

物聯網實務

廖裕評

9/14

教學目標

課程教學目標

隨著科技發展，物聯網裝置日漸普及，被大量運用在我們的生活中。如果可以設計程式將其蒐集到的訊息用圖表呈現，並控制裝置判斷狀況進行對應，就能使監控整個物聯網系統變得更加容易。本課程介紹IoT開發工具Node-RED。Node-RED的使用者可直接利用圖形化的「結點」編寫應用程式，每個結點分別代表不同的硬體設備、Web API或雲端服務，只要連結具有不同功能的結點，就能設計出程式。

考核項目及評量標準、比例

考核項目		評量標準、比例(%)
平時	作業	30
期中	報告	30
期末	專題	40

Objective

- The Internet of Things (IoT) is essentially the network of physical objects—devices, vehicles, buildings and other items which are embedded with electronics, software, sensors, and network connectivity, which enables these objects to collect and exchange data. Node-RED is a programming tool for wiring together hardware devices, APIs and online services in new and interesting ways.

Assessment		
Assessment Item		Percentage (%)
In class of performance	Assignments	30
Midterm	Report	30
Final	Project	40

Course design

- software installation & cloud service registration
- Introduction to HTML5
- Introduction to JavaScript
- Introduction to IoT Hacking
- Design of a voting system
- Design of a chat room
- Web App control arduino board
- Open data applications
- Building a weather station
- AI applications
- AI game
- IoT Hacking example
- project

Reference Book



物聯網實作：Node-RED
萬物聯網視覺化(附光碟)

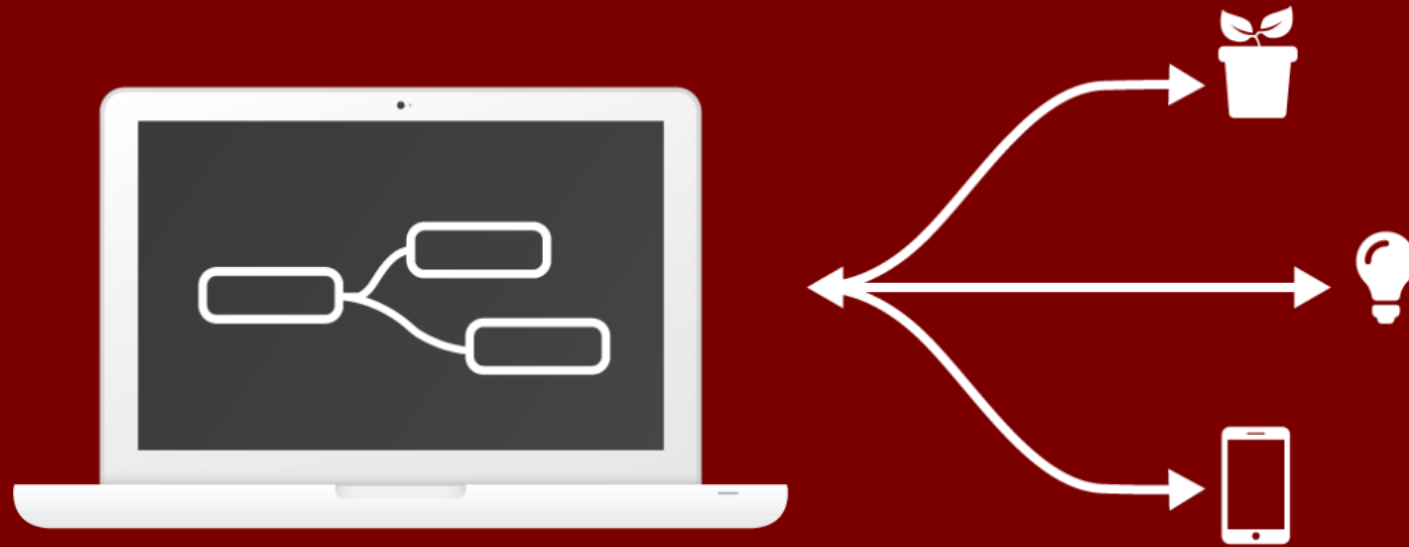


物聯網實作：深度學習應
用篇



物聯網實作：工業4.0基礎
篇(2版)

