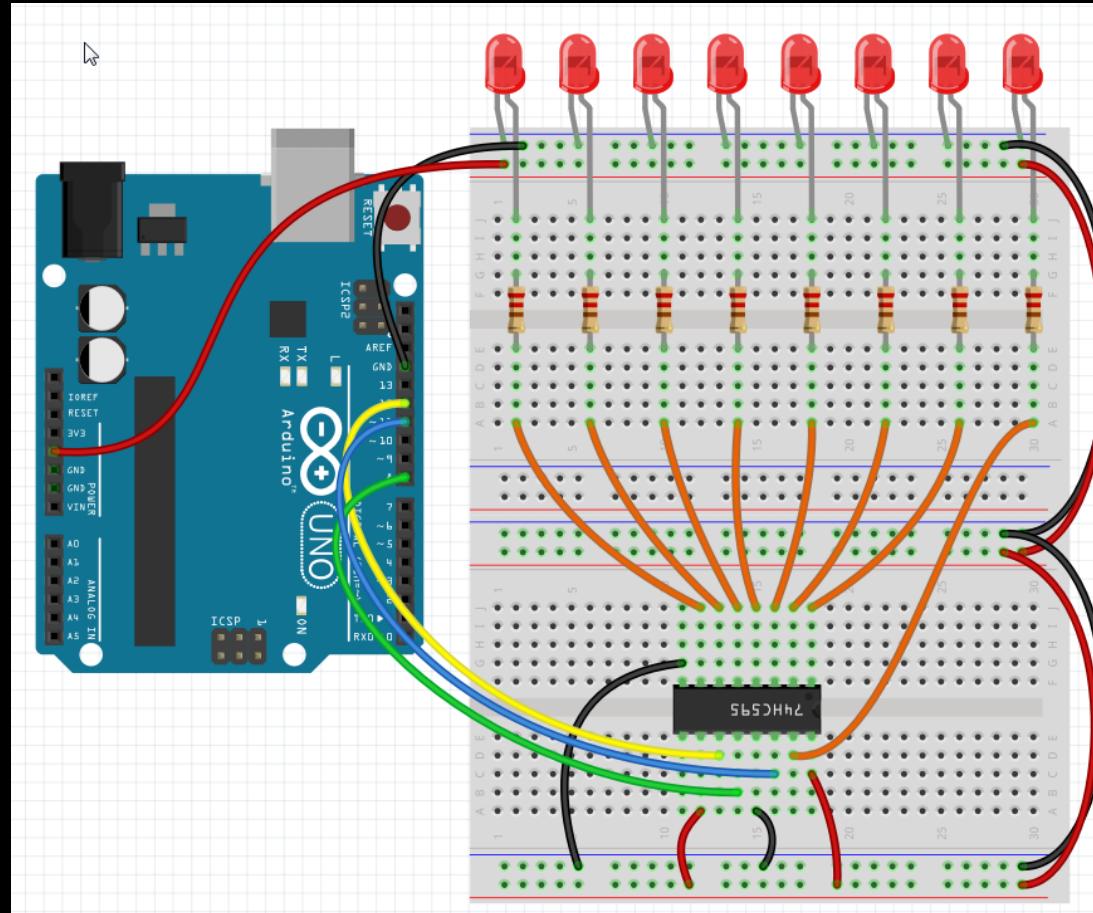


74HC595 Function Table – Simple too

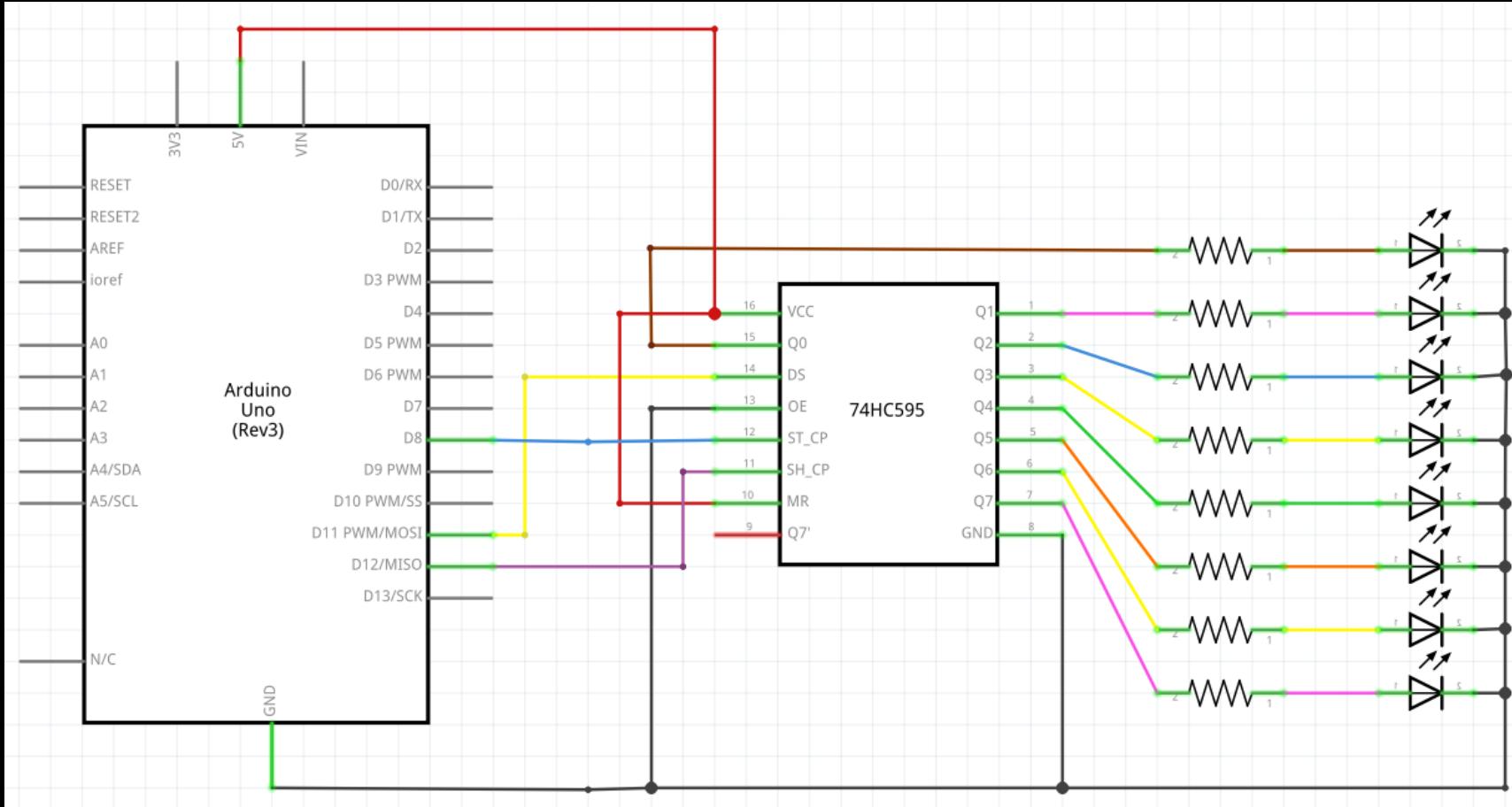
Table 3. Function table^[1]

Control				Input	Output		Function
SHCP	STCP	<u>OE</u>	<u>MR</u>	DS	Q7S	Qn	
X	X	L	L	X	L	NC	a LOW-level on <u>MR</u> only affects the shift registers
X	↑	L	L	X	L	L	empty shift register loaded into storage register
X	X	H	L	X	L	Z	shift register clear; parallel outputs in high-impedance OFF-state
↑	X	L	H	H	Q6S	NC	logic HIGH-level shifted into shift register stage 0. Contents of all shift register stages shifted through, e.g. previous state of stage 6 (internal Q6S) appears on the serial output (Q7S).
X	↑	L	H	X	NC	QnS	contents of shift register stages (internal QnS) are transferred to the storage register and parallel output stages
↑	↑	L	H	X	Q6S	QnS	contents of shift register shifted through; previous contents of the shift register is transferred to the storage register and the parallel output stages

74HC595 Connect



Connect



Shift Register Test1

- https://github.com/suakii/2016AdArduino/blob/master/Chapter3/gs_2_1_ShiftLegisterTest/gs_2_1_ShiftLegisterTest.ino

Shift Register Test2

- https://github.com/suakii/2016AdArduino/blob/master/Chapter3/gs_2_2_ShiftLegisterTest2/gs_2_2_ShiftLegisterTest2.ino

Shift Register Test3

- https://github.com/suakii/2016AdArduino/blob/master/Chapter3/gs_2_3_ShiftLegisterTest3/gs_2_3_ShiftLegisterTest3.ino

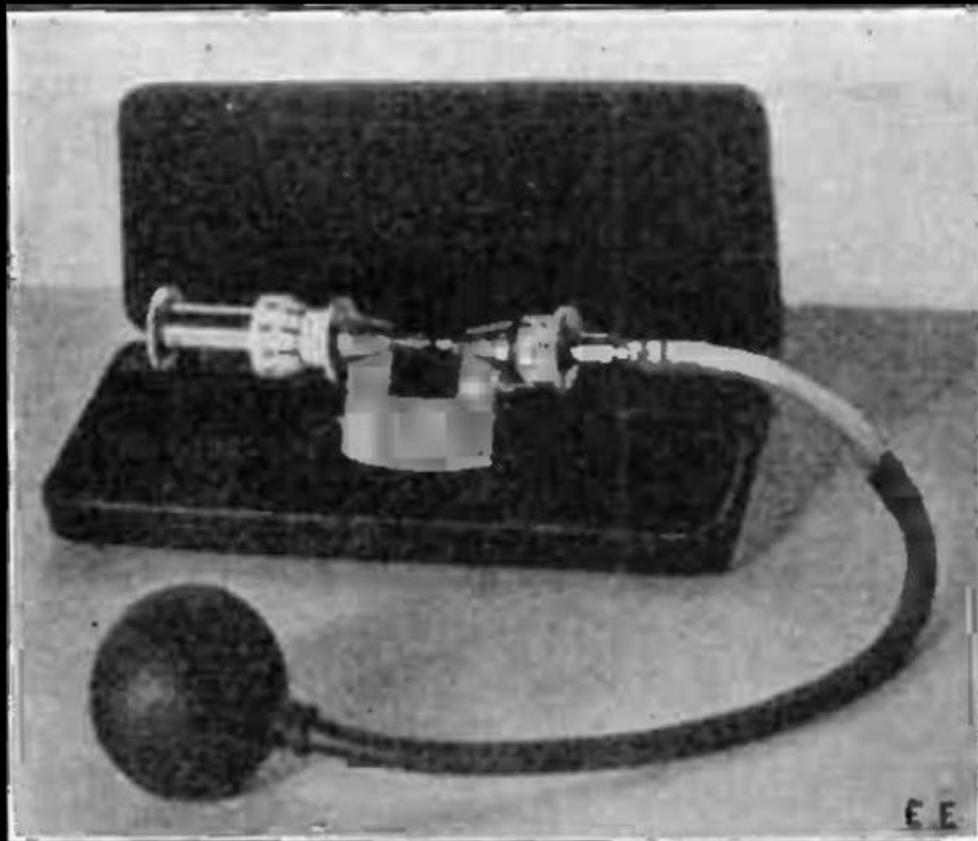
Shift Register Fade control – OE pin

- To do this, all you need to do, is to change the connection to pin 13 of the 74HC595 so that instead of connecting it to Ground, you connect it to pin 3 of the Arduino.
- https://github.com/suakii/2016AdArduino/blob/master/Chapter3/gs_2_4_StripTest/gs_2_4_StripTest.ino

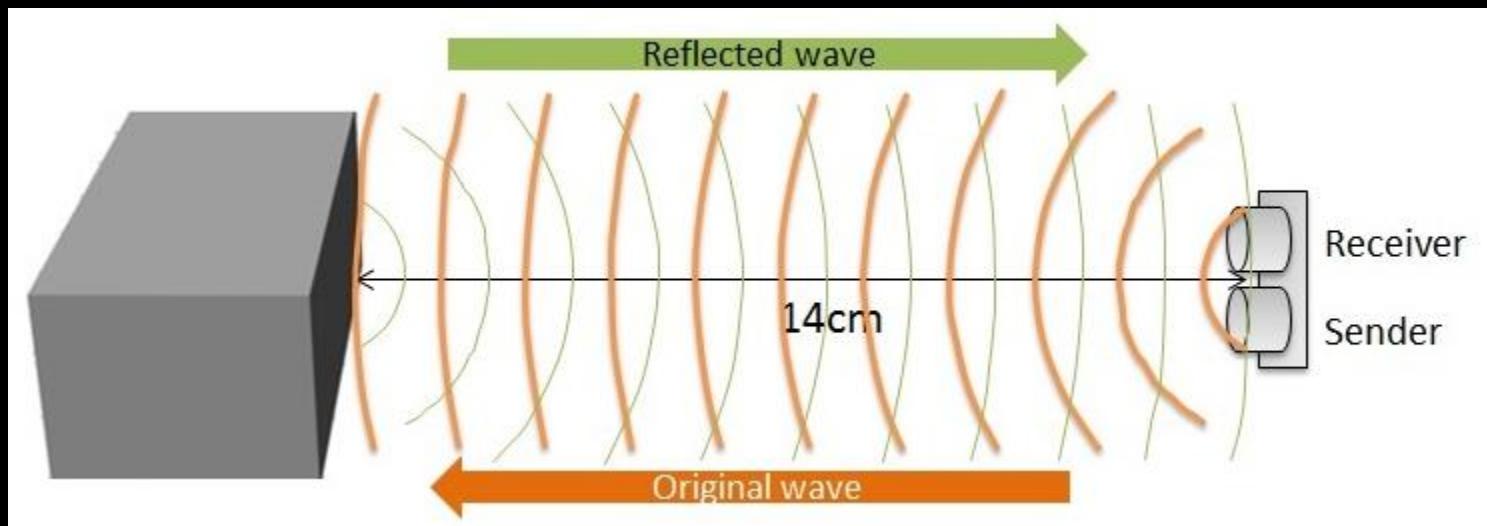
Next

Ultrasound

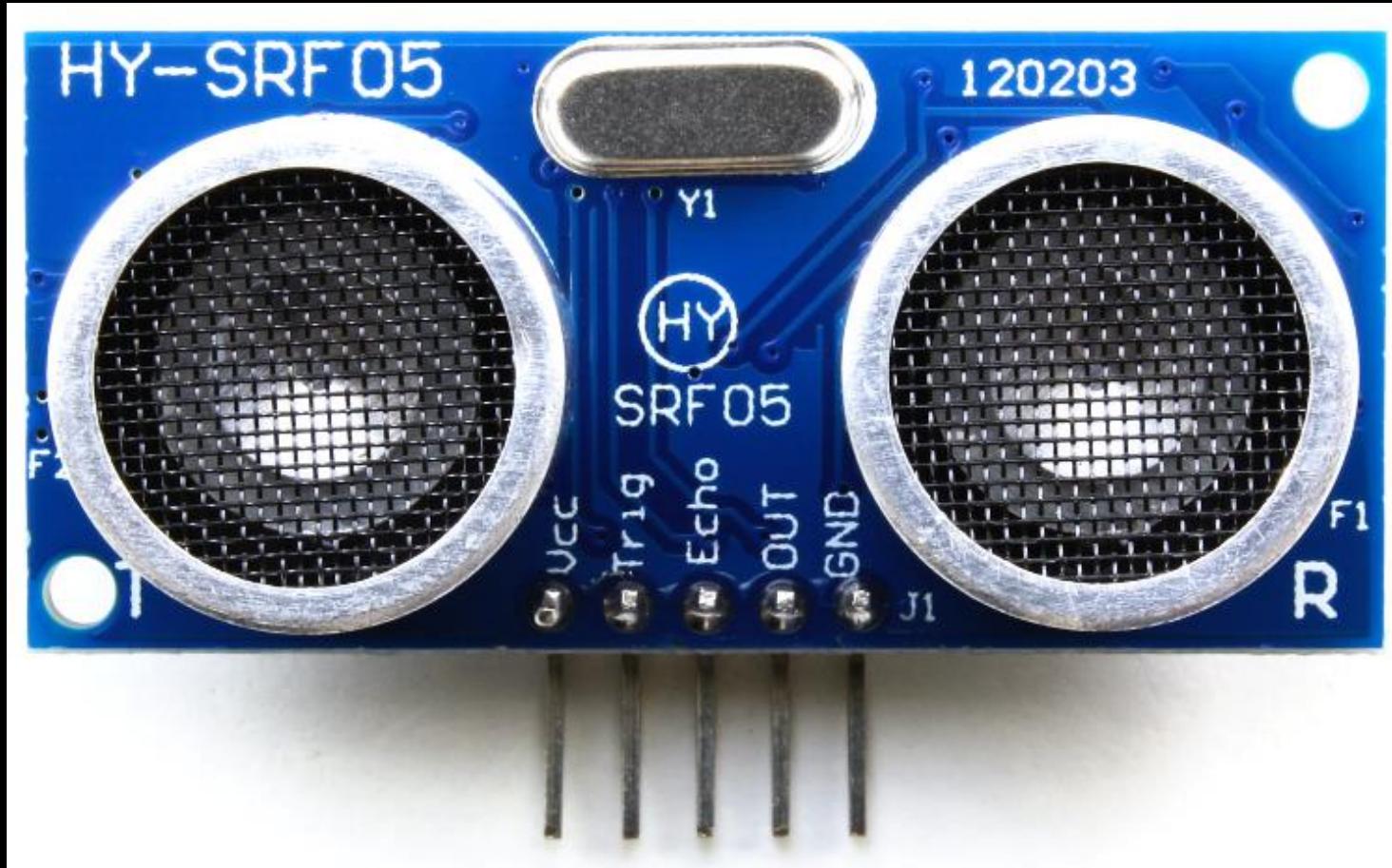
- Galton whistle, one of the first devices to produce ultrasound
- 1893



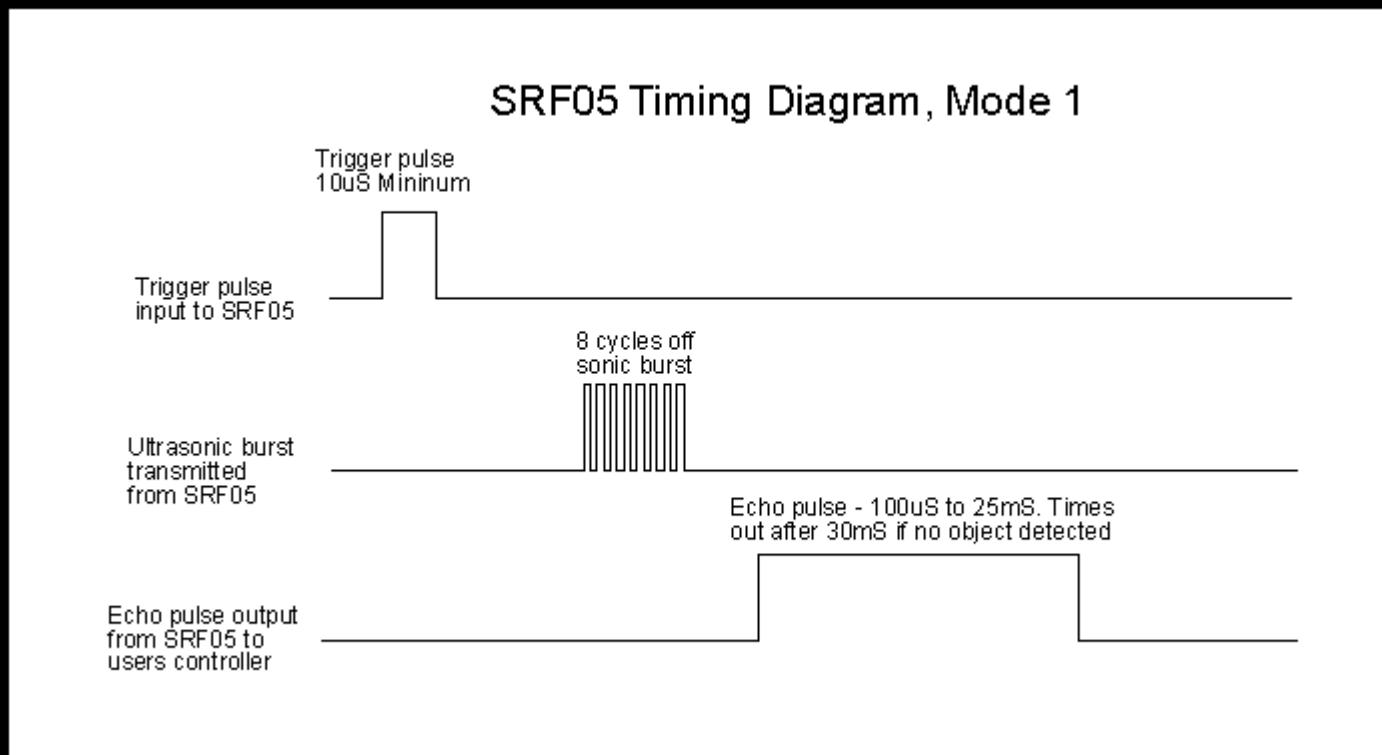
Ultrasonic Sensor



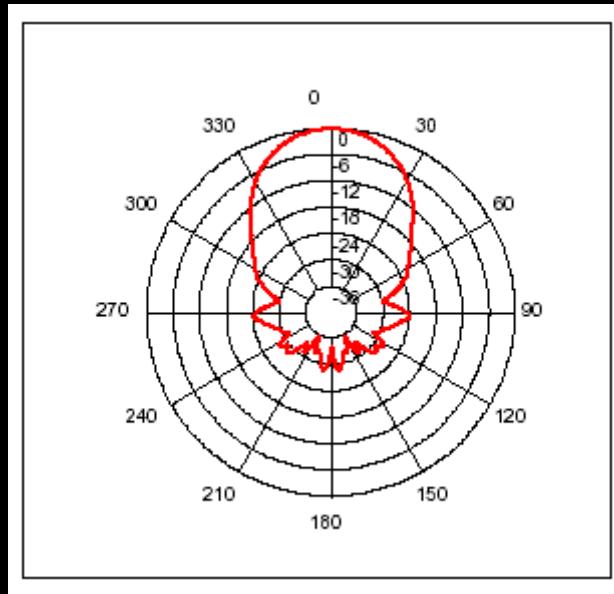
SRF05



SRF05 Timing Diagram



SRF05



Ultrasonic Rangers FAQ

- https://www.robot-electronics.co.uk/htm/sonar_faq.htm

SRF05 Test

- https://github.com/suakii/2016AdArduino/blob/master/Chapter4/gs_1_SonarTestSimple/gs_1_SonarTestSimple.ino

