



## How to Get Sensor Data From a Remote Arduino Via Wireless Lora Protocol

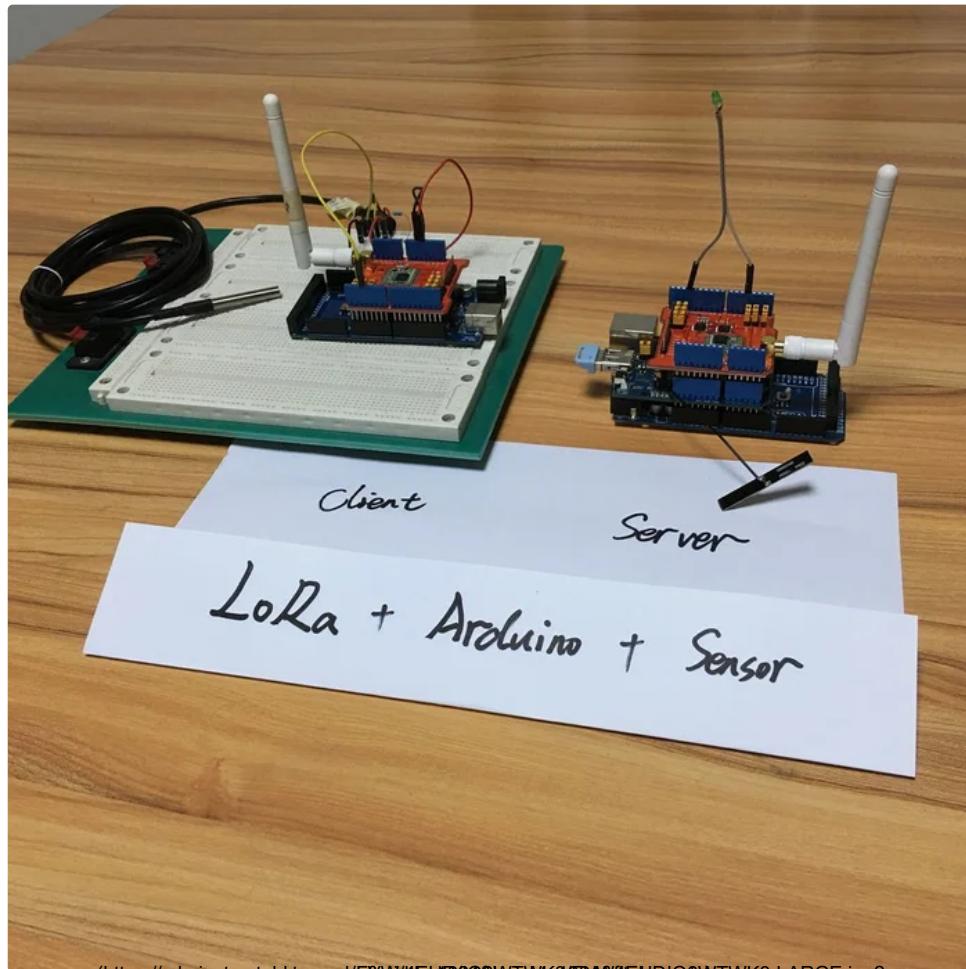
By DavidGuo (/member/DavidGuo/) in Circuits (/circuits/) > Arduino (/circuits/arduino/projects/) 27,859 120 24 Featured

Published Jul 3rd, 2016



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(/member/DavidGuo/)

By **DavidGuo**

(/member/DavidGuo/)

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This is an example to show how to get sensor data from a remote Arduino via [Wireless LoRa Protocol](#) (<http://www.lora-alliance.org/What-Is-LoRa/Technology>).

The example requires the following hardware:

- 1) Client Side: Arduino + [LoRa Shield](http://www.dragino.com/products/module/item/102-lora-shield.html) (<http://www.dragino.com/products/module/item/102-lora-shield.html>) (868MHz) + DS18B20 (Temperature Sensor).
- 2) Server Side: Arduino + [LoRa Shield](http://www.dragino.com/products/module/item/102-lora-shield.html) (<http://www.dragino.com/products/module/item/102-lora-shield.html>) (868MHz) + [Yun Shield](http://www.dragino.com/products/yunshield.html) (<http://www.dragino.com/products/yunshield.html>) + USB flash.

make sure the USB flash has this file datalog.csv in the data directory of root.