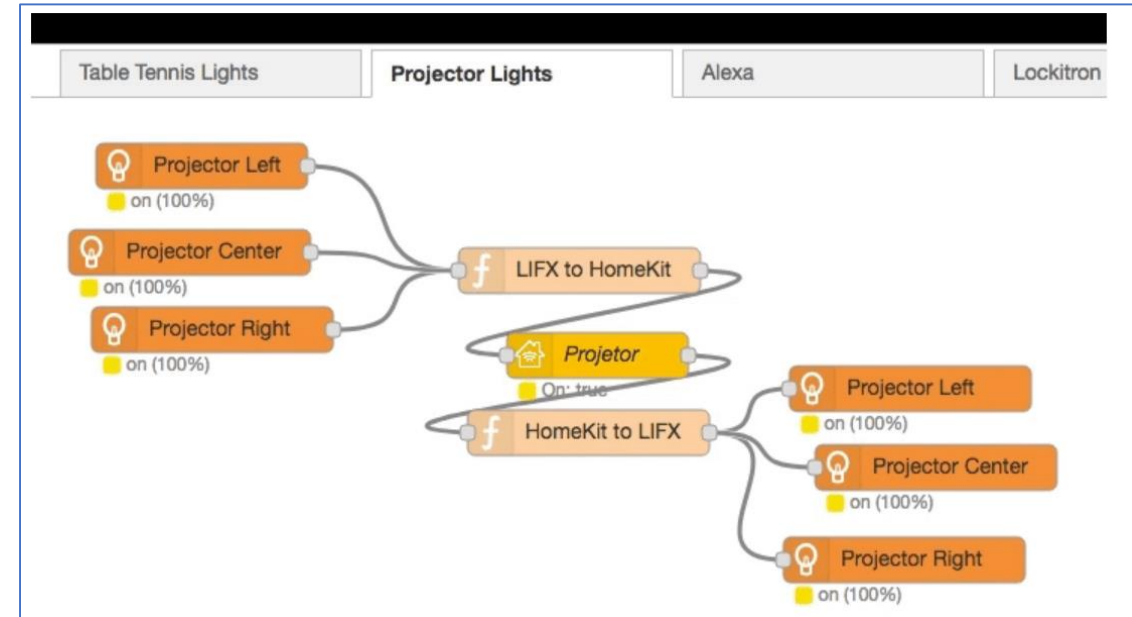
What is Node-RED?



<https://cheesecakelabs.com/blog/glue-of-the-internet-what-is-node-red/>

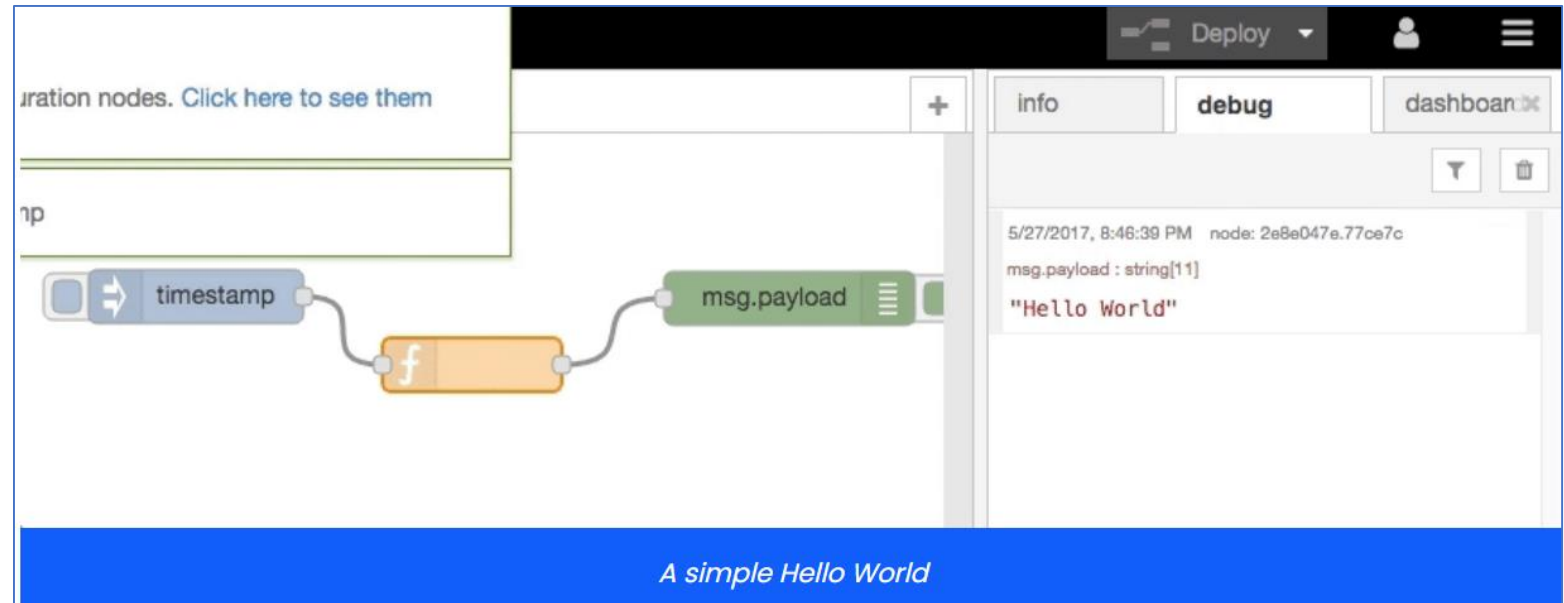
What is Node-RED?