SRF05 Test with Processing

- https://github.com/suakii/2016AdArduino/blob/master/Chapter4/gs_2_SonarGraph_processing/gs_2_SonarGraph_processing.pde

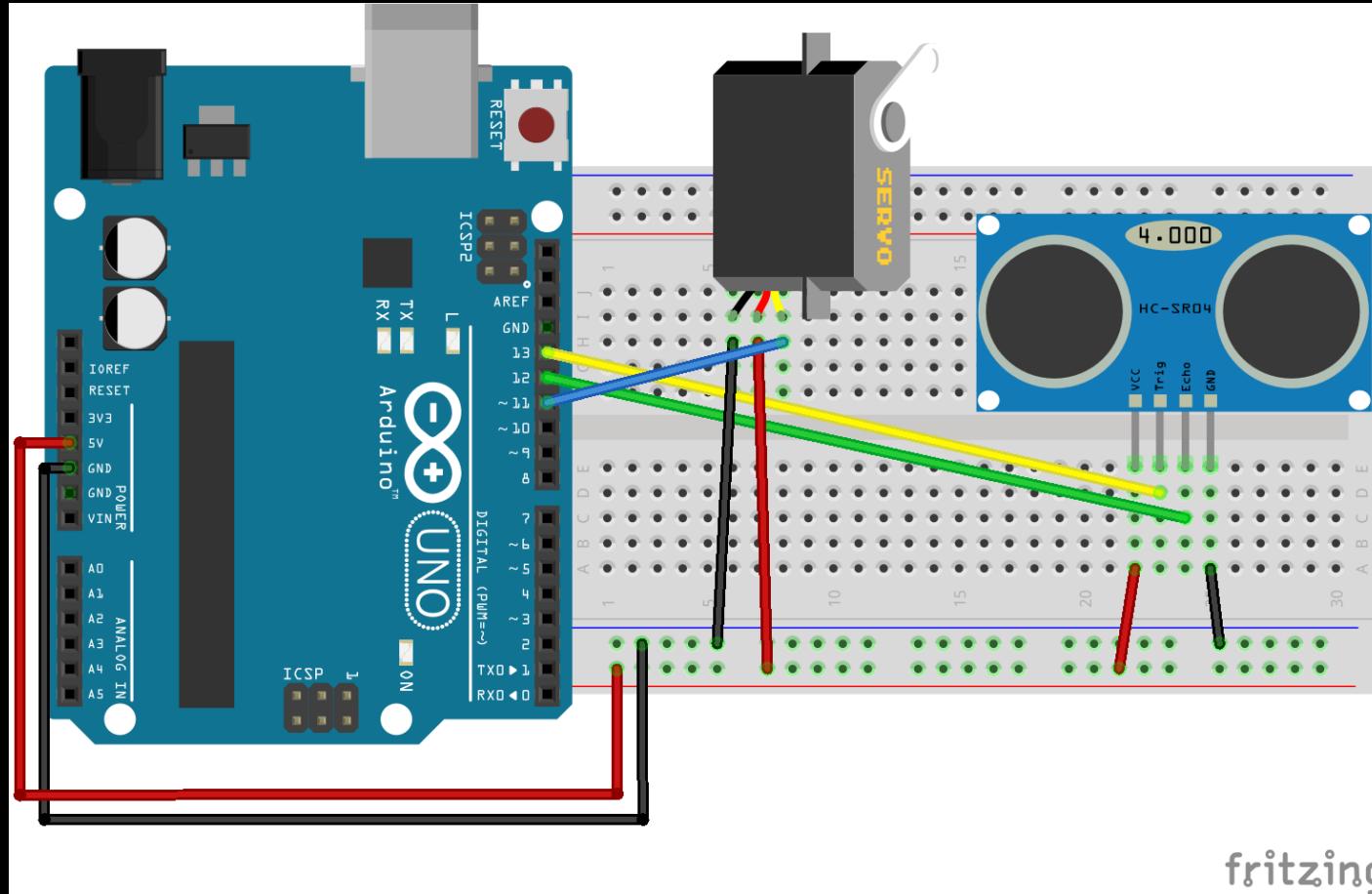
SRF05 with LED Bar

- Implement Yourself

Sonar with Piezzo – Simple Sound

- https://github.com/suakii/2016AdArduino/tree/master/Chapter4/gs_3_SonarMusic

Sonar with Servo



Sonar Radar Arduino

- https://github.com/suakii/2016AdArduino/blob/master/Chapter4/gs_4_SonarRadar_arduino/gs_4_SonarRadar_arduino.ino

Sonar Radar Processing

- https://github.com/suakii/2016AdArduino/blob/master/Chapter4/gs_4_SonarRadar_processing/gs_4_SonarRadar_processing.pdf

CU Later....

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#3

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Wi-Fi

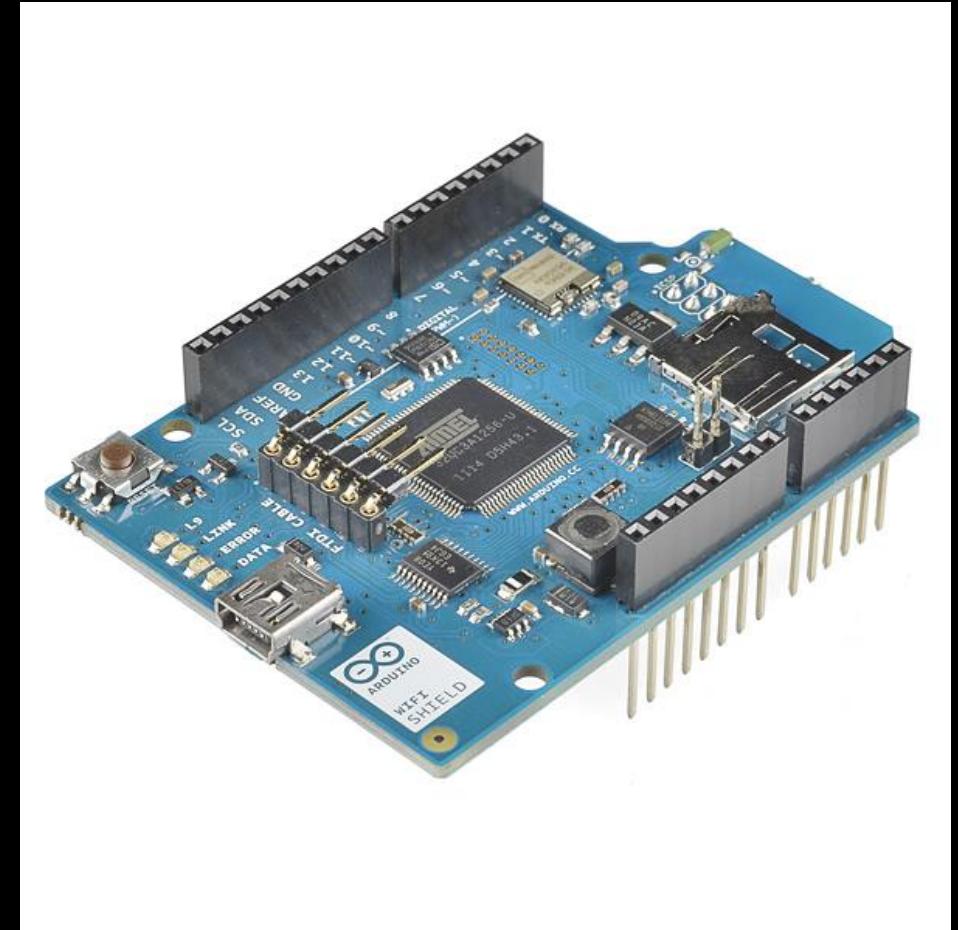


Wi-Fi

- Wi-Fi or WiFi is a technology that allows electronic devices to connect to a wireless LAN (WLAN), mainly using the 2.4 gigahertz (12 cm) UHF and 5 gigahertz (6 cm) SHF ISM radio bands.
- The "Wi-Fi Certified" trademark can only be used by Wi-Fi products that successfully complete Wi-Fi Alliance interoperability certification testing.

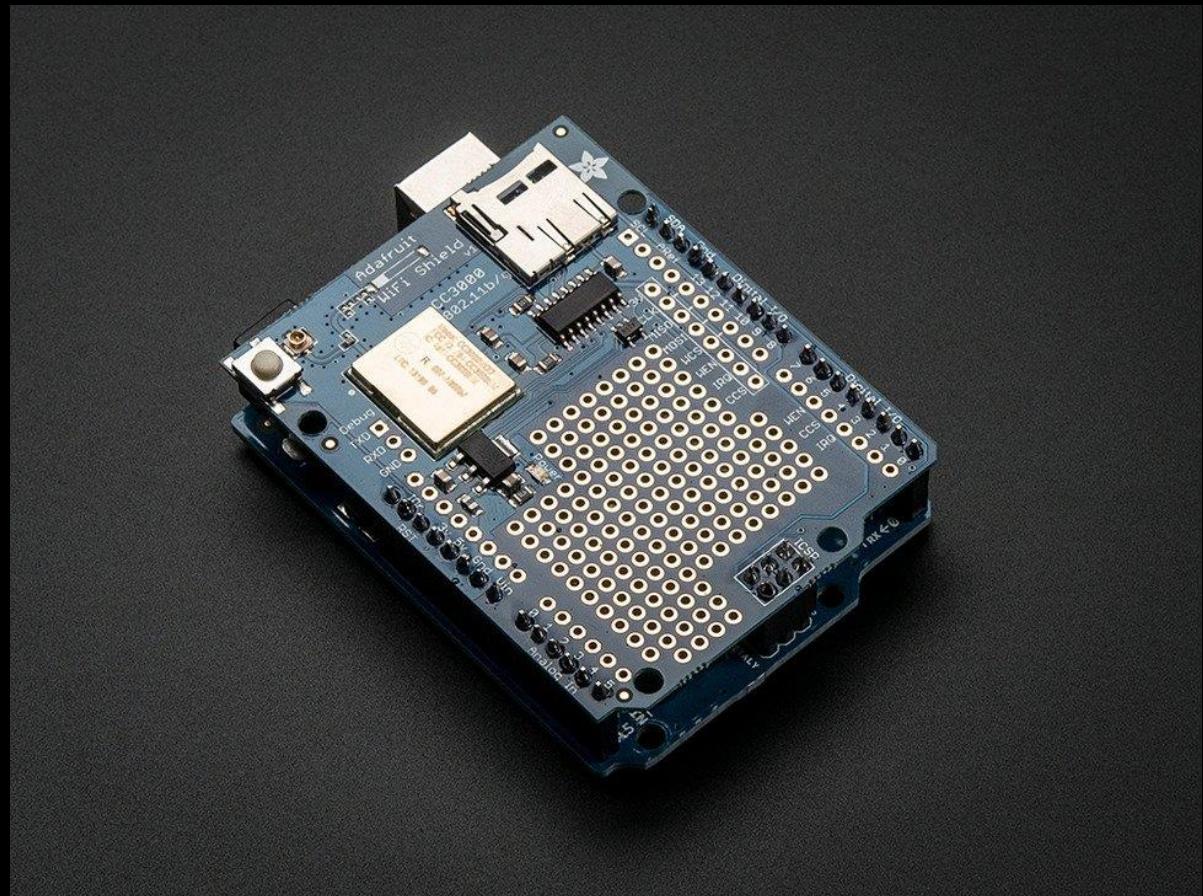
Arduino & Wi-Fi

- 126,000



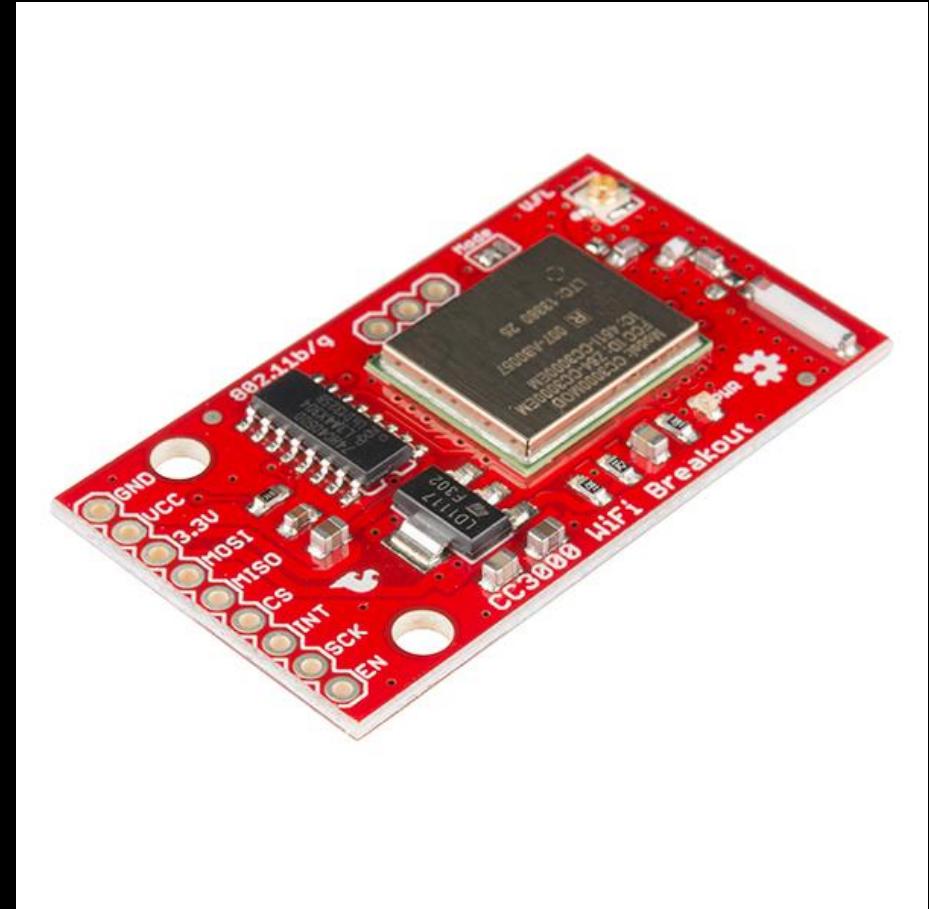
Arduino & Wi-Fi

- Adafruit CC3000
- WiFi Shield
- \$39.95



Arduino & Wi-Fi

- SparkFun WiFi Breakout - CC3000
- \$34.95
-

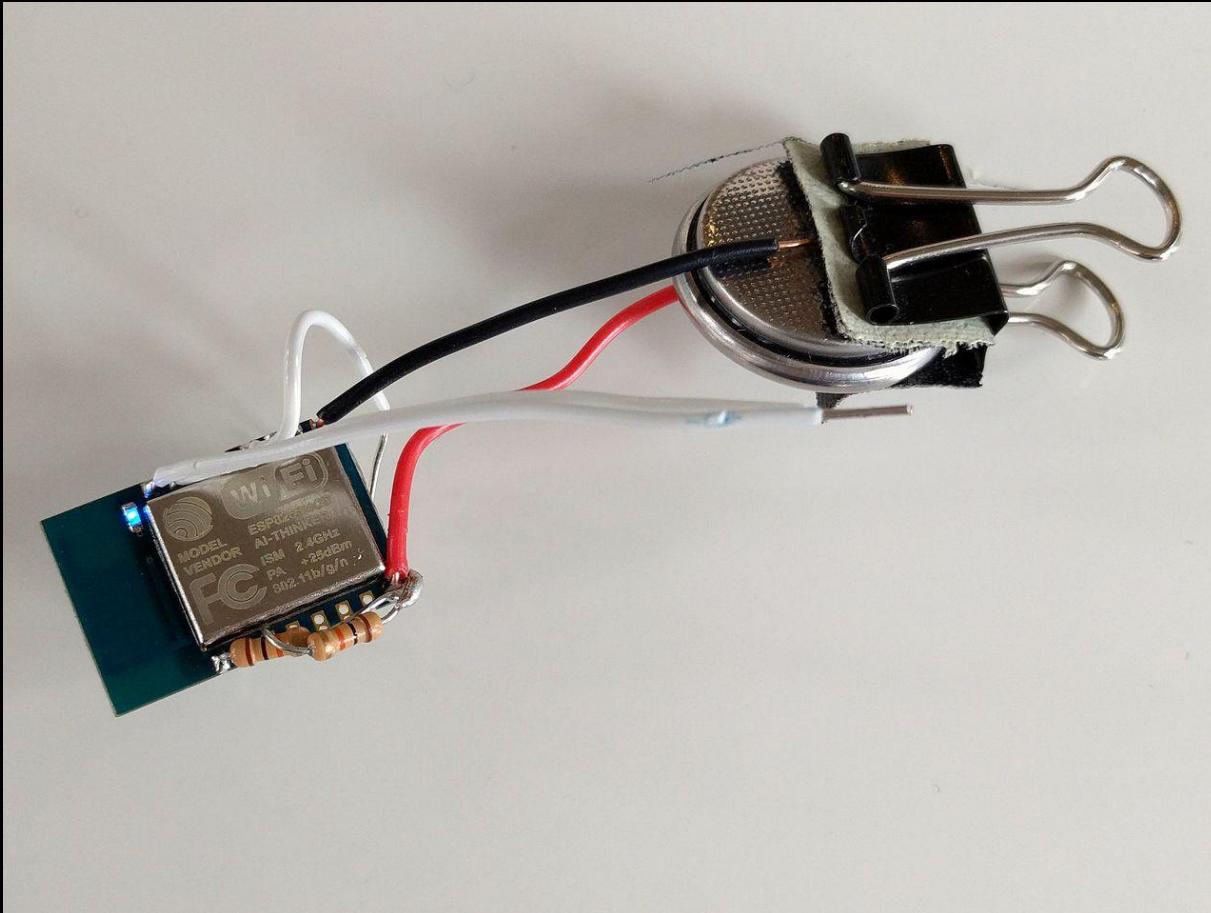


So....

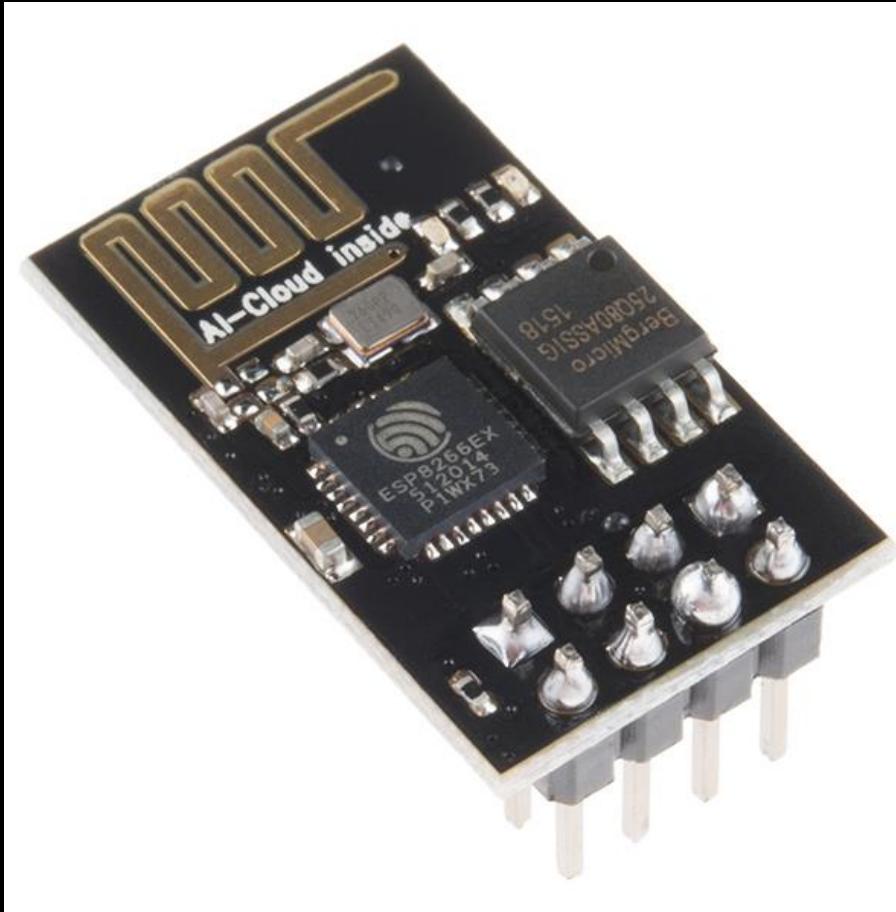
ESP8266 Wi-Fi Module

- The ESP8266 is a low-cost Wi-Fi chip with full TCP/IP stack and MCU (Micro Controller Unit) capability produced by Shanghai-based Chinese manufacturer, Espressif Systems.
- <https://espressif.com/en>