Requie below software: Radiohead library from: <http://www.airspayce.com/mikem/arduino/RadioHead/>... (<http://www.airspayce.com/mikem/arduino/RadioHead/>).

Client side will get the temperature and keep sending out to the server via Lora wireless.

Server side will listin on the Lora wireless frequency, once it get the data from Client side, it will turn on the LED and log the sensor data to a USB flash.

Follow the next operations to complete this project.

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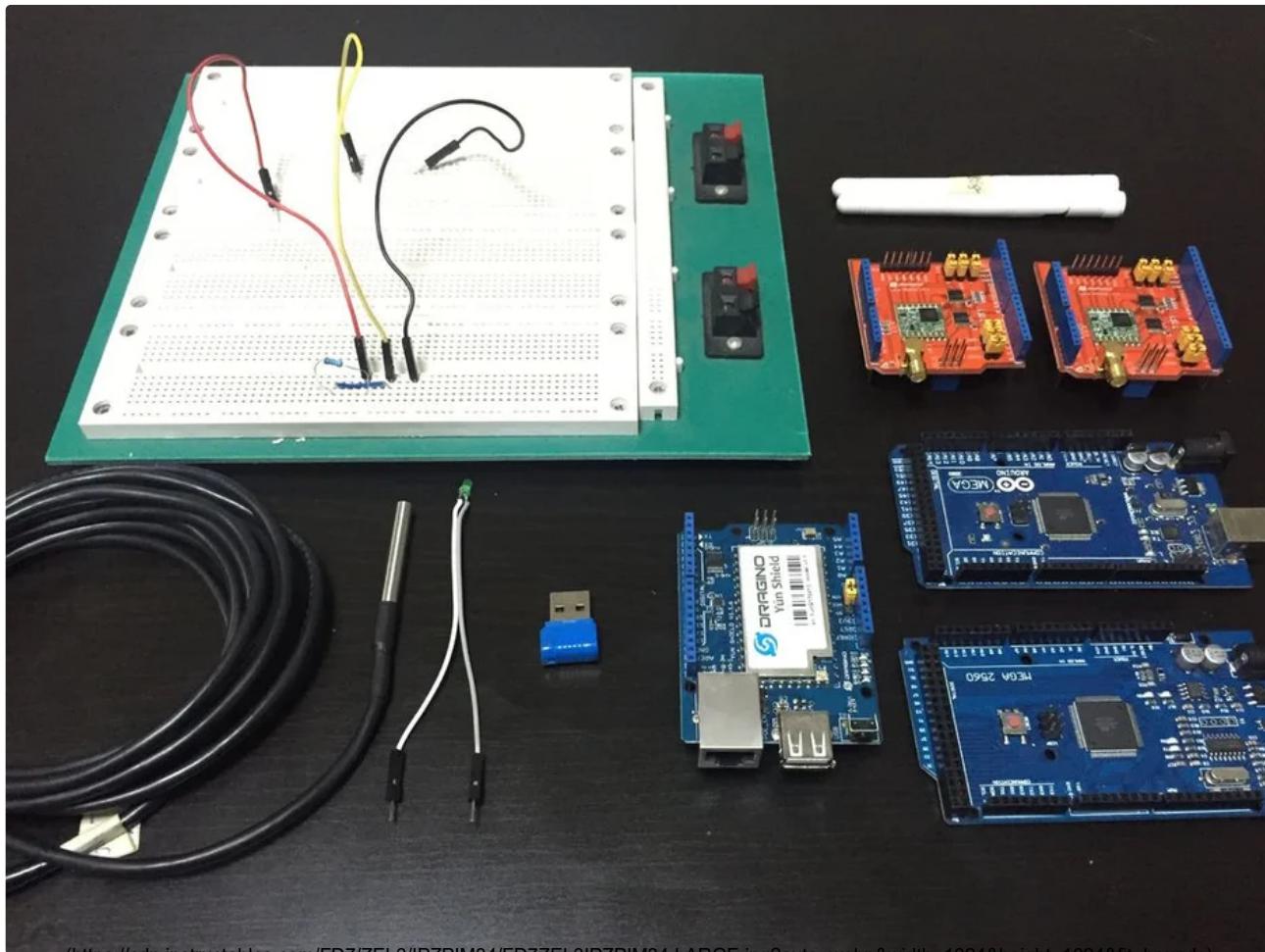
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## Step 1: Preparations