- [Node-RED](#) is “a programming tool for wiring together hardware devices, APIs and online services in new and interesting ways”. It uses a visual web interface, where blocks – also called **nodes** – can receive and send messages to other nodes. It makes the whole integration process easier by abstracting a lot of repetitive and boilerplate code needed to make these simple things.



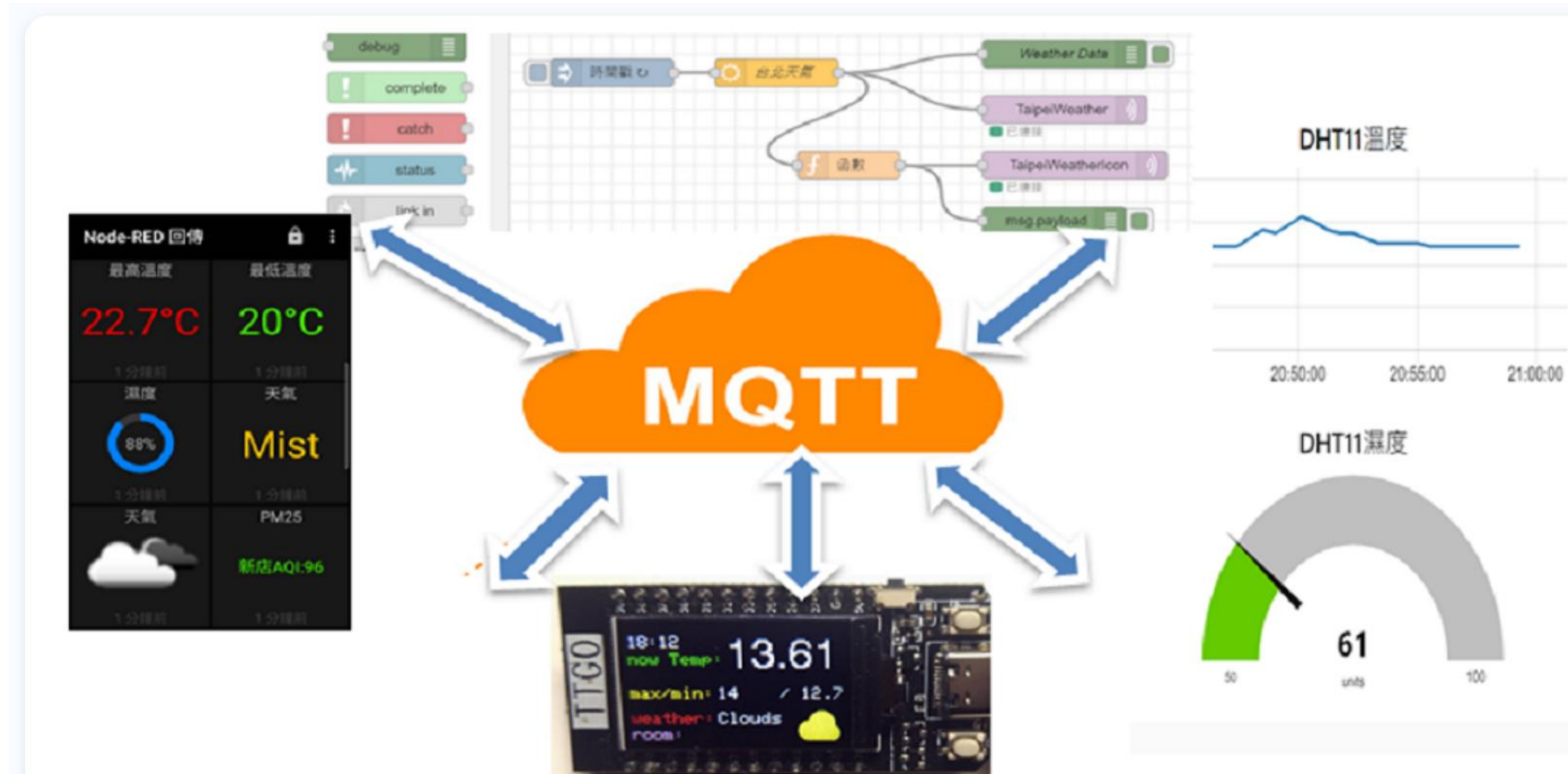
What is Node-RED?