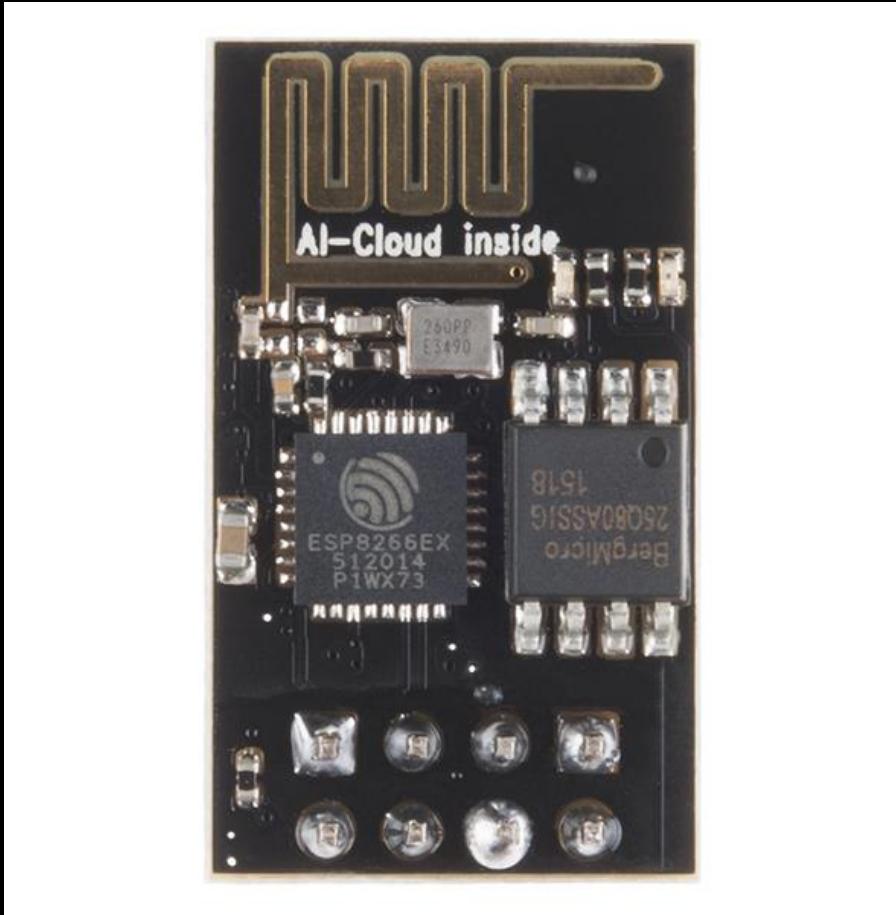
ESP8266 module powered by a coin cell



ESP8266-01



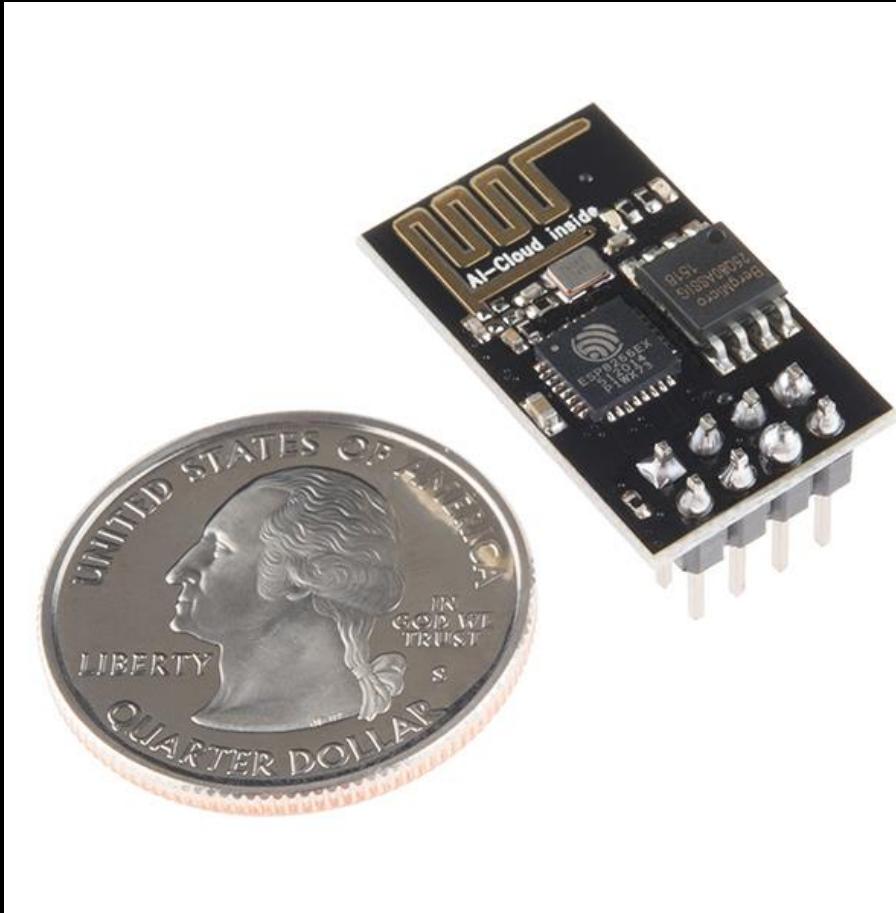
ESP8266-01



ESP8266-01



ESP8266-01



How much?

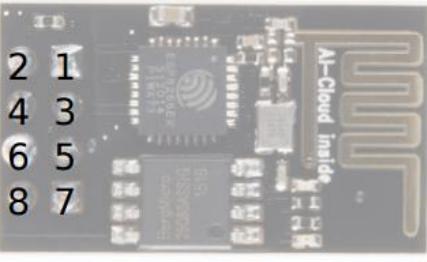
› 상품코드	1279338
› 판매가격	2,700원 (부가세 미포함가)
› 제조사	OEM (중국)
› 적립금	20원
› 평균준비기간	2~3일
› 브랜드	SZH 브랜드몰 바로가기 ▶
› A/S 정보	
› 최소주문수량	1 개
› 수량	<input type="text" value="1"/>  

Simple to use...

ESP8266 Module (WRL-13678)



D7	GPIO1	TX	2-TXO
		Chip Enable	4-CHPD
		Reset	6-RST
		3.3V	8-3V
		GND	1-GND
D2/SDA	GPIO2	3-GPIO2	
D0	GPIO0	5-GPIO0	
D8	GPIO3	RX	7-RXI



PCB Antenna

Power
VCC-3.0-3.6V
Standby ~ 0.9uA
Running -60-215mA.
Average - 80mA

Wifi Features
802.11 b/g/n
2.4GHz
WPA/WPA2
Wifi Direct

+20dBm output power (802.11b)

I/O Features
Integrated TCP/IP
Integrated TR switch, LNA,
balun

Memory/Speed Features
80MHz
64KB instruction RAM
96KB data RAM
64K boot ROM
1MB* Flash Memory

Basic Connection
VCC - 3.3V
GND - GND
TX - RX on Arduino or FTDI
RX - TX on Arduino or FTDI
Chip Enable - 3.3V

Default Baud Rate
11520* 8N1

LEDs
Red: Power
Blue: TX

*milage may vary on different
version of the board

AT Command Usage

Commands are case sensitive and should end with /r/n

Commands may use 1 or more of these types
Set = AT<+><=,> - Sets the value
Inquiry = AT<+><=? - See what the value is set at
Test = AT<+><=? - See the possible options
Execute = AT<+><= - Execute a command

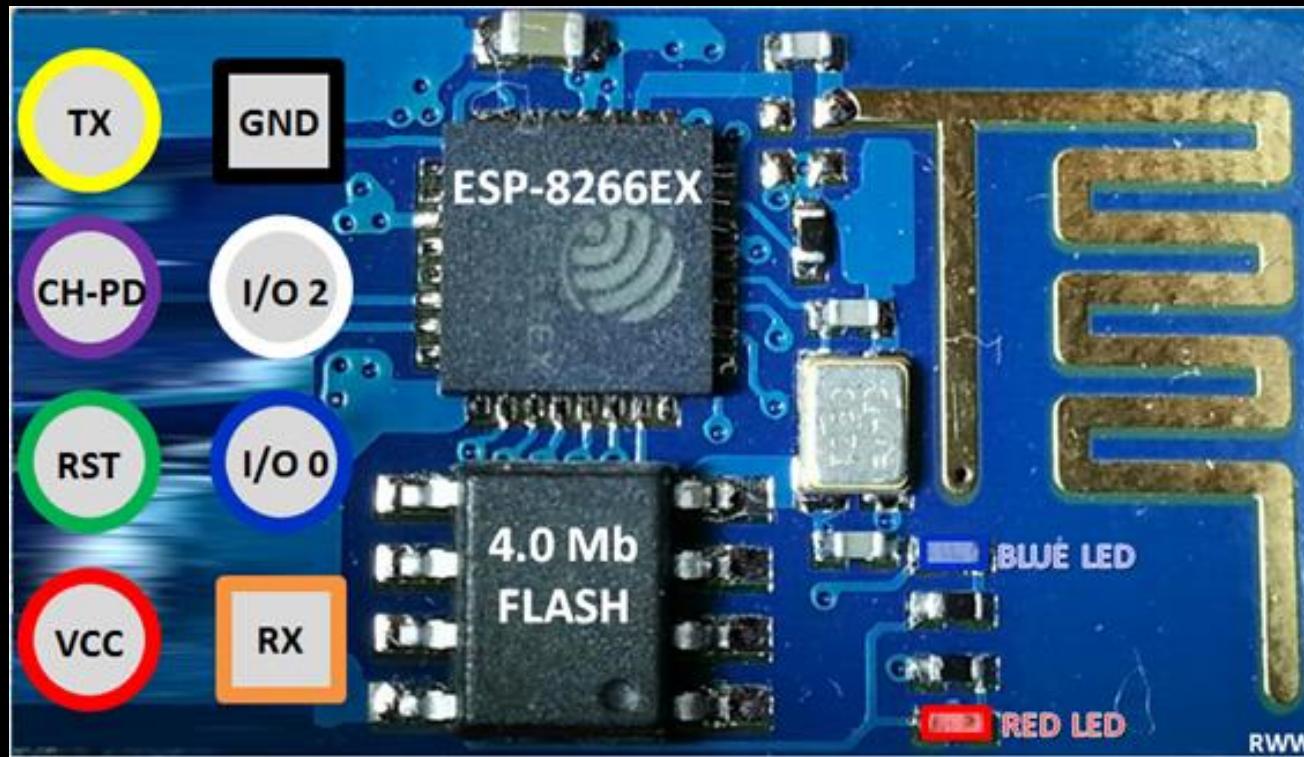
Commands with * have been deprecated in favor of
COMMAND_CUR and COMMAND_DEF. CUR will not write the
value to flash, DEF will write the value to flash and be used as the
default in the future.

AT Command List

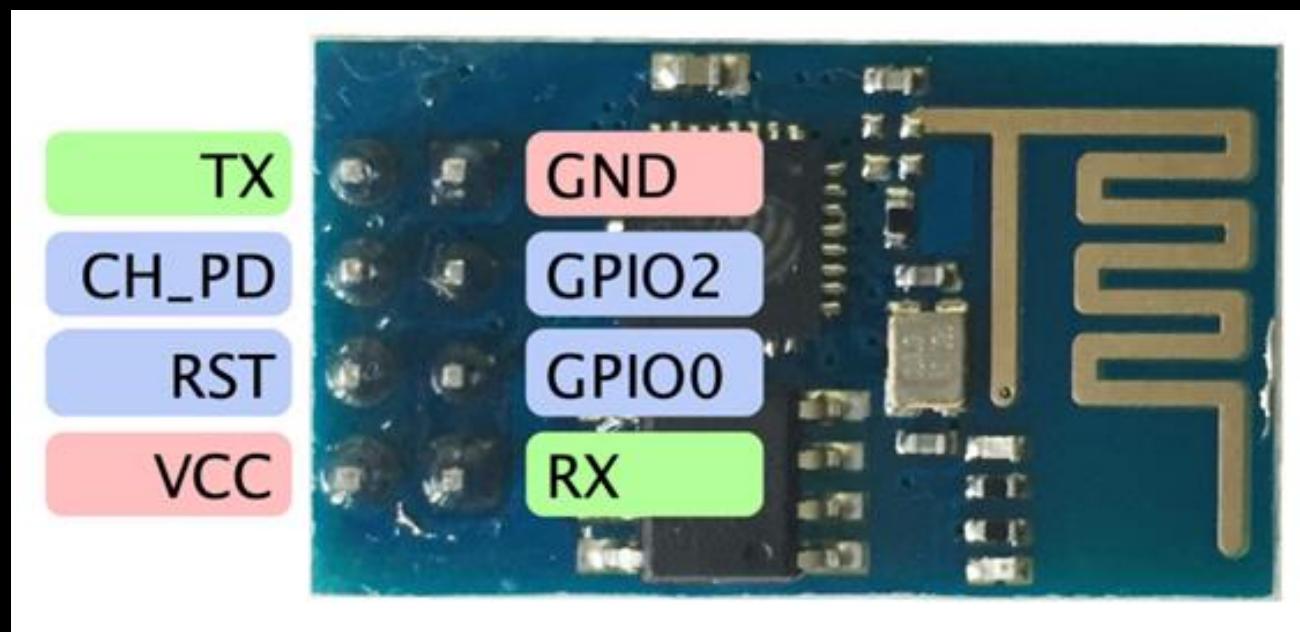
AT - Attention
AT+RST - Reset the board
AT+GMR - Firmware version
AT+CWMODE* - Operating Mode
1. Client
2. Access Point
3. Client and Access Point
AT+CWJAP=<ssid>,<pwd> - Join network
AT+CWLAP - View available networks
AT+CWQAP - Disconnect from network
AT+CWSAP=<ssid>,<pwd><chl><ecn> - Set up access point
0. Open. No security
1. WEP
2. WPA_PSK
3. WPA2_PSK
4. WPA_WPA2_PSK
AT+CWLIF - Show assigned IP addresses as access point
AT+CIPSTATUS - Show current status as socket client or server
AT+CIPSTART=<type>,<addr>,<port> - Connect to socket server
IP is fixed at 192.168.4.1, mask is fixed at 255.255.255.0
if CIPMUX is set to multichannel add <id> to beginning of string
AT+CIPCLOSE - Close socket connection
AT+CIFSR - Show assigned IP address when connected to network
AT+CIPMUX=<mode> - Set connection
0. Single Connection
1. Multi-Channel Connection
AT+CIPSERVER=<mode>[,<port>](AT+CIPMUX=1) - Default port is 333
0. Close the Socket Server
1. Open the Socket Server
AT+CIPMODE=<mode> - Set transparent mode
Data received will be sent to serial port as
0. +IPD,<connection channel>,<length>format (AT+CIPMUX=[0,1])
1. Data stream (AT+CIPMUX=0)
AT+CIPSTO=<time> - Set auto socket client disconnect timeout
from 1-28800s

Example commands
AT+CWMODE=? //View options for mode (test)
AT+CWMODE=3 //Set mode to client and access modes (set)
AT+CWLAP //View available networks (execute)
AT+CWJAP = "ssid","password" //Join network (set)
AT+CWJAP? //View the current network (inquiry)
AT+CIFSR //Show IP address (execute)
AT+CWQAP //Disconnect from network (execute)
AT+CWSAP="apoint","pass",1,0 //Setup an open access point (set)
AT+CWLIF //Show devices connected to access point

Pin mapping

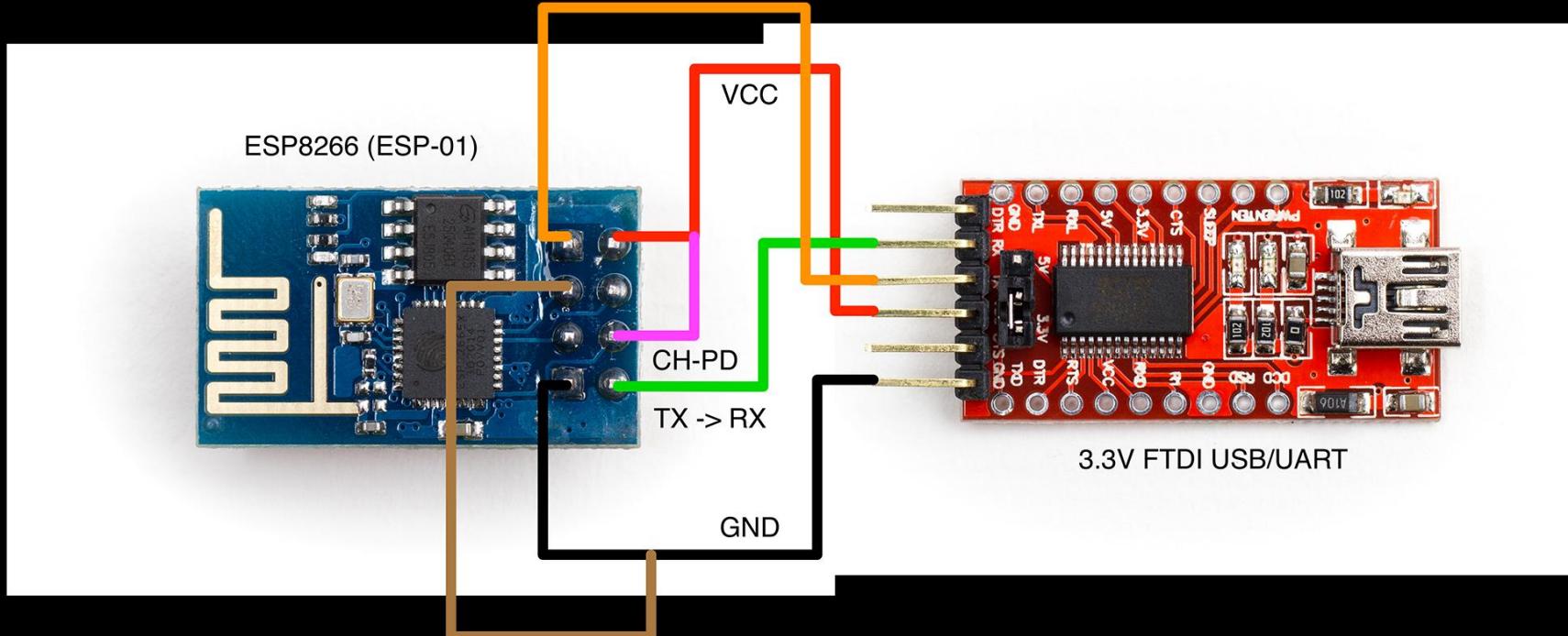


Pin Mapping



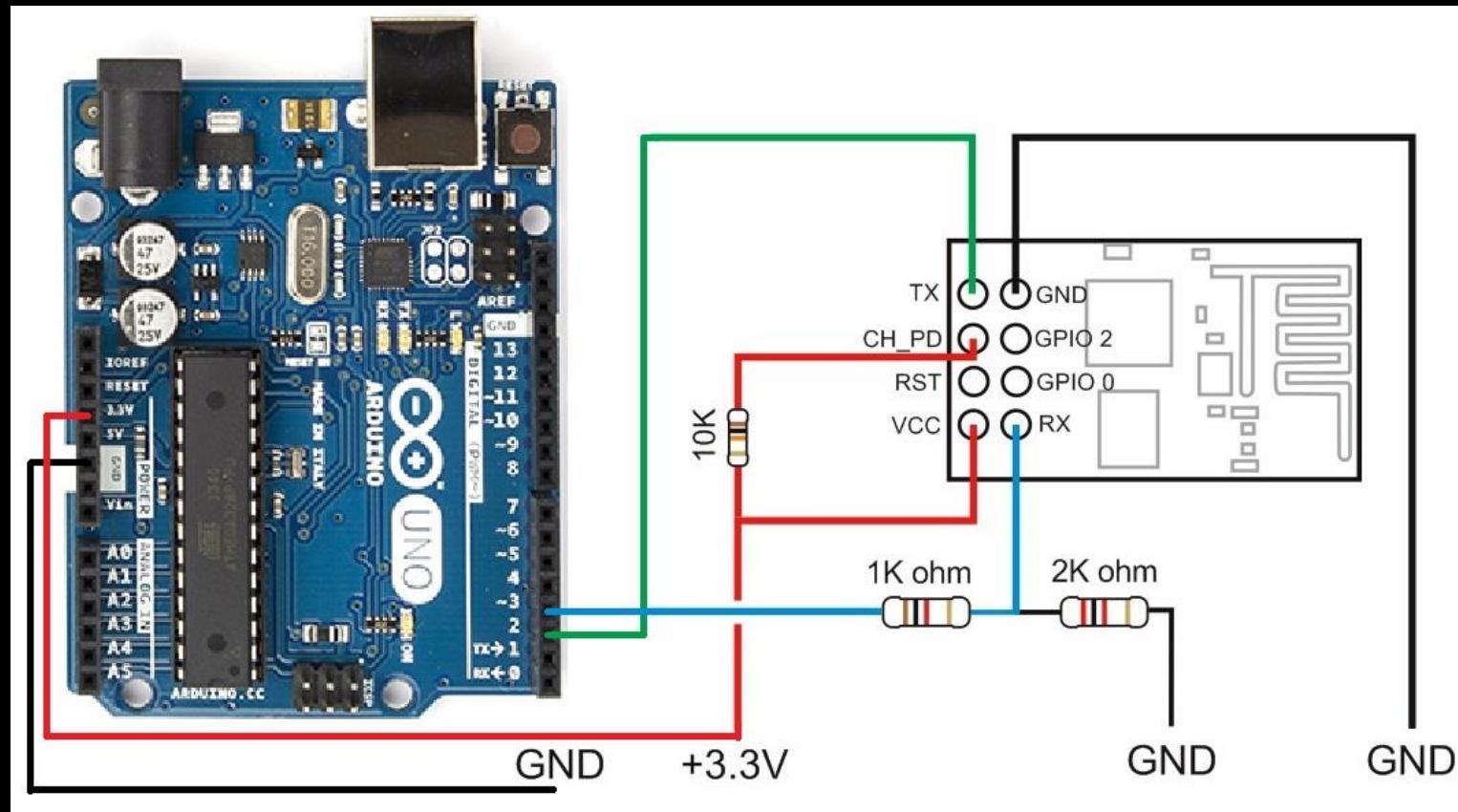
How use? Not using Arduino

- Updating the Firmware
- Direct programming using GPIO pin



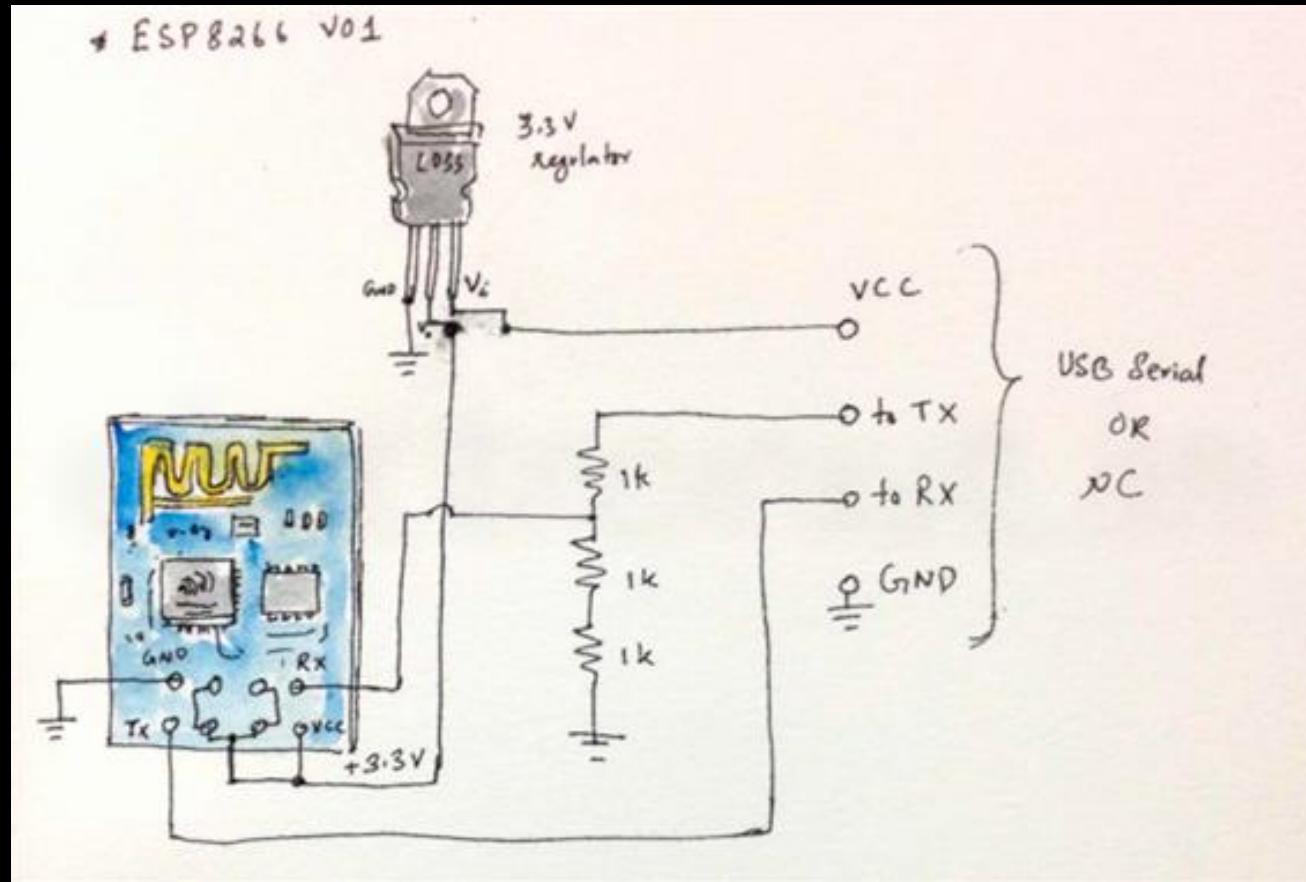
Arduino ESP8266-01

- Why use resistor?