([https://cdn.instructables.com/ED7/ZEL/2IDZPIM34/ED7ZEL2IDZPIM34-LARGE\\_instructable-image\\_Pwidth=1024&hight=1024&fl\\_instruct](https://cdn.instructables.com/ED7/ZEL/2IDZPIM34/ED7ZEL2IDZPIM34-LARGE_instructable-image_Pwidth=1024&hight=1024&fl_instruct))

In this project,you need the things below:

- Arduino board x 2 (We use the MEGA2560 here)
- Dragino Lora Shield v1.3 x 2 (We use 868MHZ here)
- Yun Shield v1.1.6 x 1
- USB flash x 1
- DS18B20 x 1 (Temperature sensor)
- Bread board x 1
- 868MHZ antenna x 2
- USB cable x 2
- LED x 2
- 4.7k resistance x 1
- Some jump wires
- Power supply

**Note:**

About the Yun Shiled,we must use the Yun Shield v1.1.6/Yun Shield v2.2.4 or higher version

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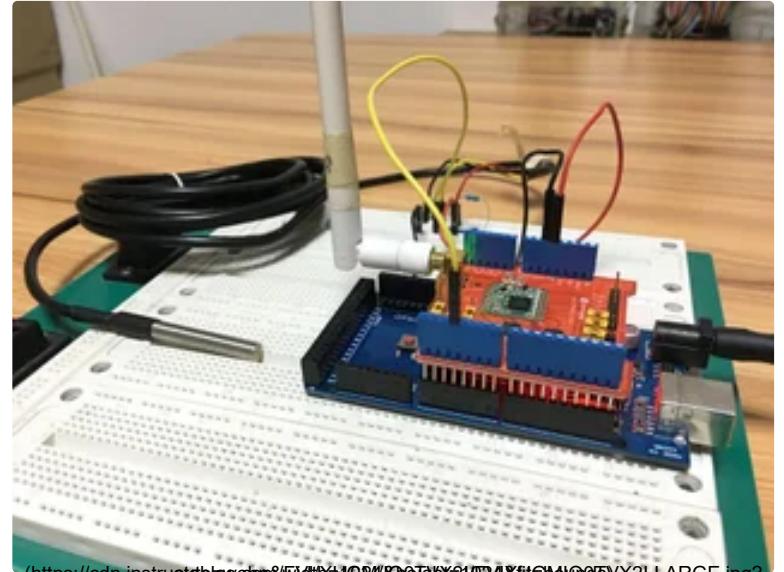
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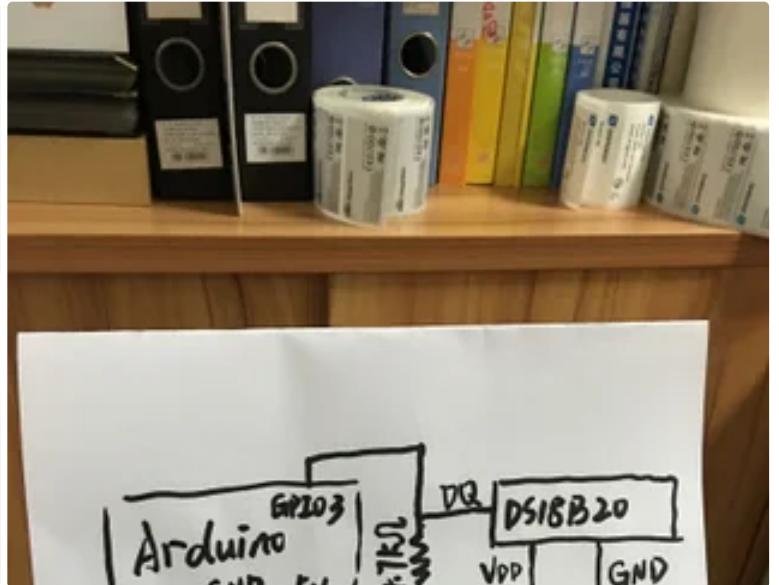
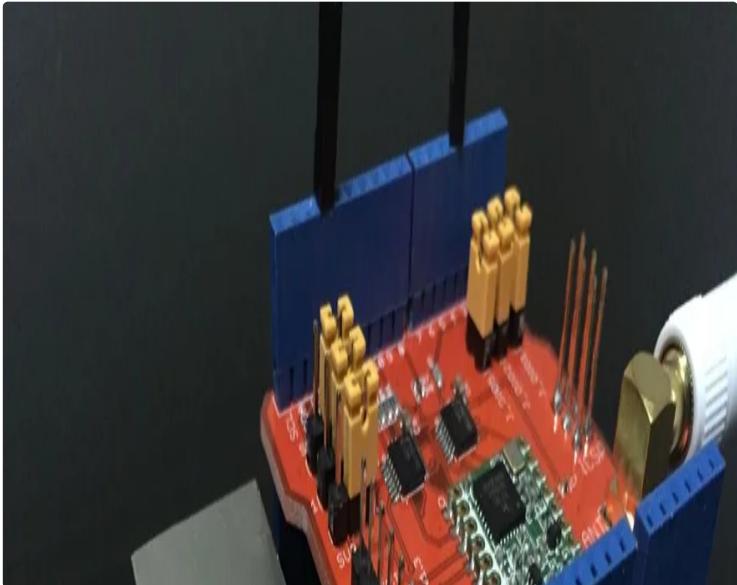
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## Step 2: Connections