- This tool is built on top of [node.js](https://nodejs.org/), and each node runs some JavaScript code. You can also use *function nodes* to write your own logic. Here's an example with a simple Hello World:

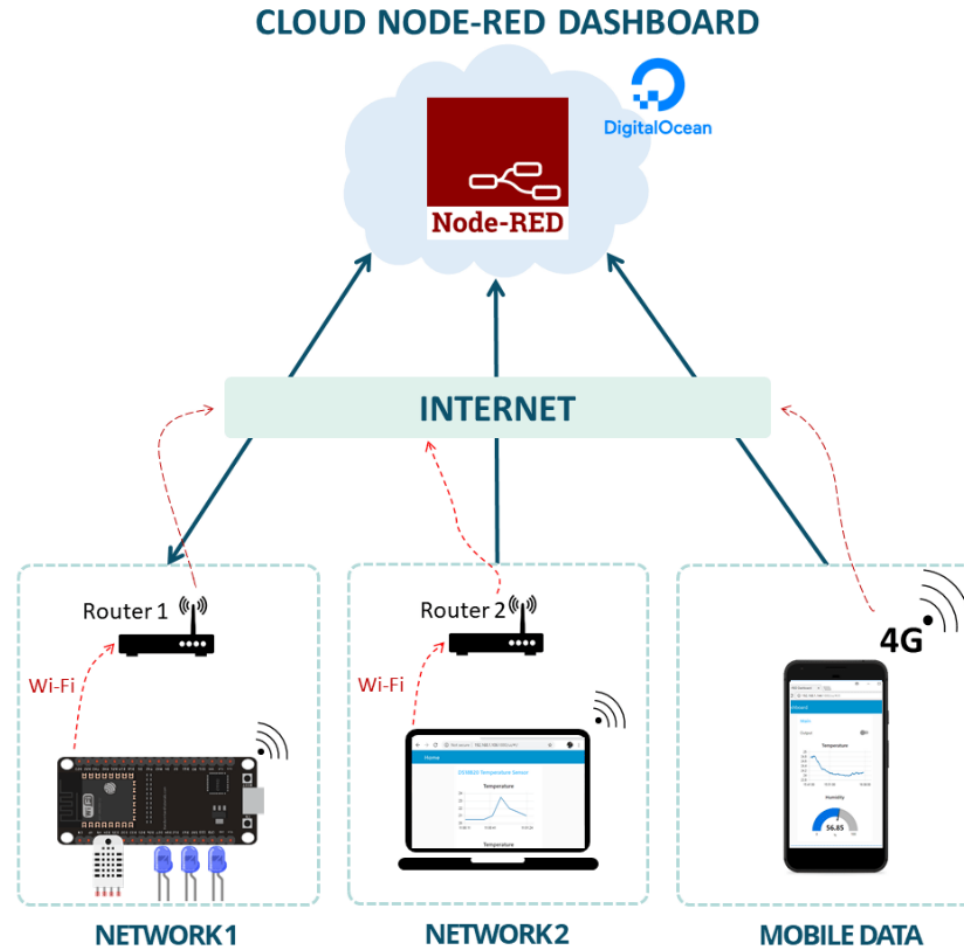


<https://ckl-website-static.s3.amazonaws.com/wp-content/uploads/2017/06/hello.gif>