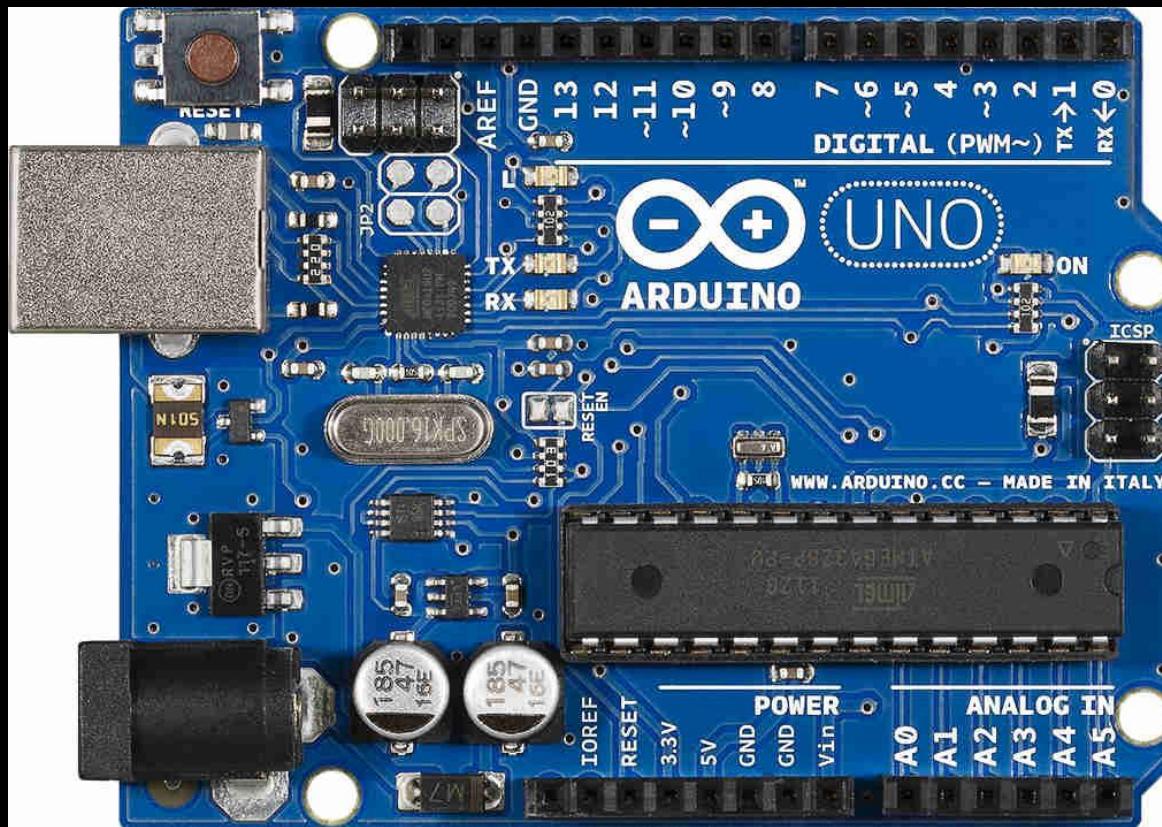
Arduino ESP8266-01

- Why use resistor?



Arduino Software Serial

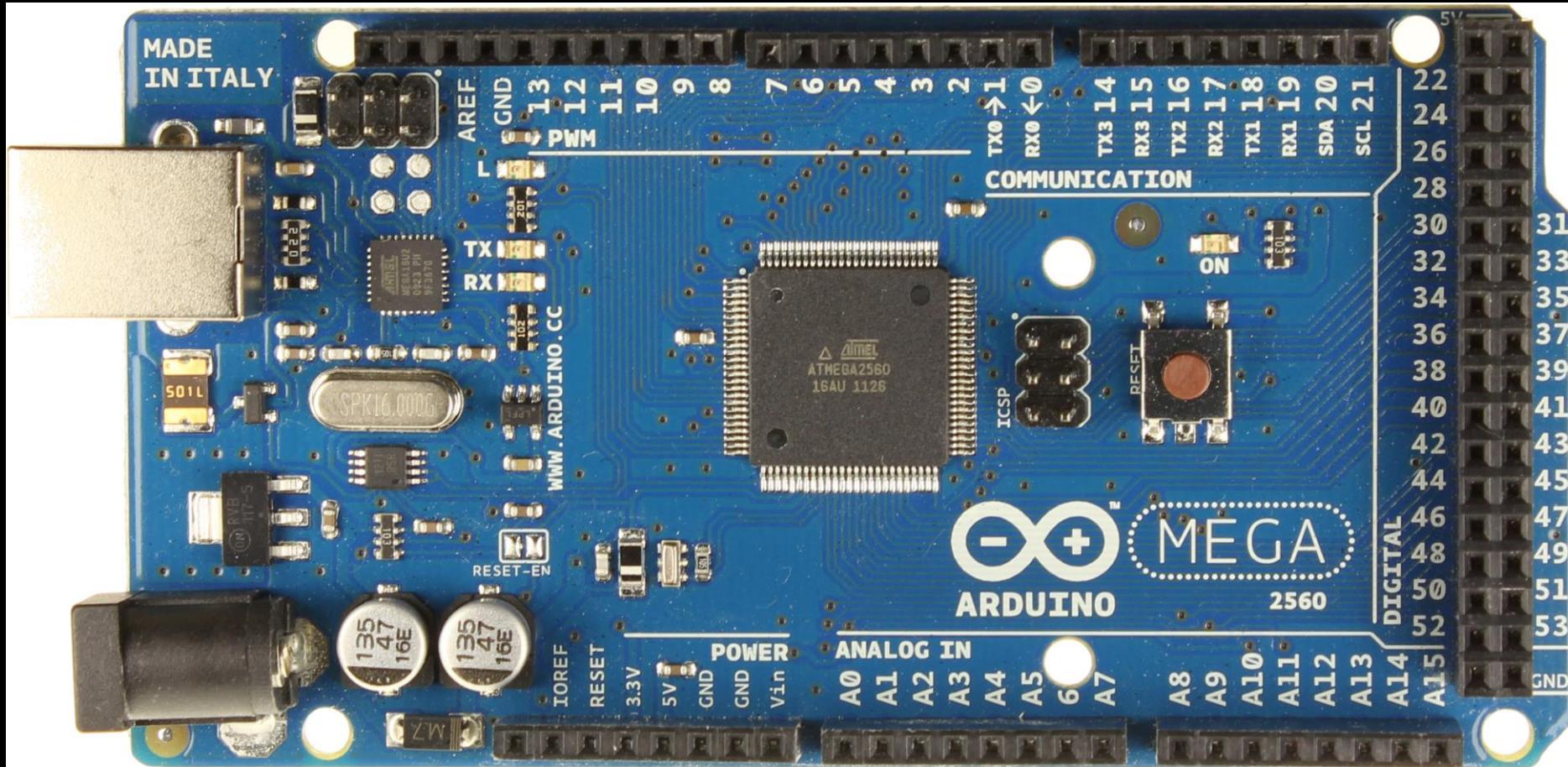
- The Software Serial library has been developed to allow serial communication on other digital pins of the Arduino.



But.....

- Arduino Uno's Software Serial doesn't support 115200bps which is ESP8266-01 default speed.
- So we are using Arduino Mega with multiple Hardware Serial.

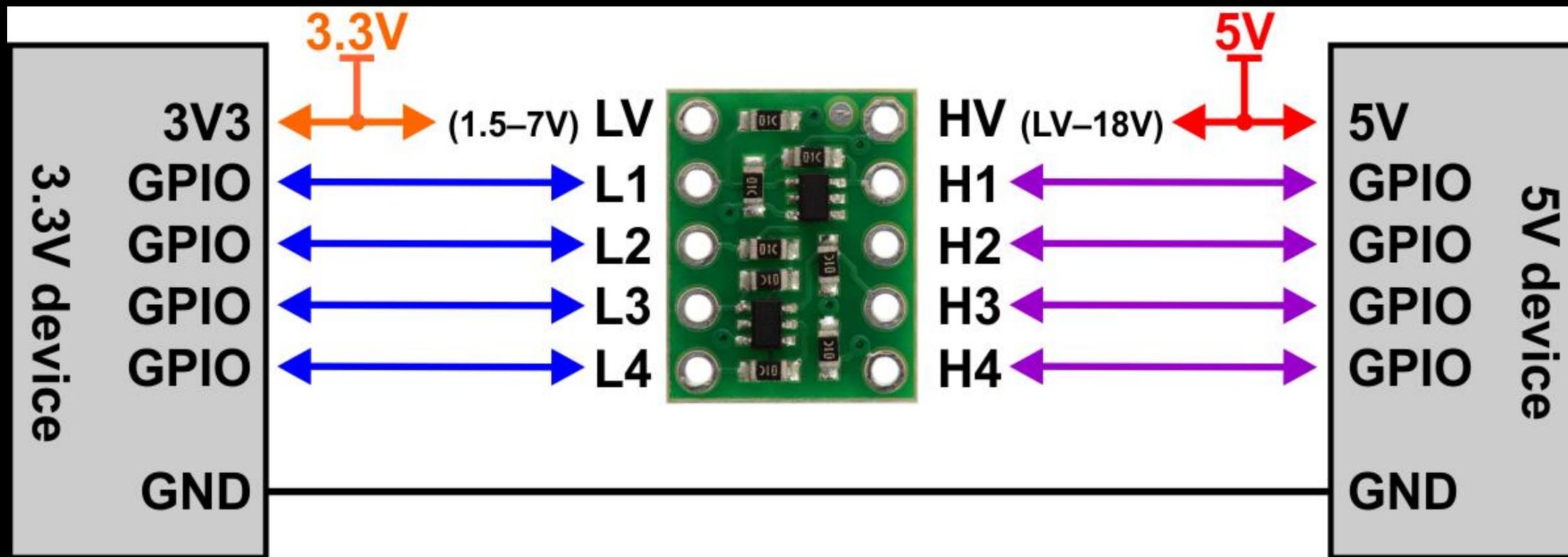
Arduino Mega



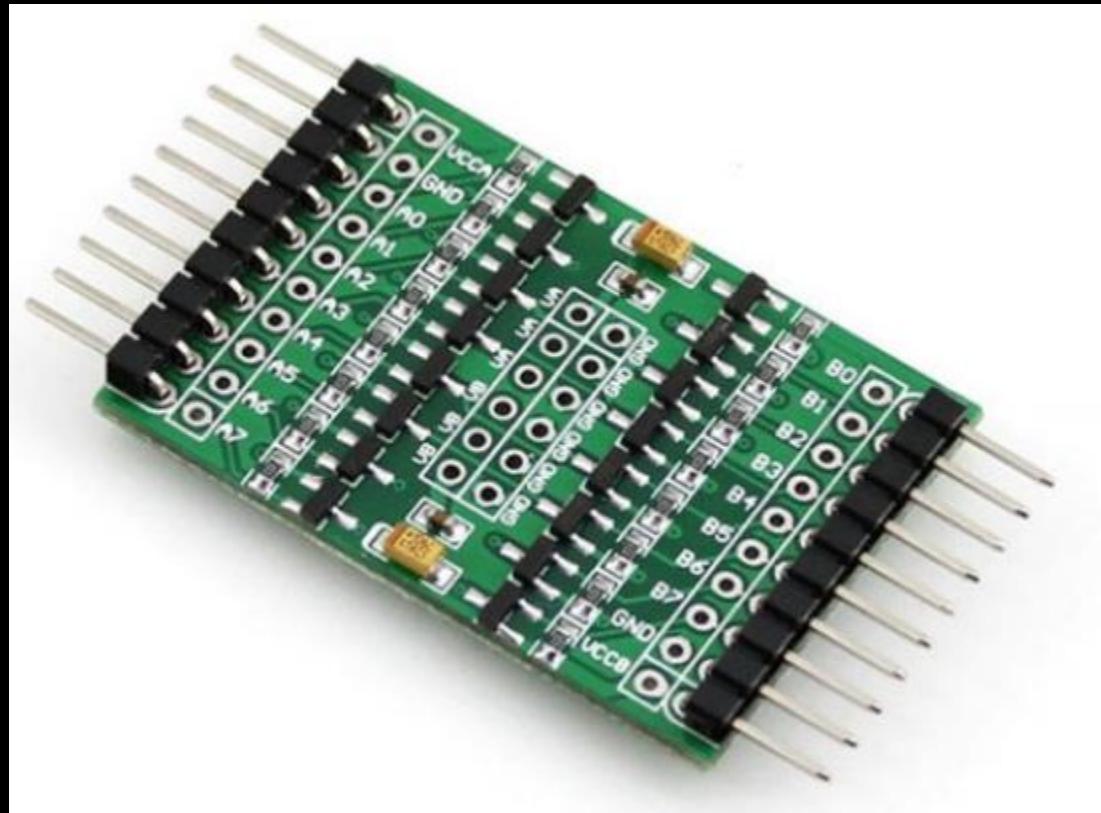
Another Problem

- ESP8266-01's logic level is 3.3V not 5V.
- So we need to change logic level between esp8266 and Arduino mega.