In this step, we need to assemble the client and the server separately. Follow above pictures, and make sure

you got everything ready.

**NOTE:**

- The data wire is plugged into port 3 on the Arduino (Client)
- The LED is on the GPIO 4 (Server)
- Put the ant on the boards
- Create a directory named “data” in the USB flash root and create a file data.csv in this directory.

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### Step 3: Codes

The image shows two separate instances of the Arduino IDE. The left window is titled 'get\_temp\_data\_and\_sent\_to\_the\_Lora\_Server | Arduino 1.6.8' and contains the following code:

```

19
20 */
21 //Include required lib so Arduino can communicate with the temperature sensor DS18B20
22 #include <OneWire.h>
23 #include <DallasTemperature.h>
24 // Singleton instance of the radio driver
25 #include <SPI.h>
26 #include <RH_RF95.h>
27 RH_RF95 rf95;
28
29 // Data wire is plugged into port 3 on the Arduino
30 #define ONE_WIRE_BUS 3
31
32 // Setup a oneWire instance to communicate with any OneWire devices (not just Maxim/Dallas temp)
33 OneWire oneWire(ONE_WIRE_BUS);
34
35 // Pass our oneWire reference to Dallas Temperature.

```

The right window is titled 'get\_data\_from\_lora\_node\_and\_store\_in\_USB | Arduino 1.6.8' and contains the following code:

```

22 //Include required lib so Arduino can talk with the Lora Shield
23 #include <SPI.h>
24 #include <RH_RF95.h>
25
26 //Include required lib so Arduino can communicate with Yun Shield
27 #include <FileIO.h>
28 #include <Console.h>
29
30 // Singleton instance of the radio driver
31 RH_RF95 rf95;
32 int led = 4;
33 int reset_lora = 9;
34 String dataString = "";
35
36 void setup()
37 {
38   pinMode(led, OUTPUT);

```

Power them by Power supply, and connect them to the computer via USB cable.

## Client

Open the IDE (Over here, we use the version 1.6.8), choose the correct port and correct board for your client. Upload the client sketch to the arduino board, you can find the code here:

[https://github.com/dragino/Lora/blob/master/Lora%20Shield/Examples/Lora\\_Temperature\\_RadioHead/get\\_temp\\_data\\_and\\_sent\\_to\\_the\\_Lora\\_Server/get\\_temp\\_data\\_and\\_sent\\_to\\_the\\_Lora\\_Server.ino](https://github.com/dragino/Lora/blob/master/Lora%20Shield/Examples/Lora_Temperature_RadioHead/get_temp_data_and_sent_to_the_Lora_Server/get_temp_data_and_sent_to_the_Lora_Server.ino) ([https://github.com/dragino/Lora/blob/master/Lora%20Shield/Examples/Lora\\_Temperature\\_RadioHead/get\\_temp\\_data\\_and\\_sent\\_to\\_the\\_Lora\\_Server/get\\_temp\\_data\\_and\\_sent\\_to\\_the\\_Lora\\_Server.ino](https://github.com/dragino/Lora/blob/master/Lora%20Shield/Examples/Lora_Temperature_RadioHead/get_temp_data_and_sent_to_the_Lora_Server/get_temp_data_and_sent_to_the_Lora_Server.ino)).