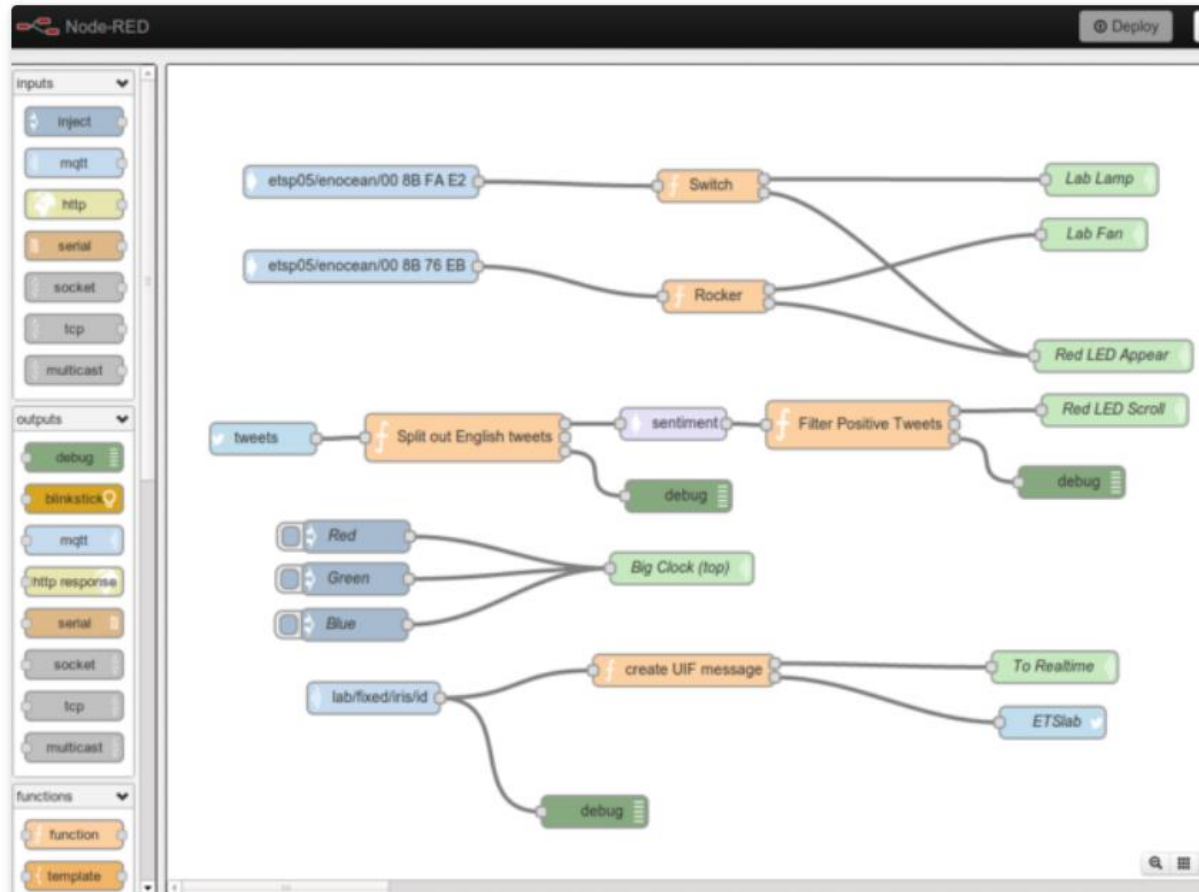
Applications



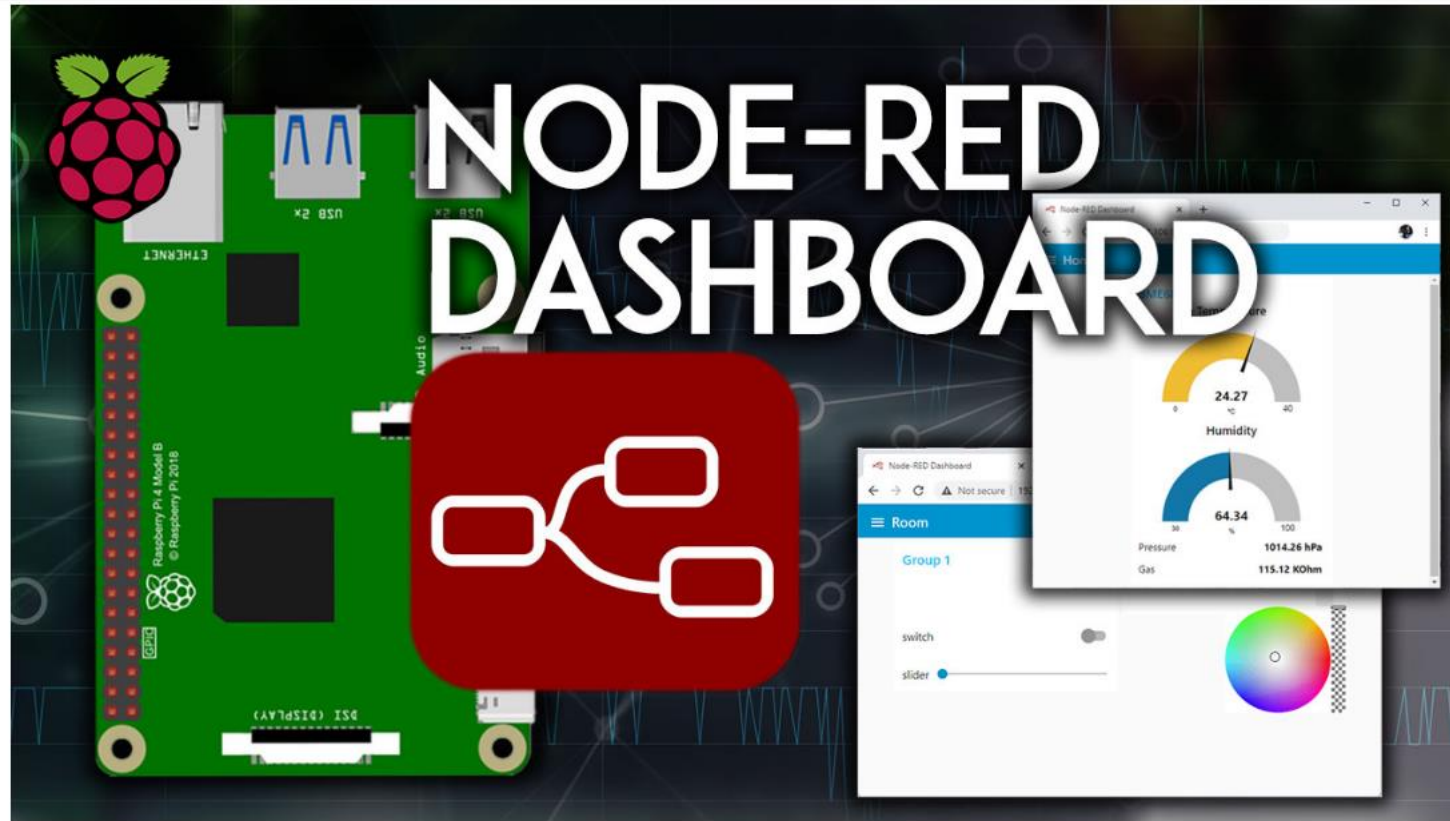