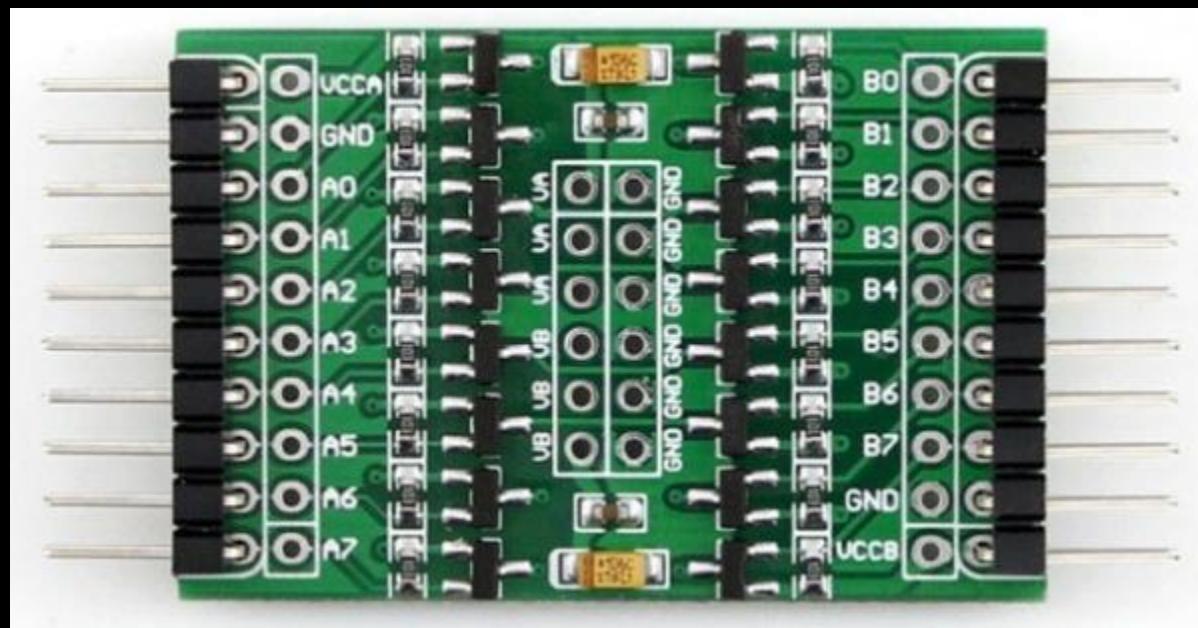
Logic Level Converter



Logic Level Converter



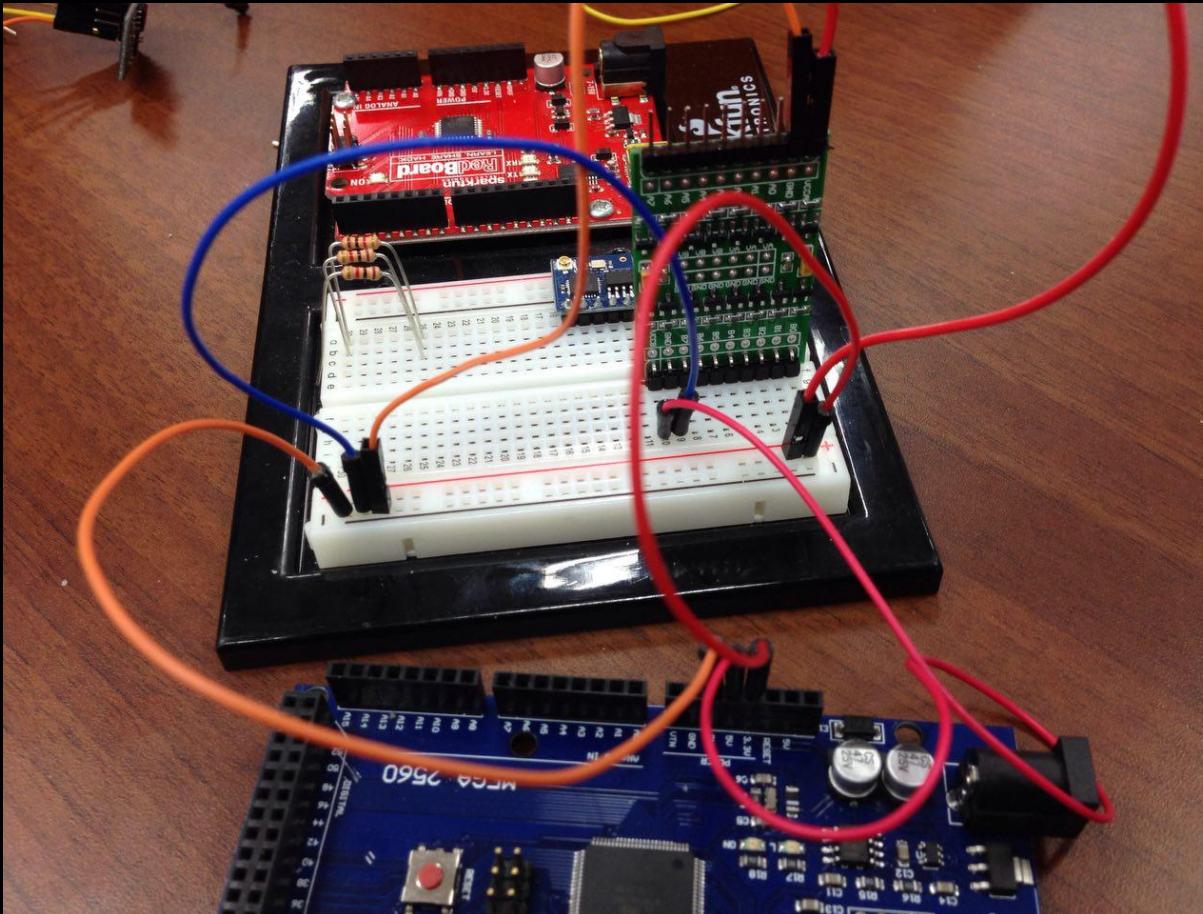
Logic Level Converter



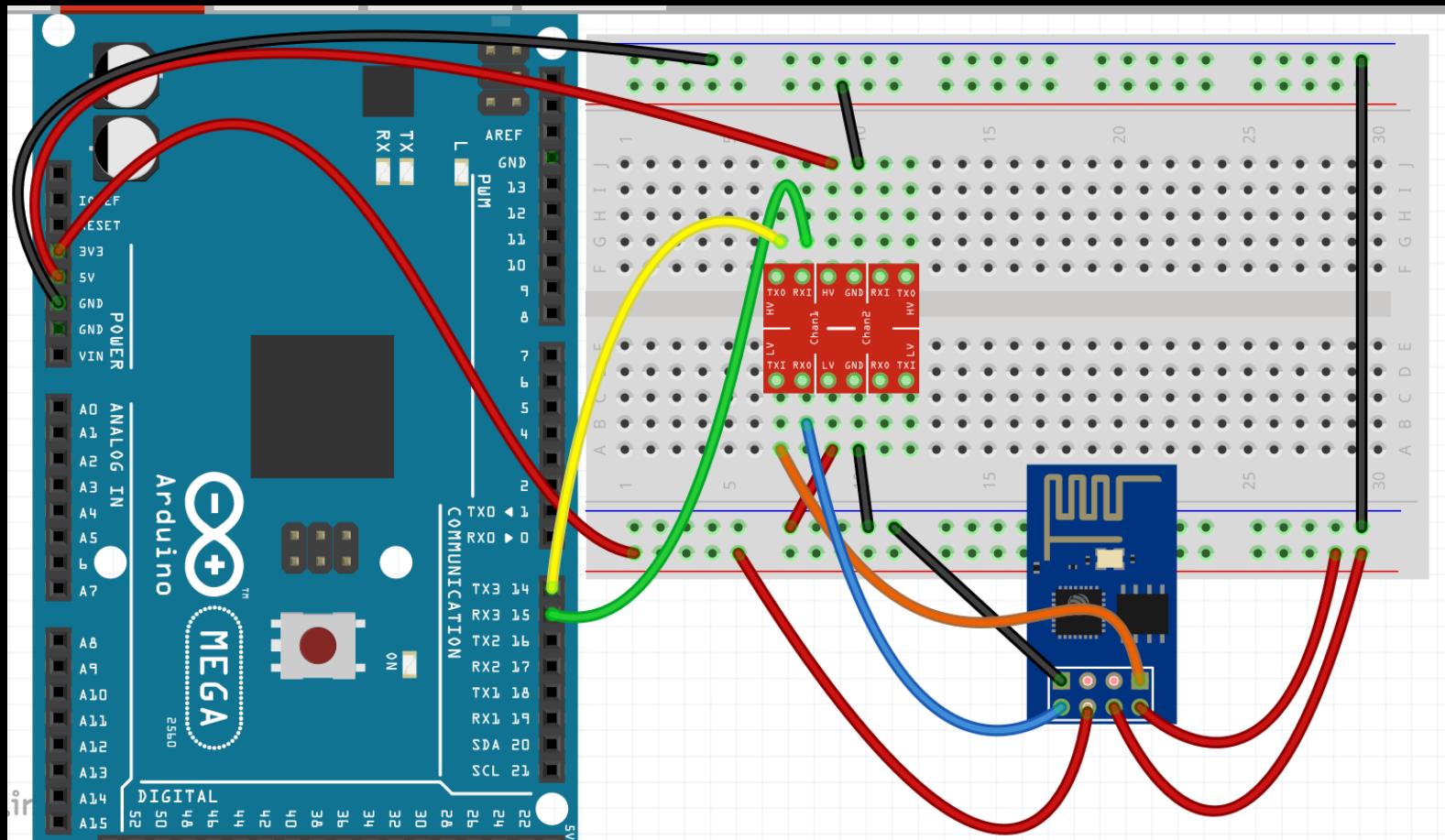
Logic Level Converter

- VCCA/VA connects to 3.3V power supply
- VCCB/VB connects to 5V power supply
- GND connects to power negative pole respectively, the two power supply should be common-grounded with each other
- When Ax has TTL 3.3V input, Bx will get TTL 5V output
- When Bx has TTL 5V input, Ax will get TTL 3.3V output
- NO direction control required

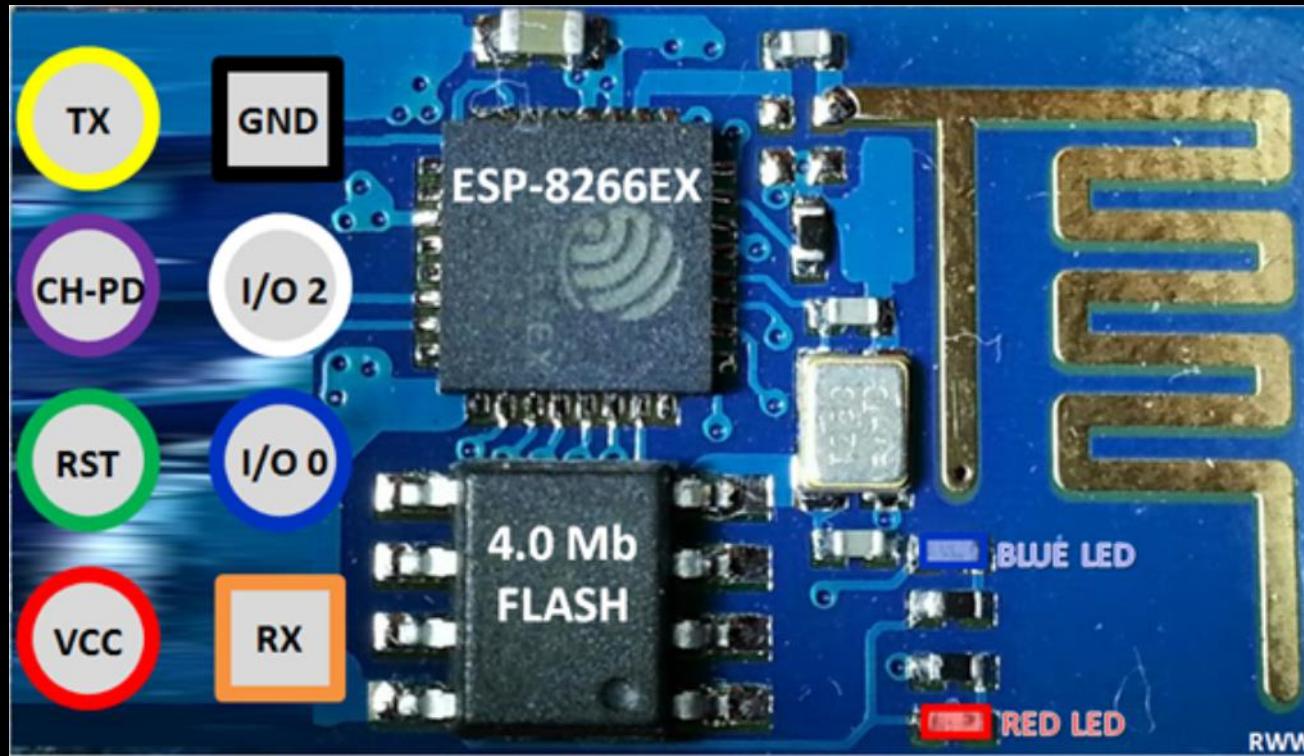
Connect #1



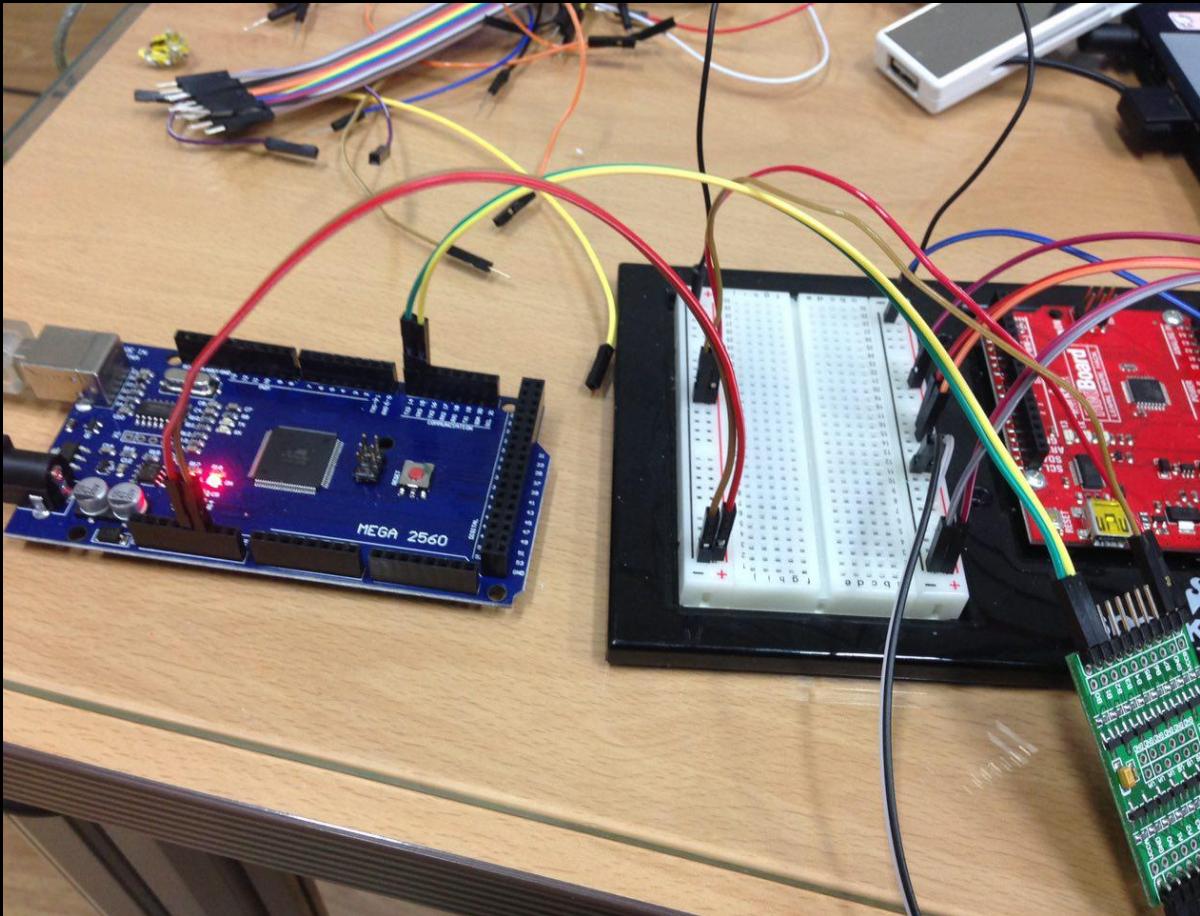
Make..