## Server

Upload the server sketch to the arduino as above, you can find the code here:

[https://github.com/dragino/Lora/blob/master/Lora%20Shield/Examples/Lora\\_Temperature\\_RadioHead/get\\_data\\_from\\_lora\\_node\\_and\\_store\\_in\\_USB/get\\_data\\_from\\_lora\\_node\\_and\\_store\\_in\\_USB.ino](https://github.com/dragino/Lora/blob/master/Lora%20Shield/Examples/Lora_Temperature_RadioHead/get_data_from_lora_node_and_store_in_USB/get_data_from_lora_node_and_store_in_USB.ino) ([https://github.com/dragino/Lora/blob/master/Lora%20Shield/Examples/Lora\\_Temperature\\_RadioHead/get\\_data\\_from\\_lora\\_node\\_and\\_store\\_in\\_USB/get\\_data\\_from\\_lora\\_node\\_and\\_store\\_in\\_USB.ino](https://github.com/dragino/Lora/blob/master/Lora%20Shield/Examples/Lora_Temperature_RadioHead/get_data_from_lora_node_and_store_in_USB/get_data_from_lora_node_and_store_in_USB.ino)).

## Step 4: Running Result





<https://edn.instructables.com/ELIXIR-015-MATERIALS-IN-THE-LORAVUE-LARGE.html>

datalog.csv		
1	09/08/11-15:54:24	:
2	09/08/11-15:54:30	:
3	09/08/11-15:54:31	:
4	09/08/11-15:54:33	:
5	09/08/11-15:54:35	:
6	09/08/11-15:54:36	:
7	09/08/11-15:54:37	:
8	09/08/11-15:54:39	:
9	09/08/11-15:54:50	:
10	09/08/11-15:54:51	:
11	09/08/11-15:54:53	:
12	09/08/11-15:54:54	:
13	09/08/11-15:54:56	:

After the last step,you can see the LED on the server will flash once per second.Open the Serial Monitor of the client,you can see the temperature info obtained through the sensor and the communication between client and server.Open the Serial Monitor of the server,you can also get the server status.

Then,enter the USB flash by [WinSCP \(http://wiki.dragino.com/index.php?title=Transfer\\_/\\_Edit\\_it\\_files\\_in\\_ms14\)](http://wiki.dragino.com/index.php?title=Transfer_/_Edit_it_files_in_ms14).Open "/mnt/sda1/data/datalog.csv" and you will see the stored information(time stamp with the real-time temperature) as the last photo at this step.

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## Step 5: Usage Notice of Lora Shield

You have to be aware that Radio link quality and performances are highly dependent of environment.

Better performances can be reached with:

- Outdoor environment.
- No obstacles.
- No high level radio interferer in the ISM 868MHz band.
- At least 1 meter above the ground.

Radio performances are degraded with:

- Obstacles: buildings, trees...

- Inner buildings environments.
- High ISM 868MHz band usage by other technologies.

Radio communication are usually killed with bad topographic conditions. It is usually not possible to communicate through a hill, even very small.

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## Step 6: Reference

1. Lora Shield: [http://wiki.dragino.com/index.php?title=Lora\\_Shield](http://wiki.dragino.com/index.php?title=Lora_Shield) ([http://wiki.dragino.com/index.php?title=Lora\\_Shield](http://wiki.dragino.com/index.php?title=Lora_Shield)).
2. Lora Shiled Hardware Source: <https://github.com/dragino/Lora/tree/master/Lora%20Shield> (<https://github.com/dragino/Lora/tree/master/Lora%20Shield>).
3. Dragino Yun Shield: [http://wiki.dragino.com/index.php?title=Yun\\_Shield](http://wiki.dragino.com/index.php?title=Yun_Shield) ([http://wiki.dragino.com/index.php?title=Yun\\_Shield](http://wiki.dragino.com/index.php?title=Yun_Shield)).
4. Log sensor data to USB flash: [http://wiki.dragino.com/index.php?title=Arduino\\_Yun\\_Examples#Log\\_sensor\\_data\\_to\\_USB\\_flash](http://wiki.dragino.com/index.php?title=Arduino_Yun_Examples#Log_sensor_data_to_USB_flash) ([http://wiki.dragino.com/index.php?title=Arduino\\_Yun\\_Examples#Log\\_sensor\\_data\\_to\\_USB\\_flash](http://wiki.dragino.com/index.php?title=Arduino_Yun_Examples#Log_sensor_data_to_USB_flash)).
5. DS18B20: <http://datasheets.maximintegrated.com/en/ds/DS18B20.pdf> (<http://datasheets.maximintegrated.com/en/ds/DS18B20.pdf>).
6. Dallas Semiconductor's 1-Wire Protocol: <http://playground.arduino.cc/Learning/OneWire> (<http://playground.arduino.cc/Learning/OneWire>).