Applications



Applications

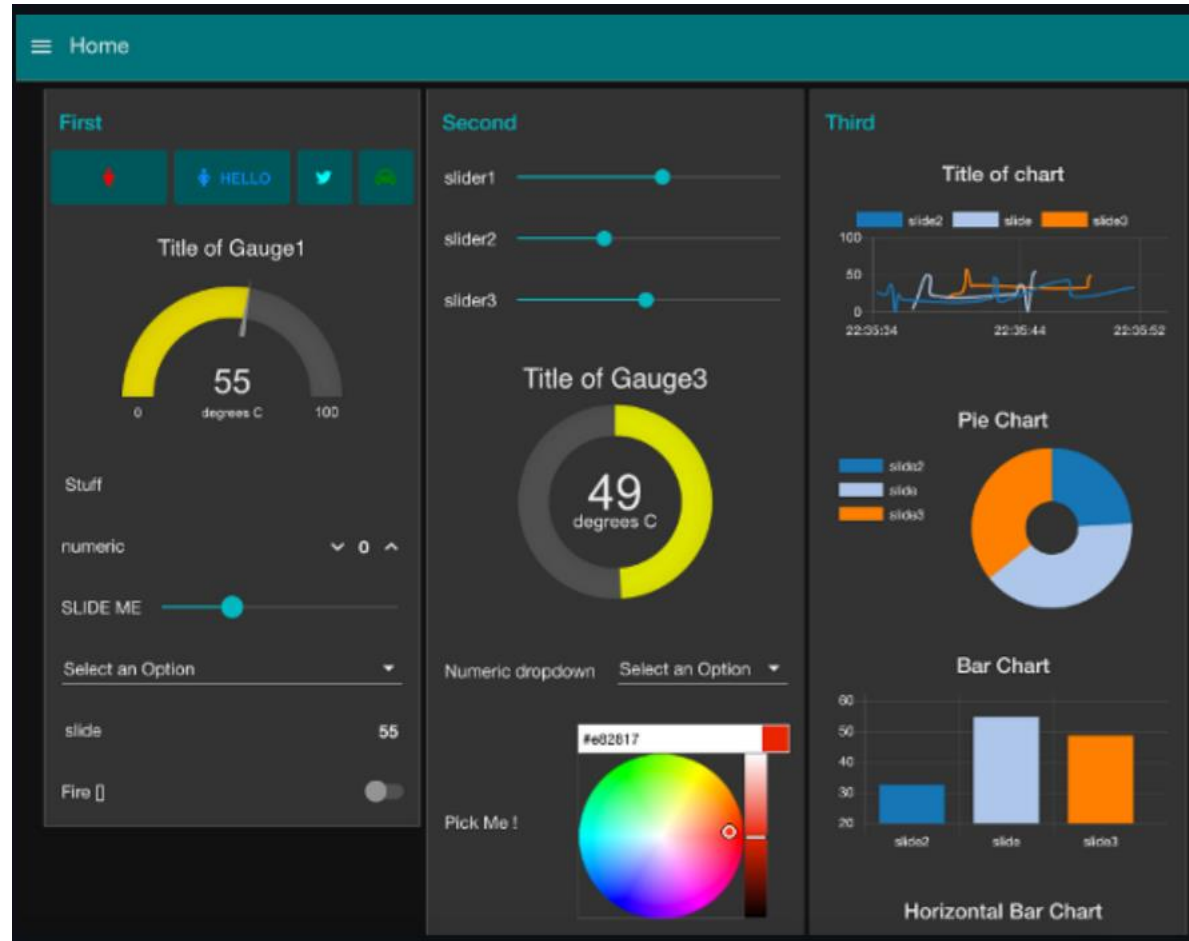