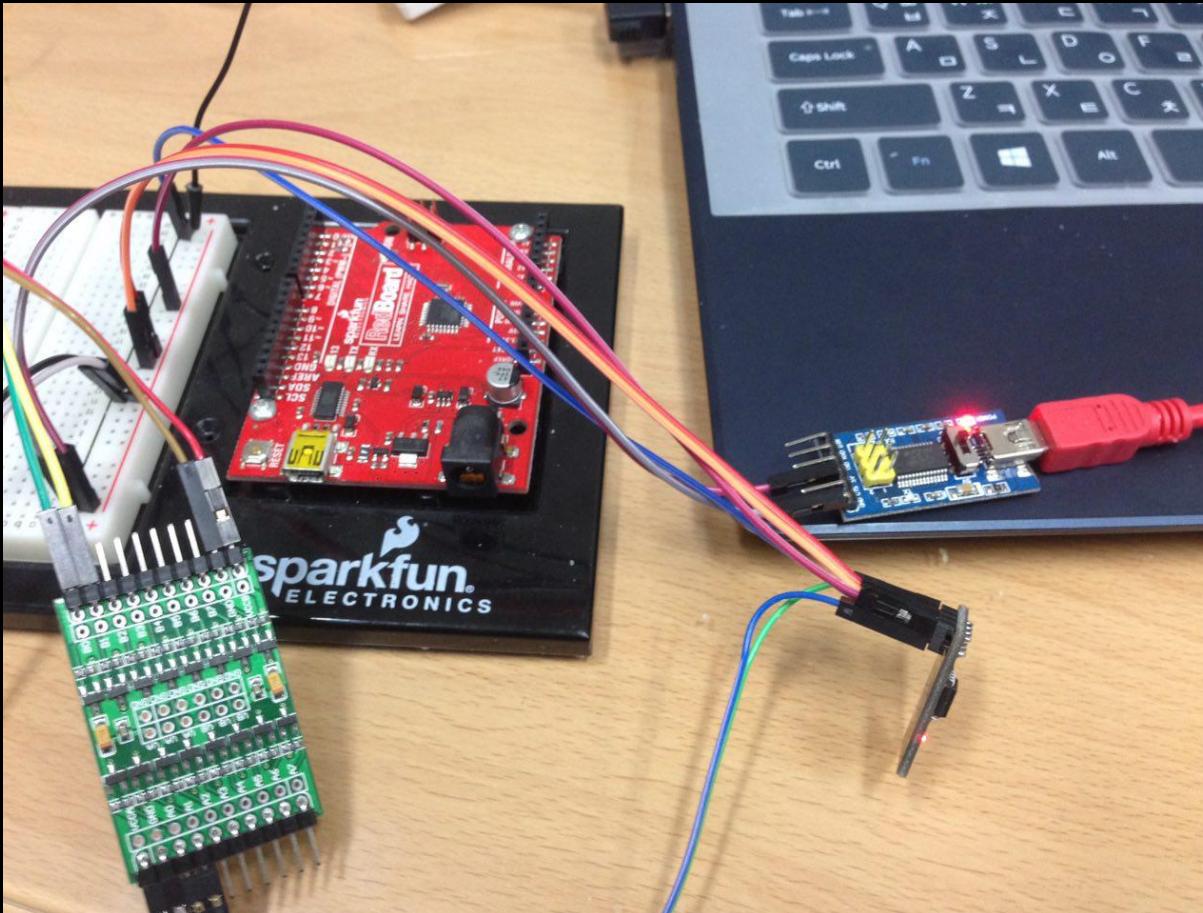
Connect #2 – FF*2 FM*4 Cable



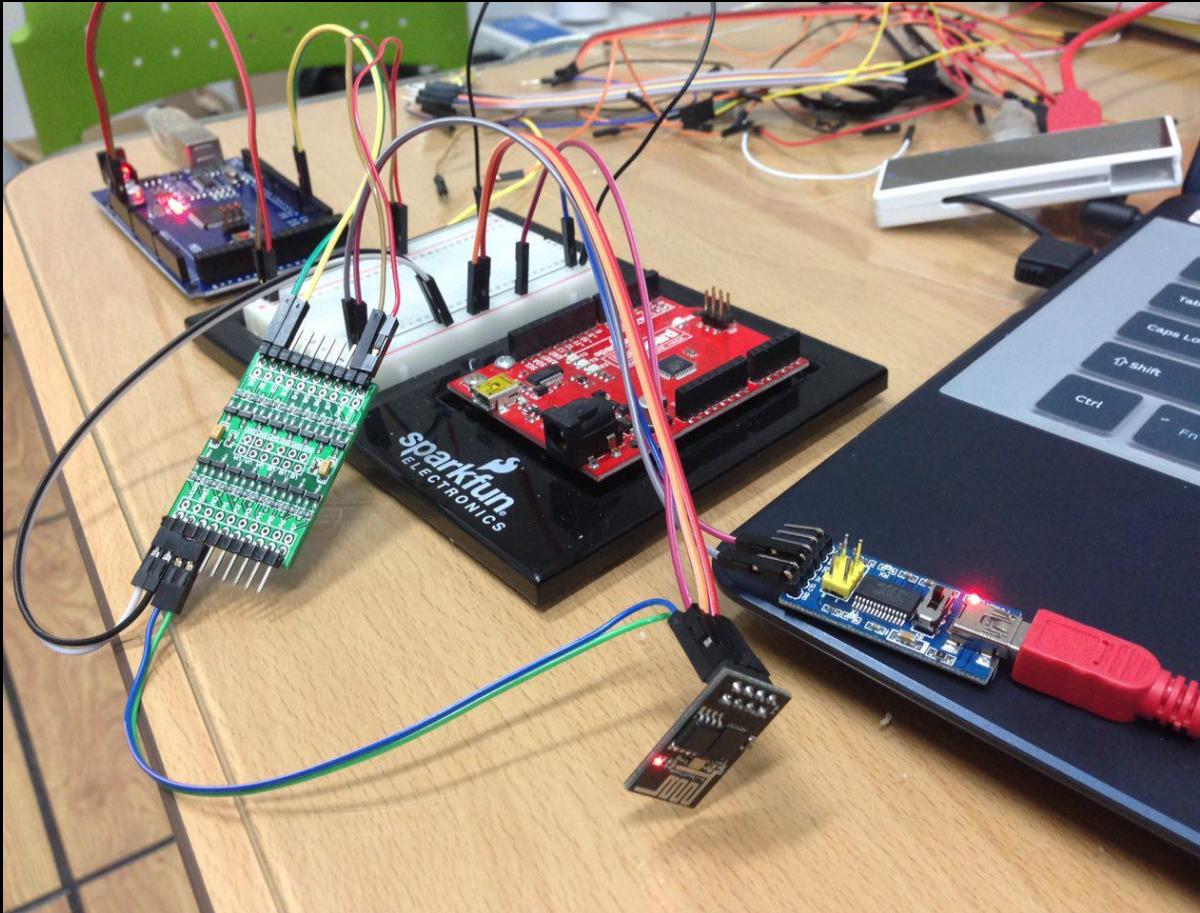
Connect #1



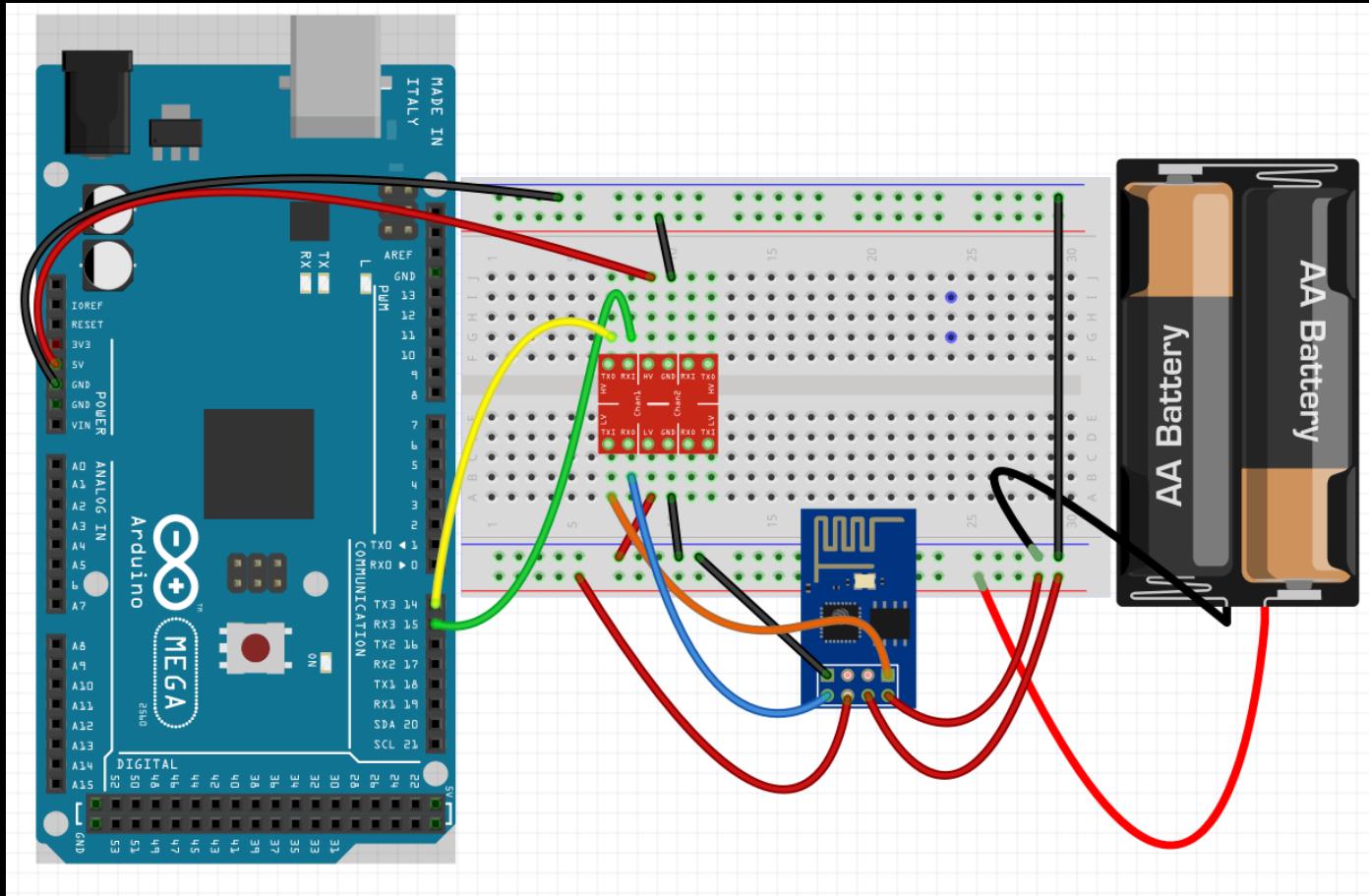
Connect #2



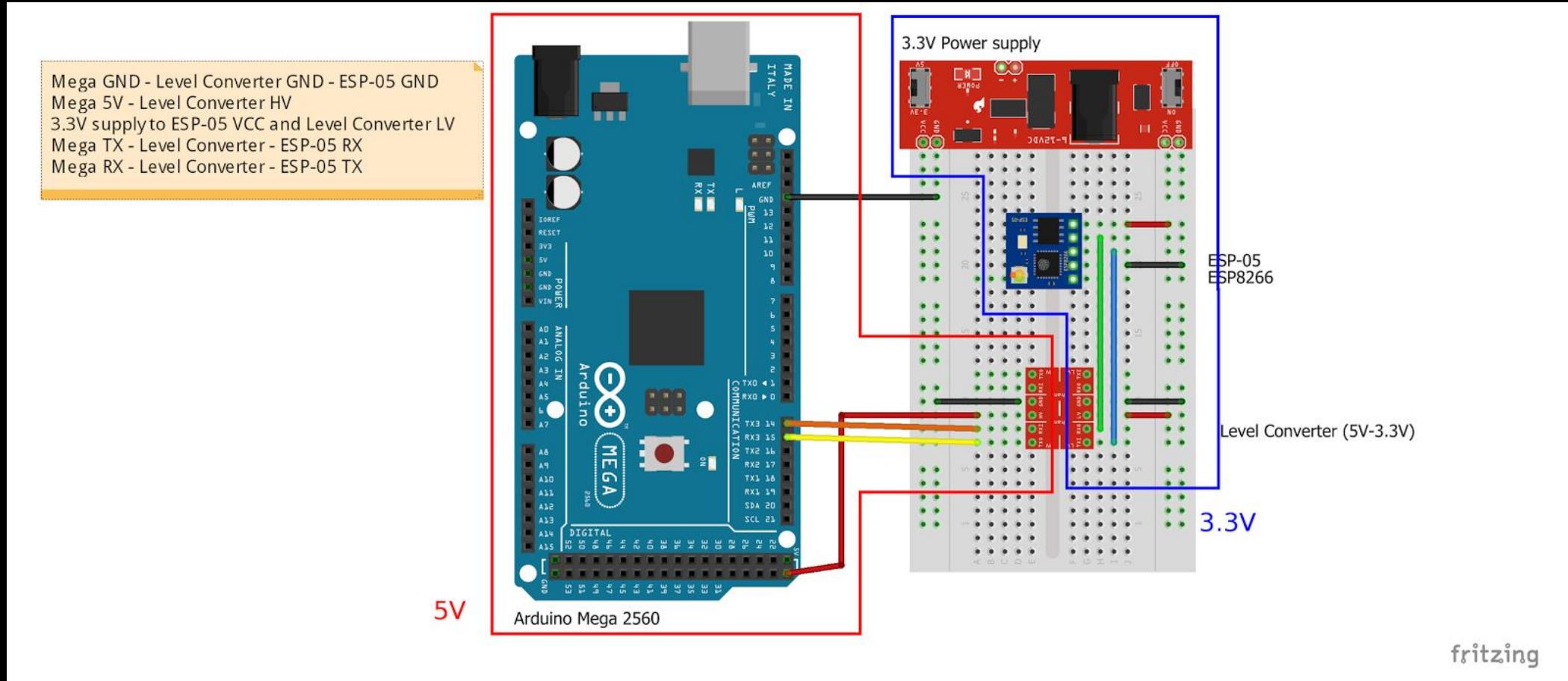
Connect #3



Final – We need external Power



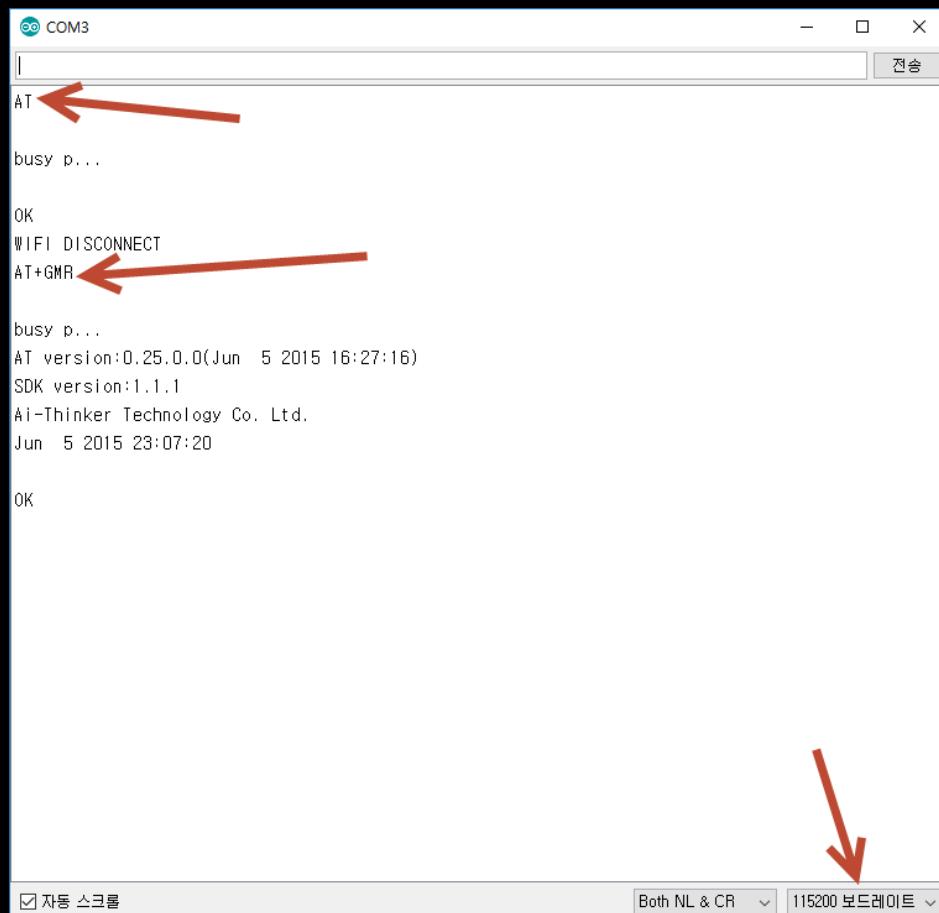
Like this..



Esp8266+MegaTest

- https://github.com/suakii/2016AdArduino/blob/master/Chapter5/gs_1_esp8266MegaTest/gs_1_esp8266MegaTest.ino

Esp8266+MegaTest



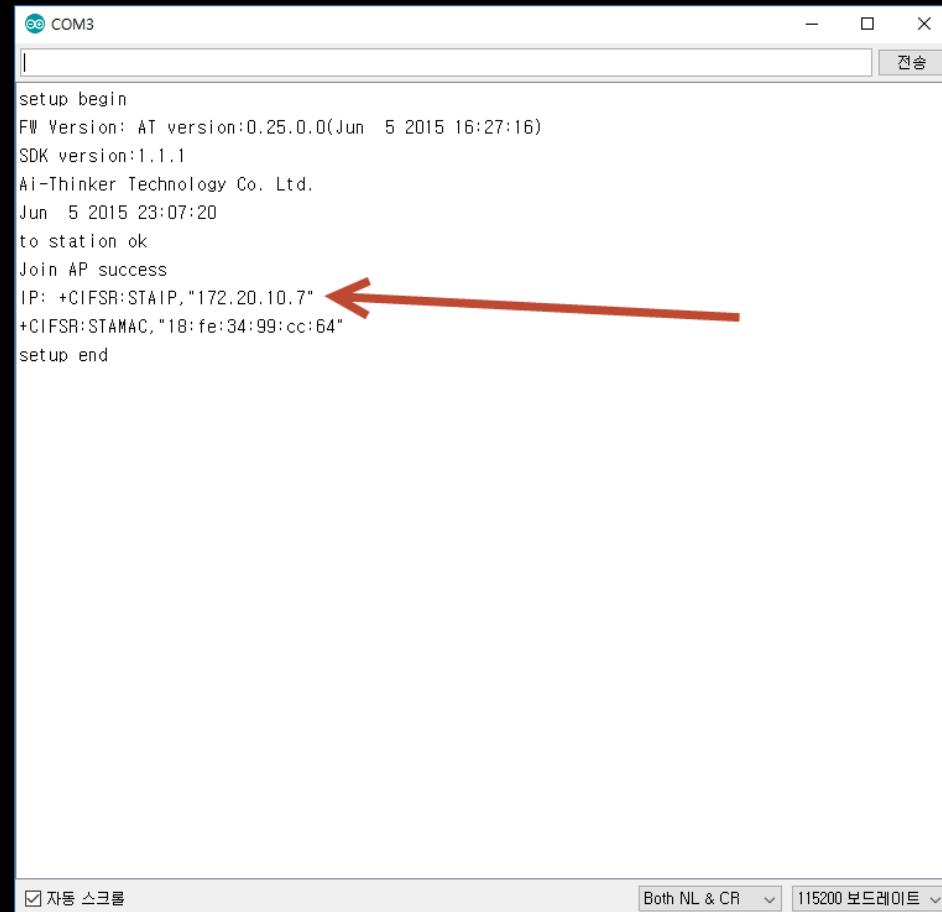
Esp8266 Library – Install to Arduino

- https://github.com/suakii/2016AdArduino/tree/master/Chapter5/gs_1-1

Connect Wi-Fi – your phone

- https://github.com/suakii/2016AdArduino/blob/master/Chapter5/gs_2_ConnectWifi/gs_2_ConnectWifi.ino

Connect Wi-Fi – your phone



```
COM3
|
setup begin
FW Version: AT version:0.25.0.0(Jun 5 2015 16:27:16)
SDK version:1.1.1
AI-Thinker Technology Co. Ltd.
Jun 5 2015 23:07:20
to station ok
Join AP success
IP: +CIFSR:STAIP,"172.20.10.7" ←
+CIFSR:STAMAC,"18:fe:34:99:cc:64"
setup end
```

자동 스크롤 Both NL & CR 115200 보드레이트

HttpGet

- https://github.com/suakii/2016AdArduino/blob/master/Chapter5/gs_3_HttpGet/gs_3_HttpGet.ino

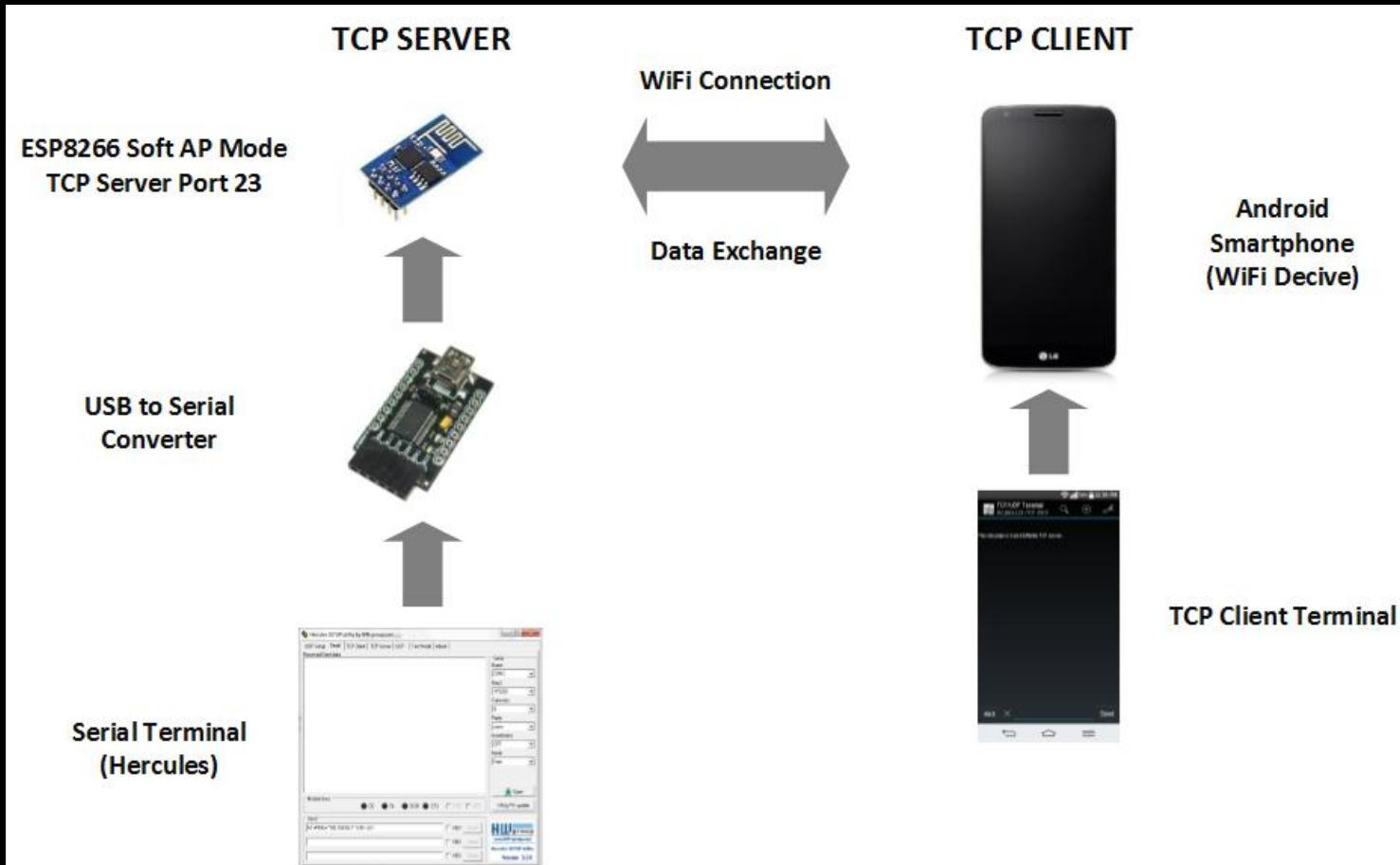
Http Get



```
COM3
[  ] 전송
setup begin
FW Version:AT version:0.25.0.0(Jun 5 2015 16:27:16)
SDK version:1.1.1
Ai-Thinker Technology Co. Ltd.
Jun 5 2015 23:07:20
to station + softap ok
Join AP success
IP:+CIFSR:APIP,"192.168.4.1"
+CIFSR:APMAC,"1a:fe:34:99:cc:64"
+CIFSR:STAIP,"172.20.10.7"
+CIFSR:STAMAC,"18:fe:34:99:cc:64"
single ok
setup end
create tcp ok
Received:[HTTP/1.1 301 Moved Permanently
Date: Thu, 24 Nov 2016 10:38:15 GMT
Server: Apache/2.2.31 (Unix) mod_ssl/2.2.31 OpenSSL/1.0.1e-fips mod_jk/1.2.40
Location: https://www.gs.hs.kr/
Content-Length: 229
Connection: close
Content-Type: text/html; charset=iso-8859-1
<!DOCTYPE HTML PUBLIC "-//IETF//DTD HTML 2.0//EN">
<html><head>
<title>301 Moved Permanently</title>
</head><body>
<h1>Moved Permanently</h1>
<p>The document has moved <a href="https://www.gs.hs.kr/">here</a>.</p>
</body></html>
]
release tcp err

자동 스크롤 Both NL & CR 115200 보드레이트
```

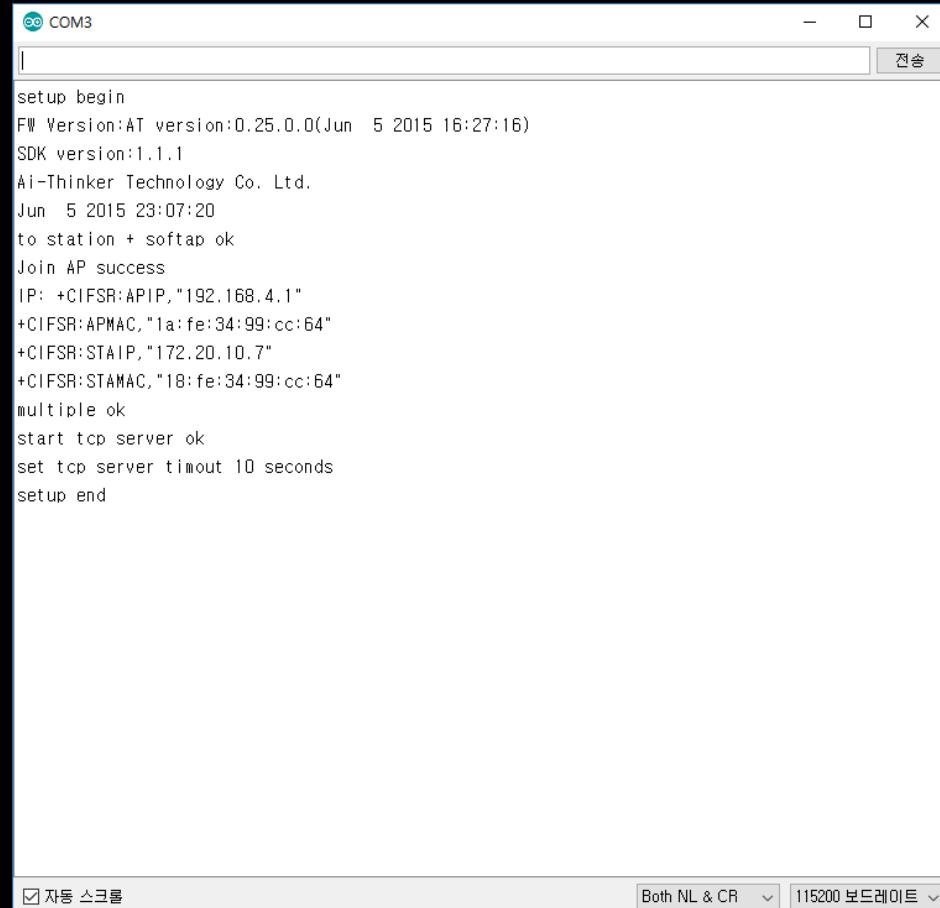
TCP Server – Like..



TCP Server

- https://github.com/suakii/2016AdArduino/blob/master/Chapter5/gs_4_TCPServer/gs_4_TCPServer.ino

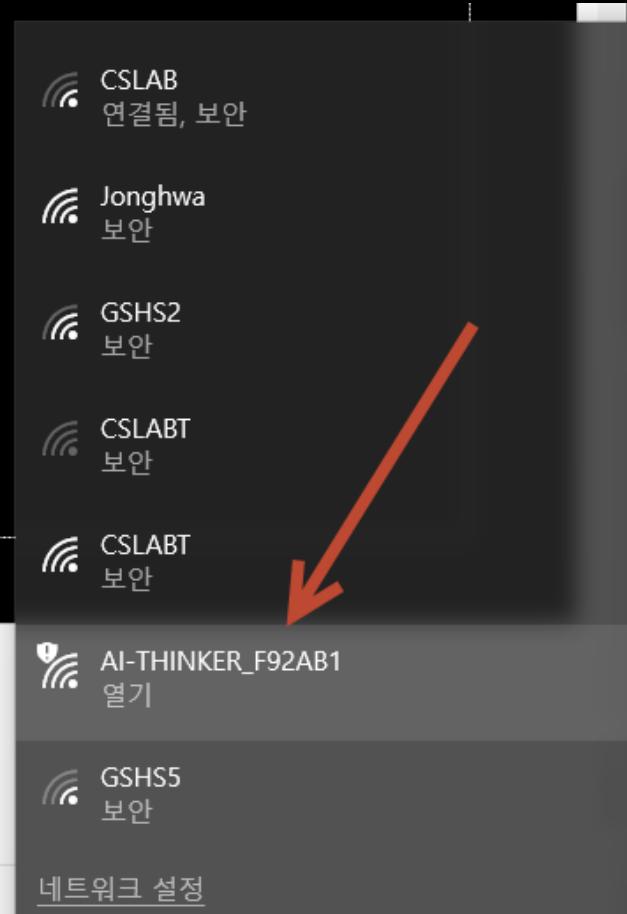
TCP Server



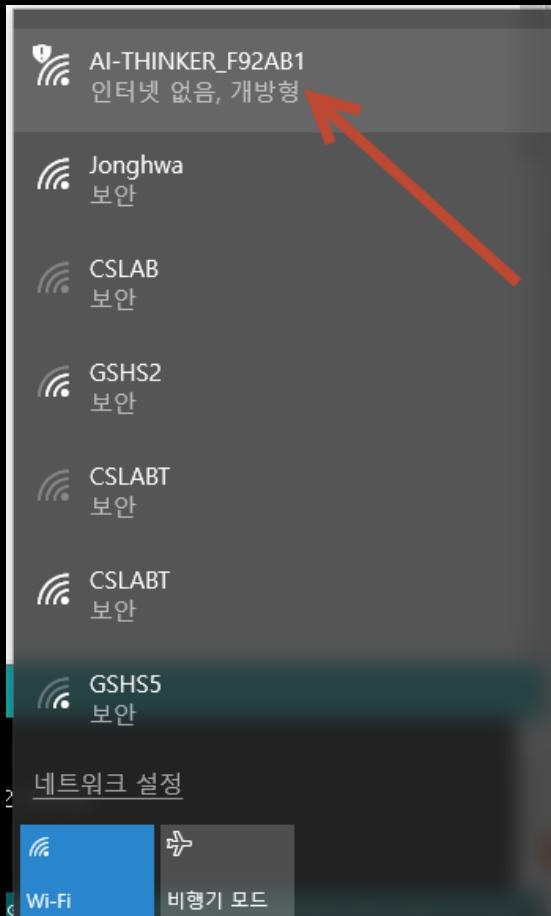
```
COM3
|
| 전송
setup begin
FW Version:AT version:0.25.0.0(Jun 5 2015 16:27:16)
SDK version:1.1.1
AI-Thinker Technology Co. Ltd.
Jun 5 2015 23:07:20
to station + softap ok
Join AP success
IP: +CIFSR:APIP,"192.168.4.1"
+CIFSR:APMAC,"1a:fe:34:99:cc:64"
+CIFSR:STAIP,"172.20.10.7"
+CIFSR:STAMAC,"18:fe:34:99:cc:64"
multiple ok
start tcp server ok
set tcp server timeout 10 seconds
setup end
```