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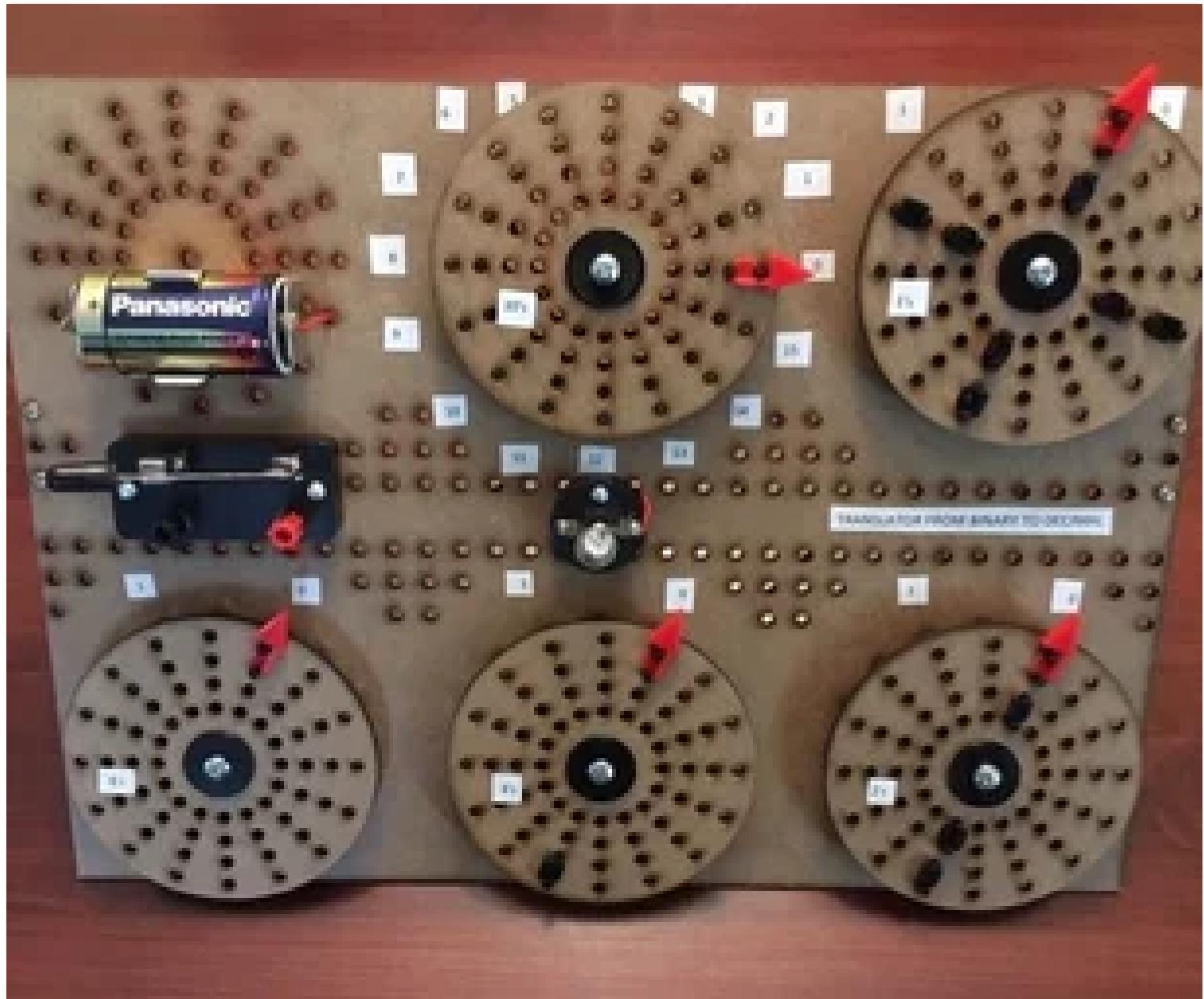
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(/id/GENIAC-Electric-Brain-Replica/)