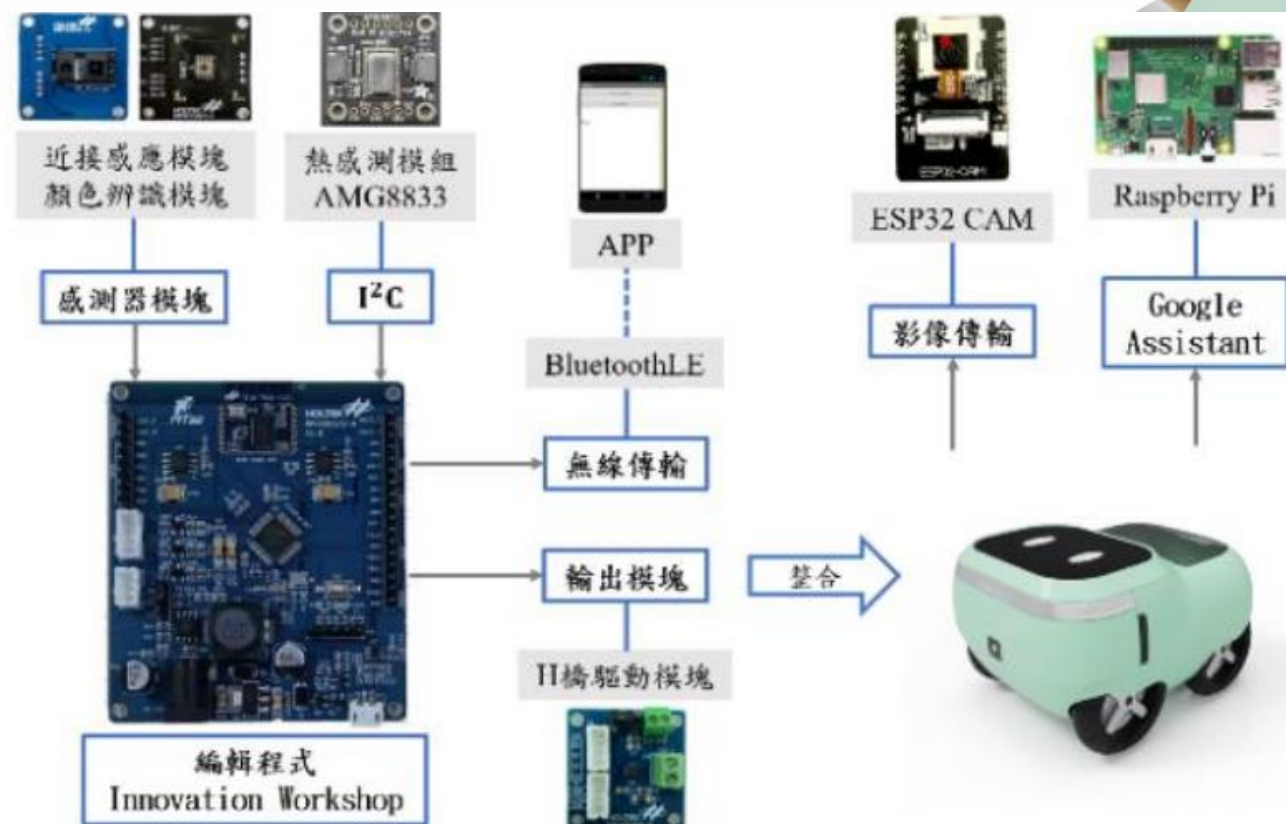
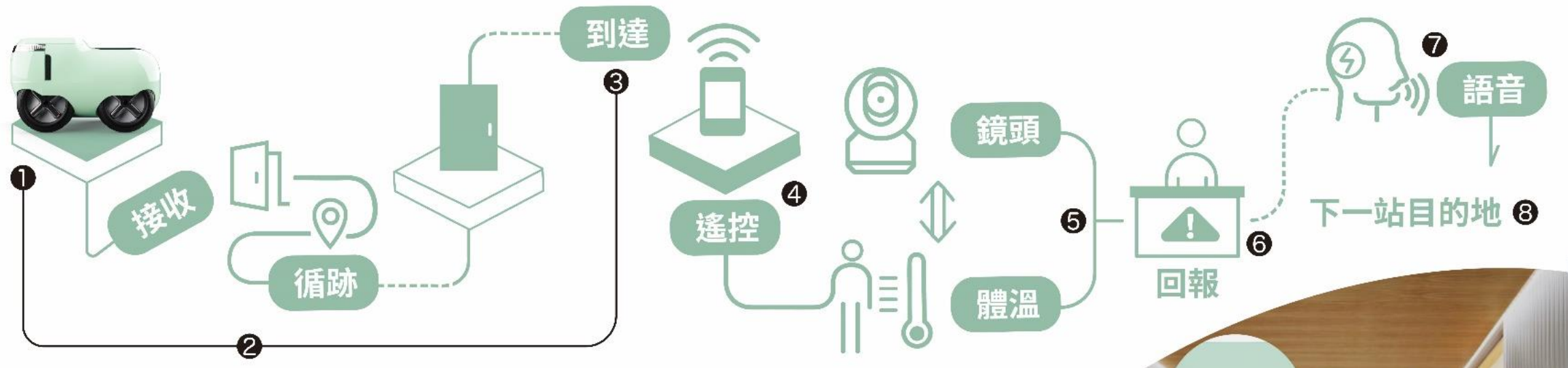
Applications