Both NL & CR 115200 보드레이트

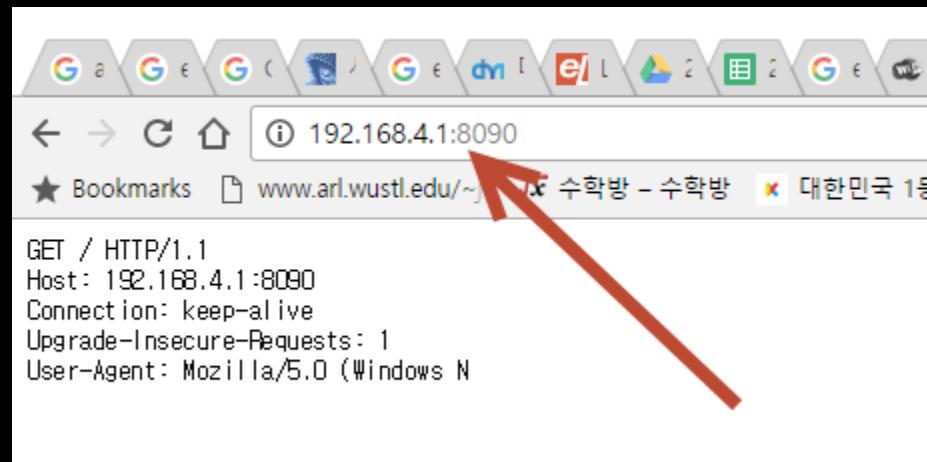
TCP Server



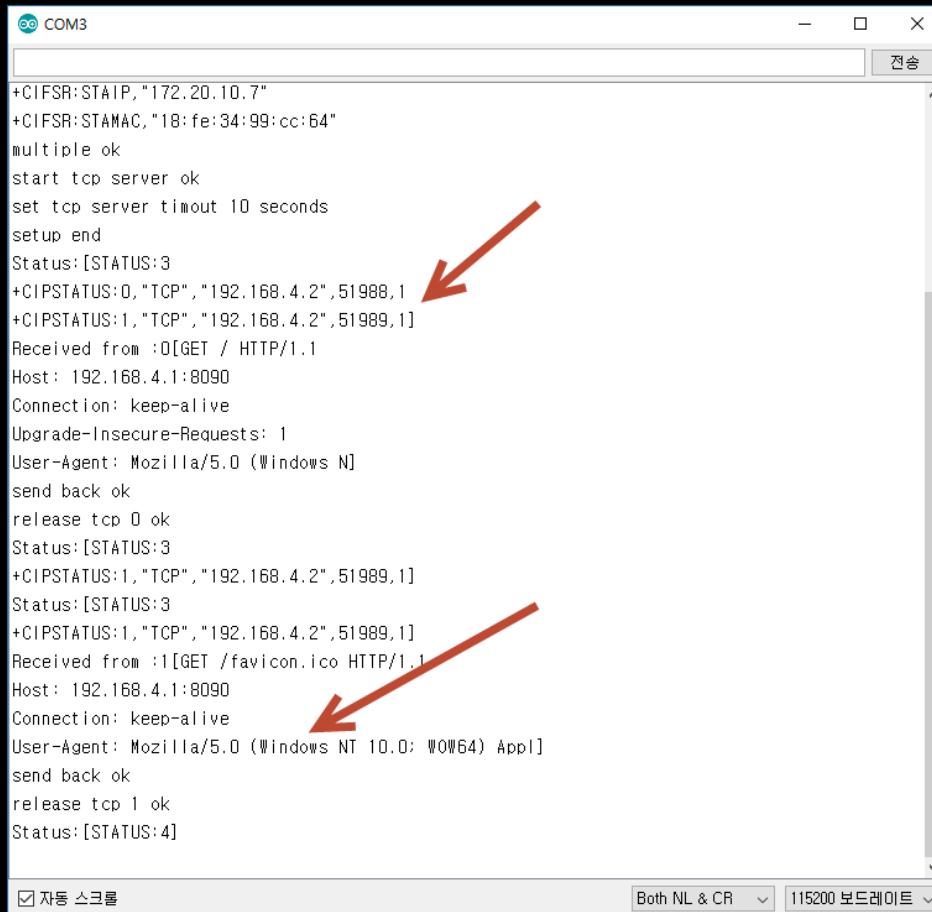
TCP Server



TCP Server



TCP Server



```
+CIFSR:STAIP,"172.20.10.7"
+CIFSR:STAMAC,"18:fe:34:99:cc:64"
multiple ok
start tcp server ok
set tcp server timeout 10 seconds
setup end
Status:[STATUS:3
+CIPISTATUS:0,"TCP","192.168.4.2",51988,1
+CIPISTATUS:1,"TCP","192.168.4.2",51989,1]
Received from :0[GET / HTTP/1.1
Host: 192.168.4.1:8090
Connection: keep-alive
Upgrade-Insecure-Requests: 1
User-Agent: Mozilla/5.0 (Windows N)
send back ok
release tcp 0 ok
Status:[STATUS:3
+CIPISTATUS:1,"TCP","192.168.4.2",51989,1]
Status:[STATUS:3
+CIPISTATUS:1,"TCP","192.168.4.2",51989,1]
Received from :1[GET /favicon.ico HTTP/1.1
Host: 192.168.4.1:8090
Connection: keep-alive
User-Agent: Mozilla/5.0 (Windows NT 10.0; WOW64) Appl]
send back ok
release tcp 1 ok
Status:[STATUS:4]
```

The screenshot shows a terminal window titled "COM3" displaying a log of a TCP server's activity. Two red arrows point to specific lines in the log:

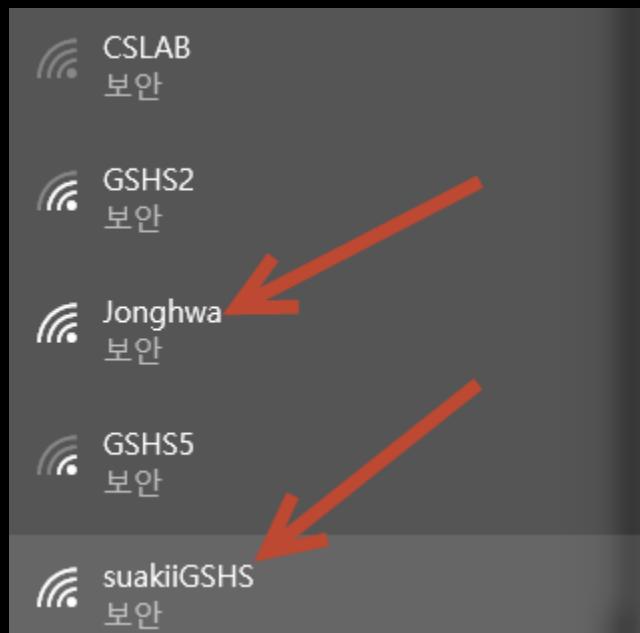
- The first arrow points to the line "+CIPISTATUS:1,"TCP","192.168.4.2",51989,1]". This indicates a new connection from an IP address of 192.168.4.2 on port 51989.
- The second arrow points to the line "Received from :1[GET /favicon.ico HTTP/1.1". This shows a client request for the favicon.ico file from the same connection.

The terminal window also includes standard controls like minimize, maximize, and close buttons, and a status bar at the bottom indicating "Both NL & CR" and a baud rate of "115200 보드레이트".

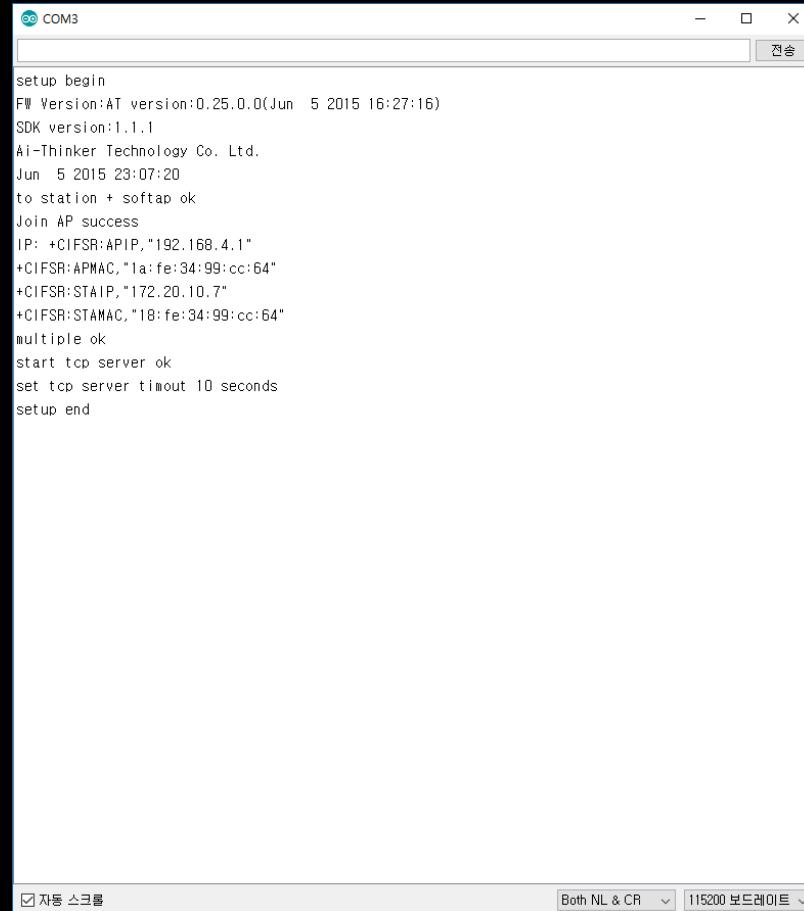
TCP Server -2 – AP Name Change

- https://github.com/suakii/2016AdArduino/blob/master/Chapter5/gs_4_TCPServerAPName/gs_4_TCPServerAPName.ino

TCP Server -2 – AP Name Change



TCP Server -2 – AP Name Change



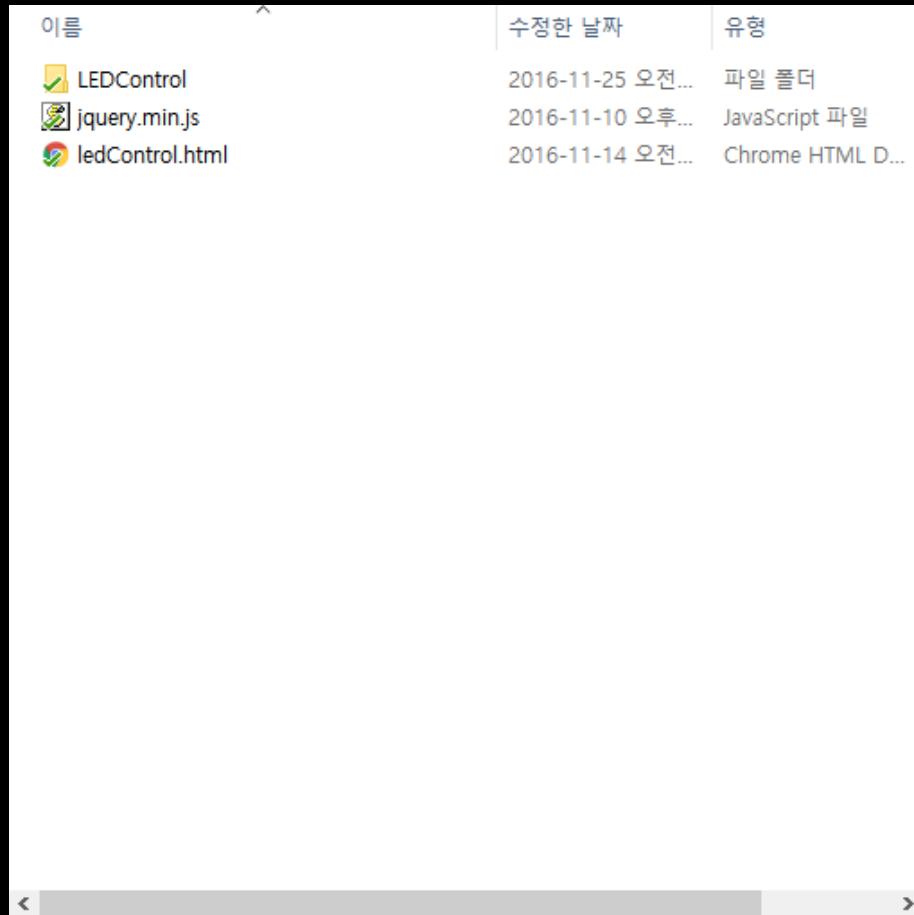
```
COM3
-
发送
setup begin
FW Version:AT version:0.25.0.0(Jun 5 2015 16:27:16)
SDK version:1.1.1
Ai-Thinker Technology Co. Ltd.
Jun 5 2015 23:07:20
to station + softap ok
Join AP success
IP: +CIFSR:APIP,"192.168.4.1"
+CIFSR:APMAC,"1a:fe:34:99:cc:64"
+CIFSR:STAIP,"172.20.10.7"
+CIFSR:STAMAC,"18:fe:34:99:cc:64"
multiple ok
start tcp server ok
set tcp server timeout 10 seconds
setup end
```

Both NL & CR 115200 보드레이트

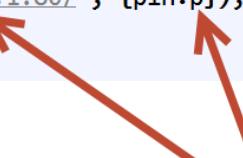
LED Control

- https://github.com/suakii/2016AdArduino/blob/master/Chapter5/gs_5_espLedControl/LEDControl/LEDControl.ino

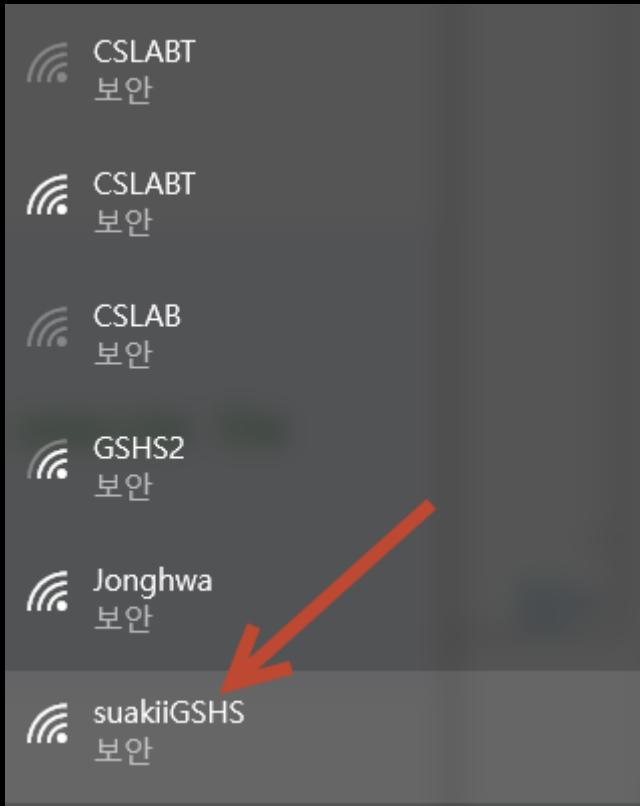
LED Control



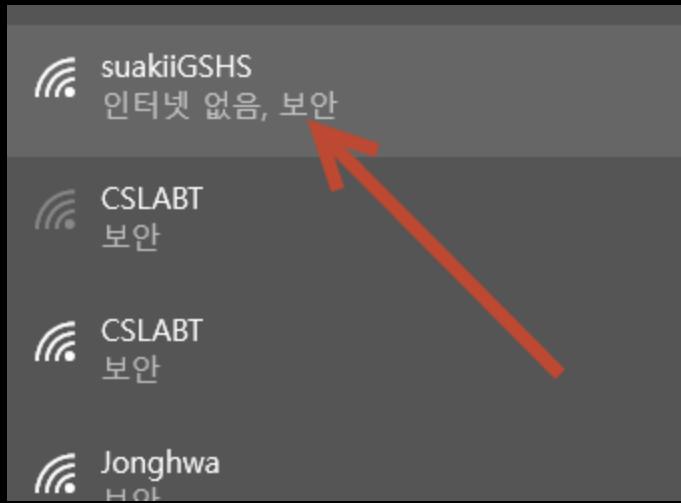
```
1 <html>
2   <head>
3     <title>ESP8266 LED Control</title>
4   </head>
5   <body>
6
7   <!-- in the &lt;button&gt; tags below the ID attribute is the value sent to the arduino --&gt;
8
9   &lt;button id="11" class="led"&gt;Toggle Pin 11&lt;/button&gt; <!-- button for pin 11 --&gt;
10  &lt;button id="12" class="led"&gt;Toggle Pin 12&lt;/button&gt; <!-- button for pin 12 --&gt;
11  &lt;button id="13" class="led"&gt;Toggle Pin 13&lt;/button&gt; <!-- button for pin 13 --&gt;
12
13  &lt;script src="jquery.min.js"&gt;&lt;/script&gt;
14  &lt;script type="text/javascript"&gt;
15    $(document).ready(function(){
16      $(".led").click(function(){
17        var p = $(this).attr('id'); // get id value (i.e. pin13, pin12, or pin11)
18        // send HTTP GET request to the IP address with the parameter "pin" and value "p", then execute the
19        // function
20        $.get("http://192.168.4.1:80/", {pin:p}); // execute get request
21      });
22    });
23  &lt;/script&gt;
24 &lt;/body&gt;
&lt;/html&gt;</pre>
```



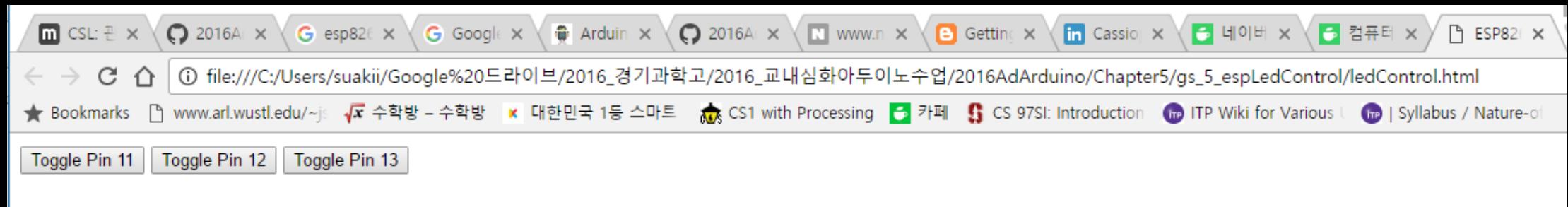
LED Control



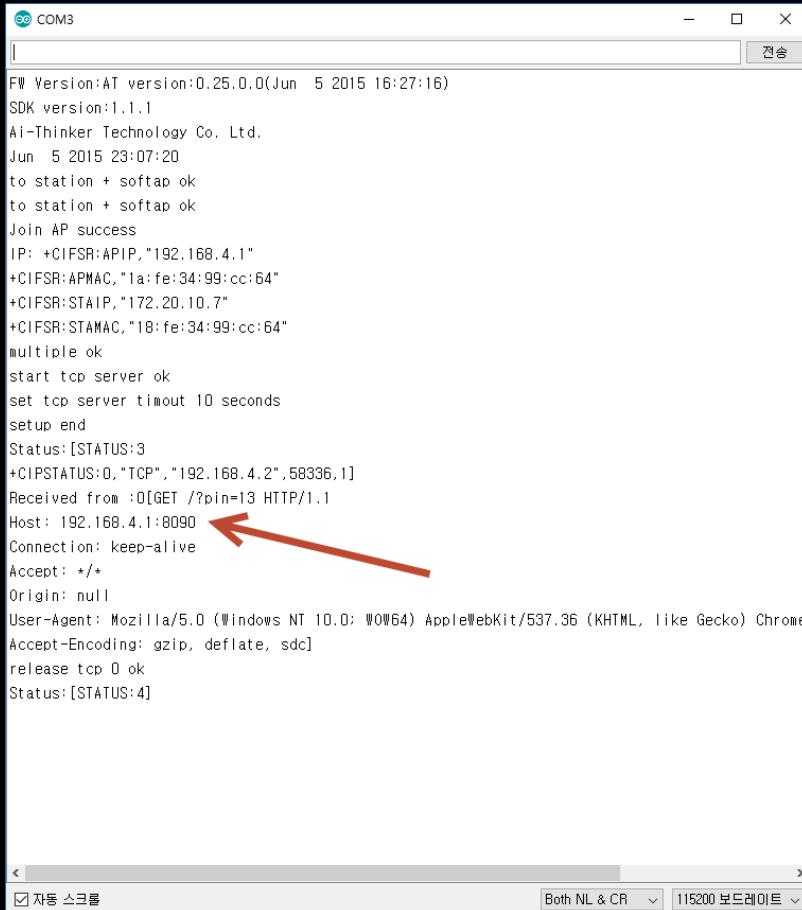
LED Control



LED Control



LED Control



```
COM3
|
FW Version:AT version:0.25.0.0(Jun 5 2015 16:27:16)
SDK version:1.1.1
Ai-Thinker Technology Co. Ltd.
Jun 5 2015 23:07:20
to station + softap ok
to station + softap ok
Join AP success
IP: +CIFSR:APIP,"192.168.4.1"
+CIFSR:APMAC,"1a:fe:34:99:cc:64"
+CIFSR:STAIP,"172.20.10.7"
+CIFSR:STAMAC,"18:fe:34:99:cc:64"
multiple ok
start tcp server ok
set tcp server timeout 10 seconds
setup end
Status:[STATUS:3
+CIPSTATUS:0,"TCP","192.168.4.2",58336,1]
Received from :0[GET /?pin=13 HTTP/1.1
Host: 192.168.4.1:8090 ←
Connection: keep-alive
Accept: /*
Origin: null
User-Agent: Mozilla/5.0 (Windows NT 10.0; WOW64) AppleWebKit/537.36 (KHTML, like Gecko) Chrome,
Accept-Encoding: gzip, deflate, sdch
release tcp 0 ok
Status:[STATUS:4]
```

< | >

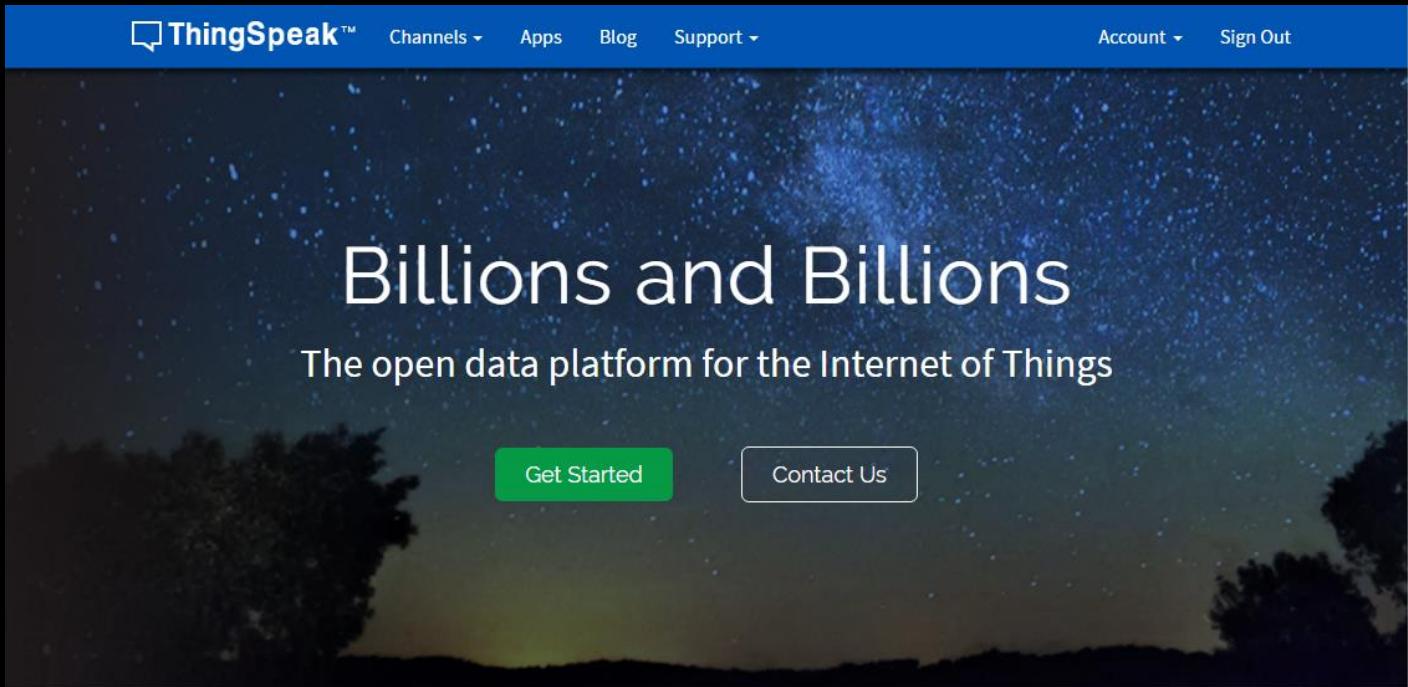
자동 스크롤

Both NL & CR 115200 보드레이트

LED Control

```
COM3
connection: keep-alive
Accept: /*
Origin: null
User-Agent: Mozilla/5.0 (Windows NT 10.0; Win64) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/53.0.2785.143 Safari/537.36
Accept-Encoding: gzip, deflate, sdch
Pin Number: 13
release tcp 0 ok
Status:[STATUS:4]
Status:[STATUS:3
+CIPSTATUS:0,"TCP","192.168.4.2",58424,1]
Received from :0[GET /?pin=13 HTTP/1.1
Host: 192.168.4.1:8090
Connection: keep-alive
Accept: /*
Origin: null
User-Agent: Mozilla/5.0 (Windows NT 10.0; Win64) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/53.0.2785.143 Safari/537.36
Accept-Encoding: gzip, deflate, sdch
Pin Number: 13
release tcp 0 ok
Status:[STATUS:4]
Status:[STATUS:3
+CIPSTATUS:0,"TCP","192.168.4.2",58425,1]
Received from :0[GET /?pin=13 HTTP/1.1
Host: 192.168.4.1:8090
Connection: keep-alive
Accept: /*
Origin: null
User-Agent: Mozilla/5.0 (Windows NT 10.0; Win64) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/53.0.2785.143 Safari/537.36
Accept-Encoding: gzip, deflate, sdch
Pin Number: 13
release tcp 0 ok
Status:[STATUS:4]
```

Simple IOT



The image shows the homepage of ThingSpeak, an open data platform for the Internet of Things. The header features the ThingSpeak logo and navigation links for Channels, Apps, Blog, Support, Account, and Sign Out. The main banner has a dark background with a starry sky and silhouettes of trees at the bottom. The text "Billions and Billions" is displayed prominently, followed by "The open data platform for the Internet of Things". Below the banner are two buttons: "Get Started" (green) and "Contact Us" (white). The footer section contains three cards: "Collect" (Send sensor data to the cloud), "Analyze" (Analyze and visualize your data), and "Act" (Trigger a reaction).