GENIAC (Electric Brain) Replica (/id/GENIAC-Electric-Brain-Replica/)

by megardi (/member/megardi/) in Circuits (/circuits/)



(/id/FS-Touch-Bed-Levelling-Tool/)

**FS-Touch Bed Levelling Tool** (/id/FS-Touch-Bed-Levelling-Tool/)

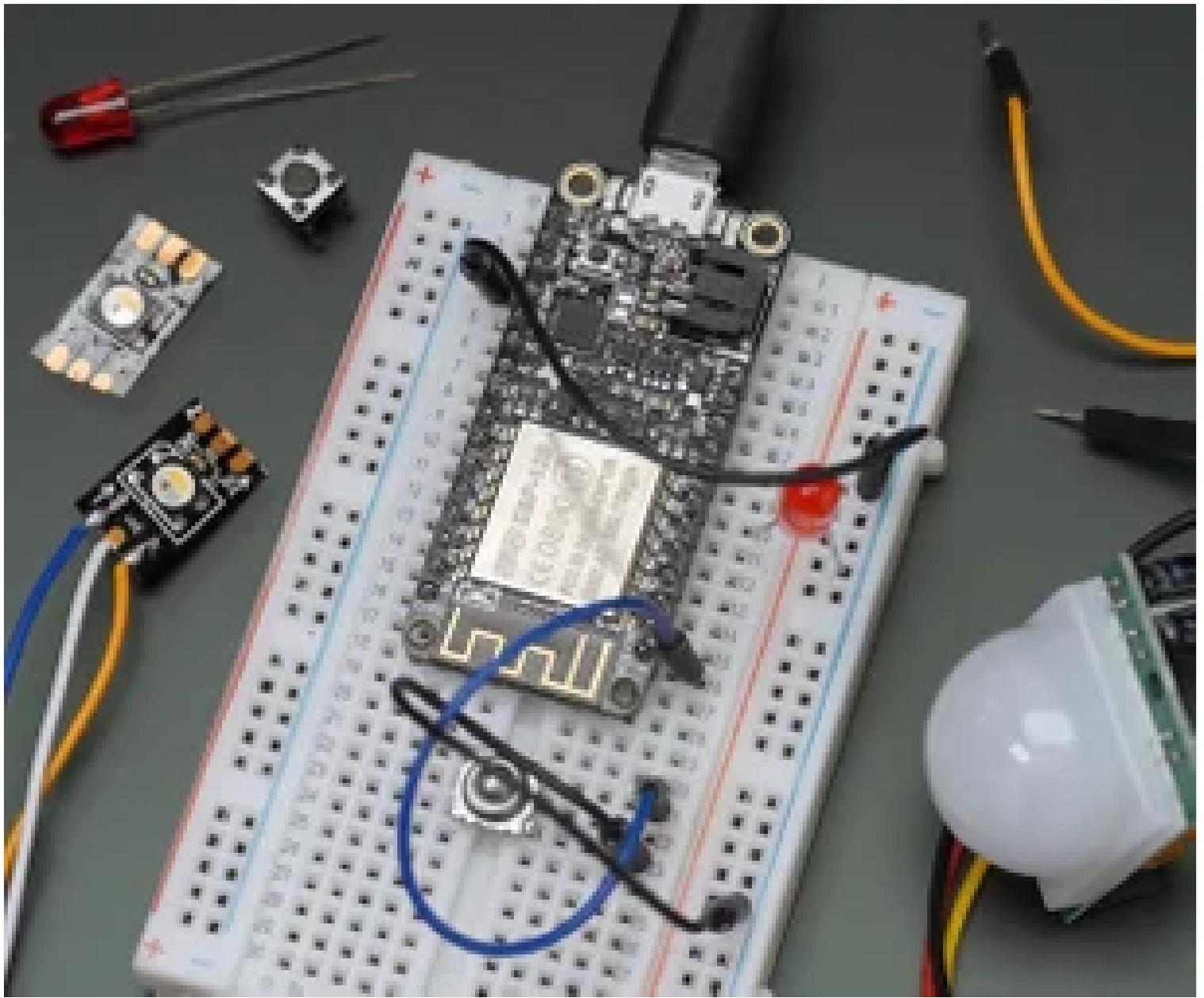
by Antzy Carmasaic (/member/Antzy%20Carmasaic/) in Arduino (/circuits/arduino/projects/)



(/id/SteamPunk-Radio/)

SteamPunk Radio (/id/SteamPunk-Radio/)

by ChristineNZ (/member/ChristineNZ/) in Arduino (/circuits/arduino/projects/)



(/class/Internet-of-Things-Class/)



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(/contest/teacher2019/)



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Please be positive and constructive.

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## 24 Discussions



(/member/DavidGuo/) DavidGuo (author) 3 years ago



Reply

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Yes,you can use the Uno board,but the Mega2560 could be better,the Mega2560 have more RAM space for the code

1 reply ▾

(/member/bryan chuah/) bryan chuah (/member/bryan chuah/) 2 years ago



Reply

▲ Upvote

hi david, may i know how do i send multiple sensor data to the server node then upload to the cloud?  
As for now i am only able to send one sensor data.

(/member/Dimagoreev/) Dimagoreev (/member/Dimagoreev/) 2 years ago



Reply

▲ Upvote

Hello, could you help me with sample ?  
How I can save data from Client to Server and next step to PC in data file ?

(/member/YimengZ2/) YimengZ2 (/member/YimengZ2/) 2 years ago



Reply

▲ Upvote

Hi David,  
Thanks for this post. I'm wondering if it is possible to make the data to a Lorawan Server e.g. The Things Network etc. I'm trying to set the arduino as the gateway but I'm not sure this can make the captured data be written into the server.

(/member/GiovanniG43/) GiovanniG43 (/member/GiovanniG43/) 2 years ago



Reply

▲ Upvote

Hi, I would like to know if me using an ethernet shield v2 would work the same way, i know i got to change the program but would it be possible to do this with an ethernet shield and the micro sd card instead of an yun shield and the usb?

1 reply ▾

wisnubramantyo (/member/wisnubramantyo/) 2 years ago  
(/member/wisnubramantyo/)

 Reply  Upvote

Hi David,

In my case when I uploaded the server sketch and open the serial monitor it showed me nothing but (???) signs continuously.

Could you tell me what went wrong? Thank you.

(<https://cdn.instructables.com/FVP/Y4BM/J674E0TA/FVPY4BMJ674E0TA.LARGE.jpg?auto=webp&fit=bounds>)

(/member/Akram2014/) Akram2014 (/member/Akram2014/) 3 years ago

 Reply  Upvote

Hi guys,

Can I use Arduino uno with LoRa shield RN2903 Microchip to send and receive temperature sensor data?

<http://cytron.com.my/c-441-arduino/c-443-shields/p-SHIELD-LORA> (<http://cytron.com.my/c-441-arduino/c-443-shields/p-SHIELD-LORA>)

(/member/diy\_bloke/) diy\_bloke (/member/diy\_bloke/) 3 years ago

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Is the Lora shield compatible with the ethernetshield?

6 replies ▾

(/member/BrandonF42/) BrandonF42 (/member/BrandonF42/) 3 years ago

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I am looking at doing a similar project but using cellular. Any advice on shields, boards to use for this?

1 reply ▾

(/member/JiwonC/) JiwonC (/member/JiwonC/) 3 years ago

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Can I use Arduino uno instead of Arduino MEGA 2560 board at this project?

(/member/victor.feria.75/) victor.feria.75 (/member/victor.feria.75/) 3 years ago

 Reply  Upvote

I just ordered the LoRa/Shield Module for Arduino. Do I need to preconfigure the LoRAs prior to installing the mods to Arduino?

1 reply ▾

(/member/DavidGuo/) DavidGuo (author) 3 years ago

Reply Upvote

Hi,all,

There is another useful expansion LoRa board for RPi: LoRa/GPS HAT

1 reply ▾

(/member/DavidGuo/) DavidGuo (author) 3 years ago

Reply Upvote

Hi,all,

There is another Useful expansion board for the RPi here:

LoRa/GPS HAT: [http://wiki.dragino.com/index.php?title=Lora/GPS\\_HAT](http://wiki.dragino.com/index.php?title=Lora/GPS_HAT)  
[\(http://wiki.dragino.com/index.php?title=Lora/GPS\\_HAT\)](http://wiki.dragino.com/index.php?title=Lora/GPS_HAT)

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