ThingSpeak™

Channels ▾ Apps Blog Support ▾

Account ▾ Sign Out

Billions and Billions

The open data platform for the Internet of Things

Get Started Contact Us

 Collect

Send sensor data to the cloud.

 Analyze

Analyze and visualize your data.

 Act

Trigger a reaction.

Make Channel

The screenshot shows the ThingSpeak website interface. At the top, there is a blue header bar with the "ThingSpeak™" logo, navigation links for "Channels", "Apps", "Blog", "Support", "Account", and "Sign Out". Below the header, the main content area has two sections: "My Channels" on the left and "Help" on the right.

My Channels

A green button labeled "New Channel" is visible. Below it is a table listing four channels:

Name	Created
🔒 Test	2016-06-28
⌚ TTest	2016-07-25
🔒 IOT	2016-07-25
🔒 GSHSAdTest	2016-11-10

Help

Text: Collect data in a ThingSpeak channel from a device, from another channel, or from the web. Click [New Channel](#) to create a new ThingSpeak channel.

Text: Learn to [create channels](#), explore and transform data.

Text: Learn more about [ThingSpeak Channels](#).

Examples

- [Arduino Tutorial](#)
- [Netduino Plus Tutorial](#)

Key

The screenshot shows the ThingSpeak API Keys management interface. At the top, there's a navigation bar with links for Channels, Apps, Blog, Support, Account, and Sign Out. Below the navigation is a secondary navigation bar with links for Private View, Public View, Channel Settings, API Keys (which is the active tab), and Data Import / Export.

Write API Key

Key:

Generate New Write API Key

Read API Keys

Key:

Note:

Save Note **Delete API Key**

Generate New Read API Key

Help

API keys enable you to write data to a channel or read data from a private channel. API keys are auto-generated when you create a new channel.

API Keys Settings

- Write API Key:** Use this key to write data to a channel. If you feel your key has been compromised, click **Generate New Write API Key**.
- Read API Keys:** Use this key to allow other people to view your private channel feeds and charts. Click **Generate New Read API Key** to generate an additional read key for the channel.
- Note:** Use this field to enter information about channel read keys. For example, add notes to keep track of users with access to your channel.

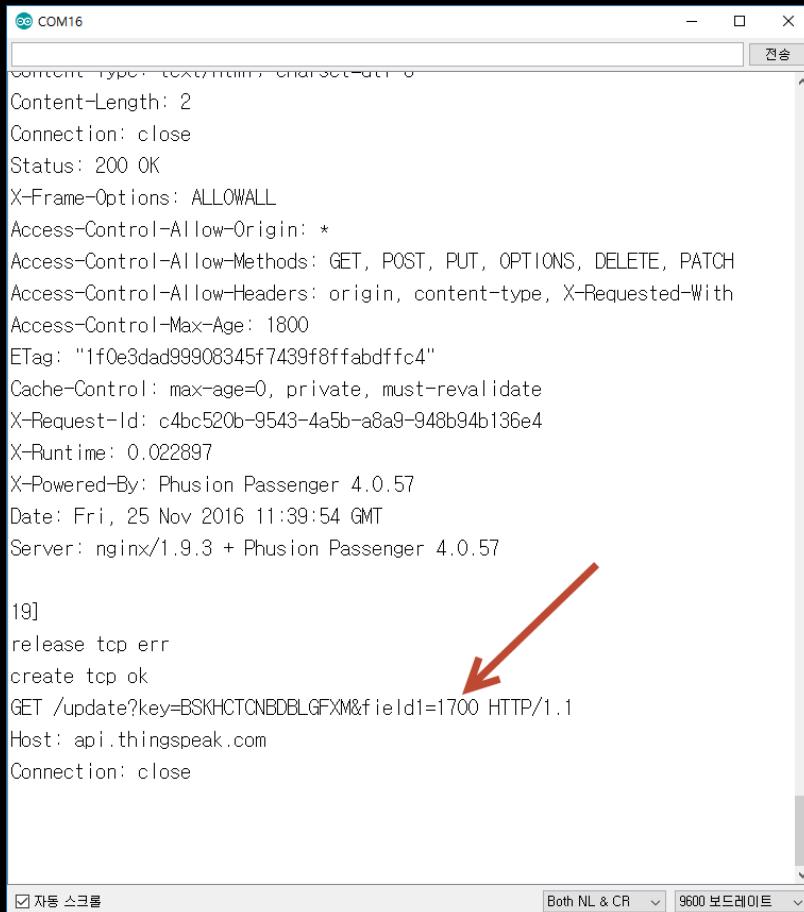
Create a Channel

```
POST https://api.thingspeak.com/channels.json  
api_key=5G98R0230IZOB1N2  
name=My New Channel
```

Update a Channel

```
PUT https://api.thingspeak.com/channels/181275  
api_key=5G98R0230IZOB1N2  
name=Updated Channel
```

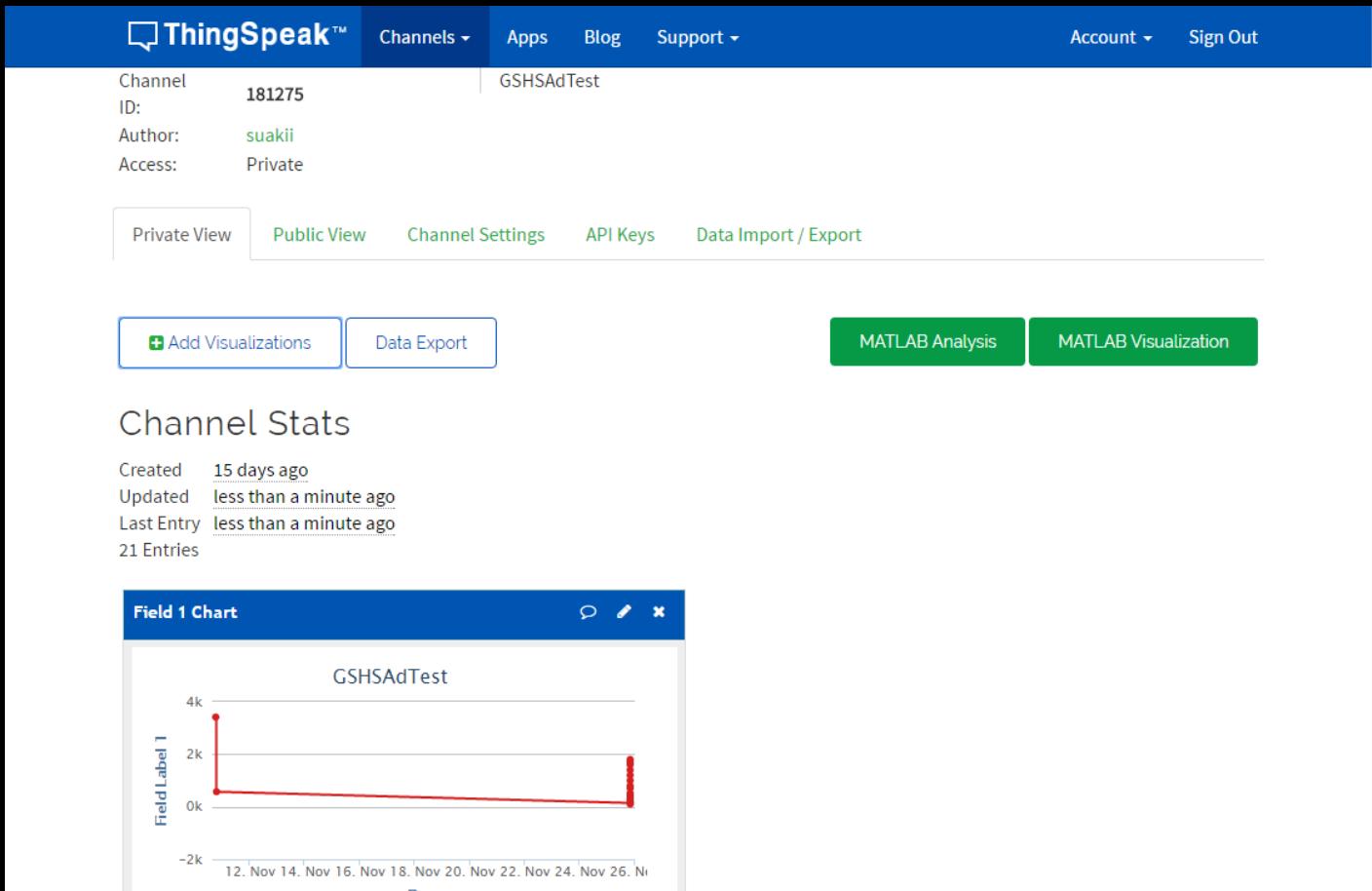
Upload Data



```
Content-Type: text/plain; charset=cp949
Content-Length: 2
Connection: close
Status: 200 OK
X-Frame-Options: ALLOWALL
Access-Control-Allow-Origin: *
Access-Control-Allow-Methods: GET, POST, PUT, OPTIONS, DELETE, PATCH
Access-Control-Allow-Headers: origin, content-type, X-Requested-With
Access-Control-Max-Age: 1800
ETag: "1f0e3dad99908345f7439f8ffabdff4"
Cache-Control: max-age=0, private, must-revalidate
X-Request-Id: c4bc520b-9543-4a5b-a8a9-948b94b136e4
X-Runtime: 0.022897
X-Powered-By: Phusion Passenger 4.0.57
Date: Fri, 25 Nov 2016 11:39:54 GMT
Server: nginx/1.9.3 + Phusion Passenger 4.0.57

19]
release tcp err
create tcp ok
GET /update?key=BSKHCTCNBDBLGFXM&field1=1700 HTTP/1.1
Host: api.thingspeak.com
Connection: close
```

Result

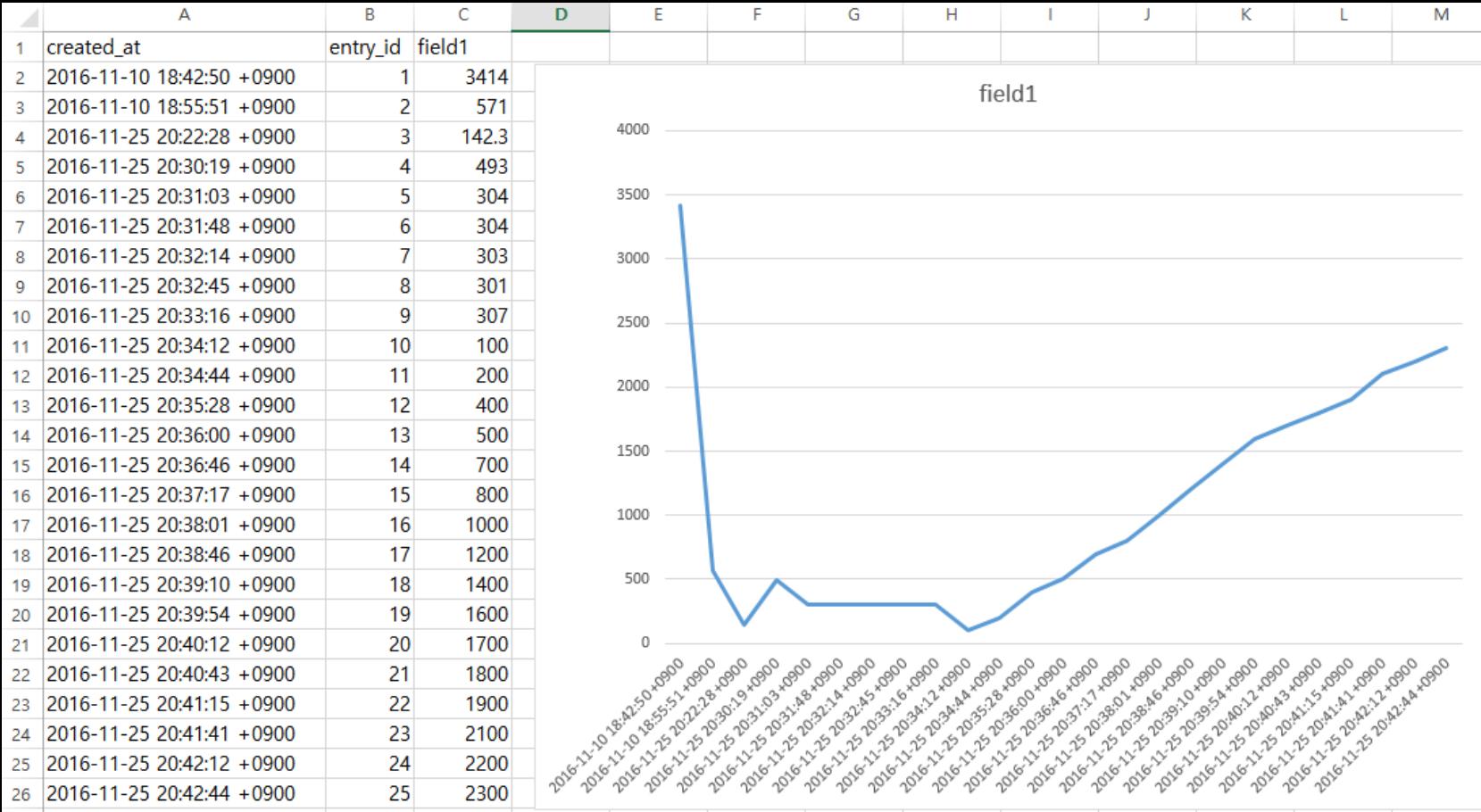


Analysis

MATLAB Analysis

MATLAB Visualization

Export and Graph



Make APP

- Don't reinvent the wheel... but....

Blynk



The Blynk website homepage features a large banner at the top showing a smartphone displaying a Blynk dashboard with the text "MY DASHBOARD" and "HI, KICKSTARTER!". To the right of the phone is an image of an Arduino Uno microcontroller board. The top navigation bar includes links for HOME, GETTING STARTED, DOCS, COMMUNITY, and FOR BUSINESS.

First drag-n-drop IoT app builder for Arduino, Raspberry Pi, ESP8266, SparkFun boards, and others

Every project made with Blynk can be branded, and published to App Store and Google Play with your icon and app name.

Interested? Click [here](#)

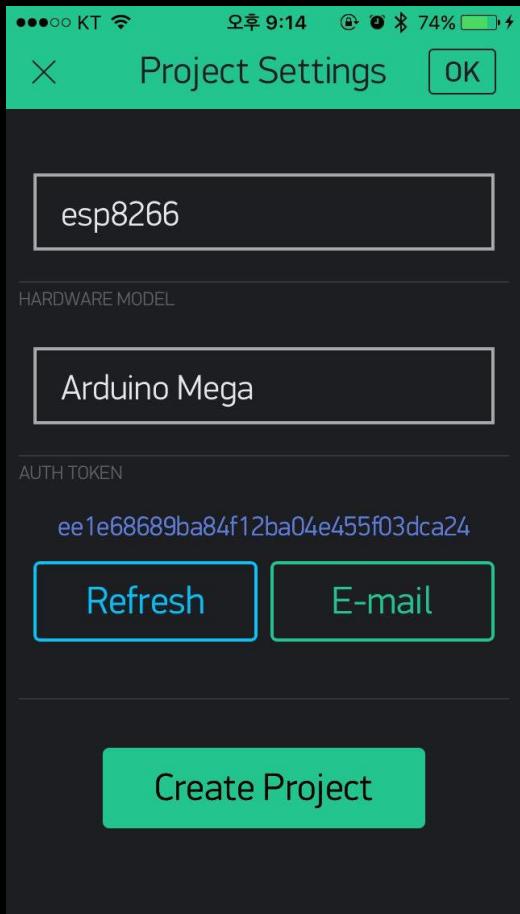
DOWNLOAD BLYNK TODAY:

 Available on the
App Store

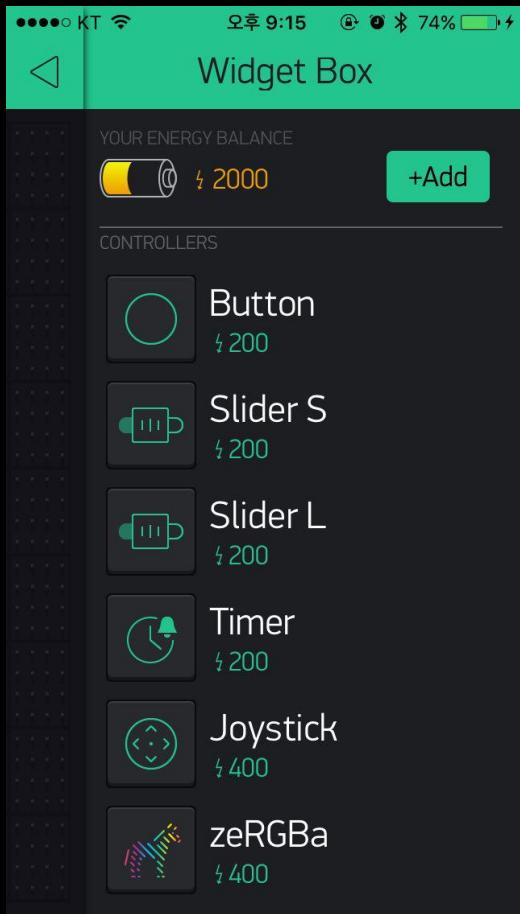
Blynk



Blynk



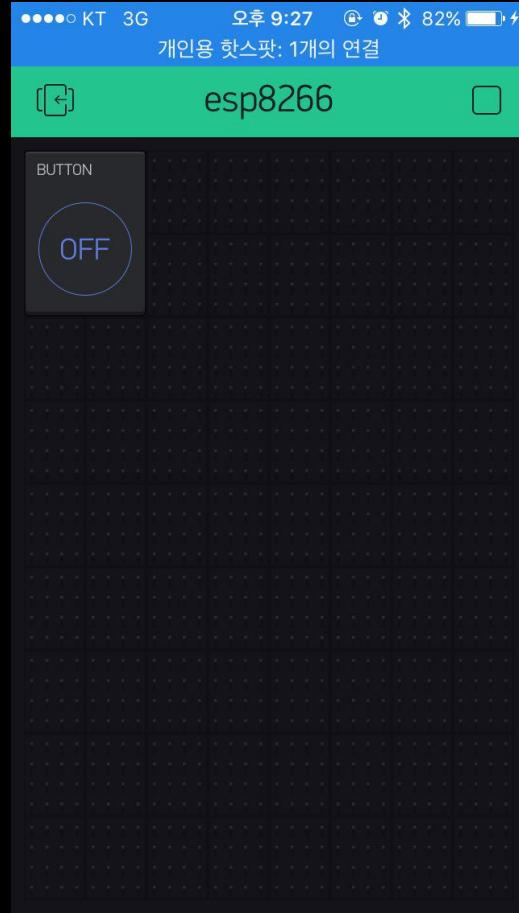
Blynk



Install libraries

```
[19] Blynk v0.4.0 on Arduino Mega
[520] Connecting to Jonghwa
[3557] AT version:0.25.0.0(Jun 5 2015 16:27:16)
SDK version:1.1.1
Ai-Thinker Technology Co. Ltd.
Jun 5 2015 23:07:20
[13581] Failed to connect WiFi
[38853] Ready (ping: 15ms).
```

Blynk



Thanks