<https://randomnerdtutorials.com/getting-started-node-red-dashboard/>

A dashboard UI for Node-RED





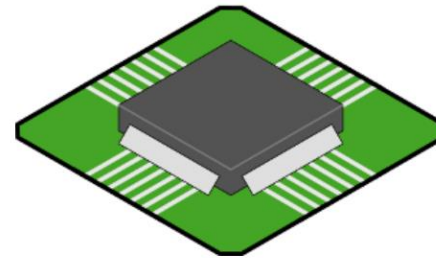
Part 1-software installation & cloud service registration

- Node-RED is a programming tool for wiring together hardware devices, APIs and online services in new and interesting ways. • It provides a browser-based editor that makes it easy to wire together flows using the wide range of nodes in the palette that can be deployed to its runtime in a single-click.



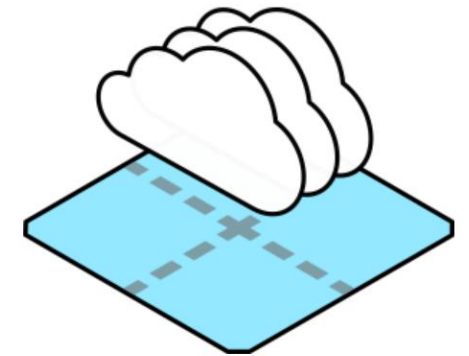
Run locally

- Getting started
- Docker



On a device

- Raspberry Pi
- BeagleBone Black
- Interacting with Arduino
- Android



In the cloud

- IBM Cloud
- SenseTechnic FRED
- Amazon Web Services
- Microsoft Azure
- FlowForge

- Node-RED Introduction

<https://nodered.org/>

Intro to Node-RED: Part 1 Fundamentals



<https://www.youtube.com/watch?v=3AR432bguOY&t=346s>

Sensetecnic-FRED

Welcome to FRED

We're hosting Node-RED so you don't have to


PAID PLANS

FRED Tall	FRED Grande	FRED Venti	FRED Short
\$9 ⁹⁹ /mo	\$49 ⁹⁹ /mo	\$249 /mo	Free
<ul style="list-style-type: none">✓ 150 node limit (limited memory)✓ 24x7 run time, always on✓ Shared server✓ Public Dashboard Support✓ 5 email support requests✓ MQTT service (5 client limit)✓ FRED Desktop (1 device)	<p>RECOMMENDED</p> <ul style="list-style-type: none">✓ No node limit (up to 500mb memory)✓ 24x7 run time, always on✓ Shared server✓ Public Dashboard Support✓ 25 email support requests✓ MQTT service (25 client limit)✓ FRED Desktop (5 devices)✓ InfluxDB service (1 database, 1 user, 2 day data retention, 50mb size)	<ul style="list-style-type: none">✓ No node limit (up to 1gb memory)✓ 24x7 run time, always on✓ Shared server✓ Public Dashboard Support✓ 50 email support requests✓ MQTT service✓ FRED Desktop (25 devices)✓ InfluxDB service (5 databases, 5 user, 30 day data retention, 500mb size)	<ul style="list-style-type: none">✓ 50 node limit (limited memory)✓ 24 hour run time
Sign Up	Sign Up	Sign Up	Sign Up


Sign up

<https://fred.sensetecnic.com/>


USER REGISTRATION

 STS Accounts | USER REGISTRATION


Username


 yupingliao2020

Password





E-mail

 lyp@cycu.edu.tw


 lyp@cycu.edu.tw

Name

 yu-ping

 liao

Company Name

 CYCU

USER REGISTRATION(scroll down)

STS Accounts | USER REGISTRATION

What industry or area of interest are you using FRED for? (select all that apply)

☒ Home automation

☐ Remote monitoring & notifications

☐ Process control/factory automation

☐ Backend integration

☐ Bots/Chat etc

☐ Transportation & logistics

☐ Web services and APIs

☐ Using FRED as part of a hardware dev kit

☐ Other

check

☒ I agree to the [Terms of Use](#)

check

我不是機器人

reCAPTCHA

隱私權 - 條款

Create an account

Create an account

Registration complete



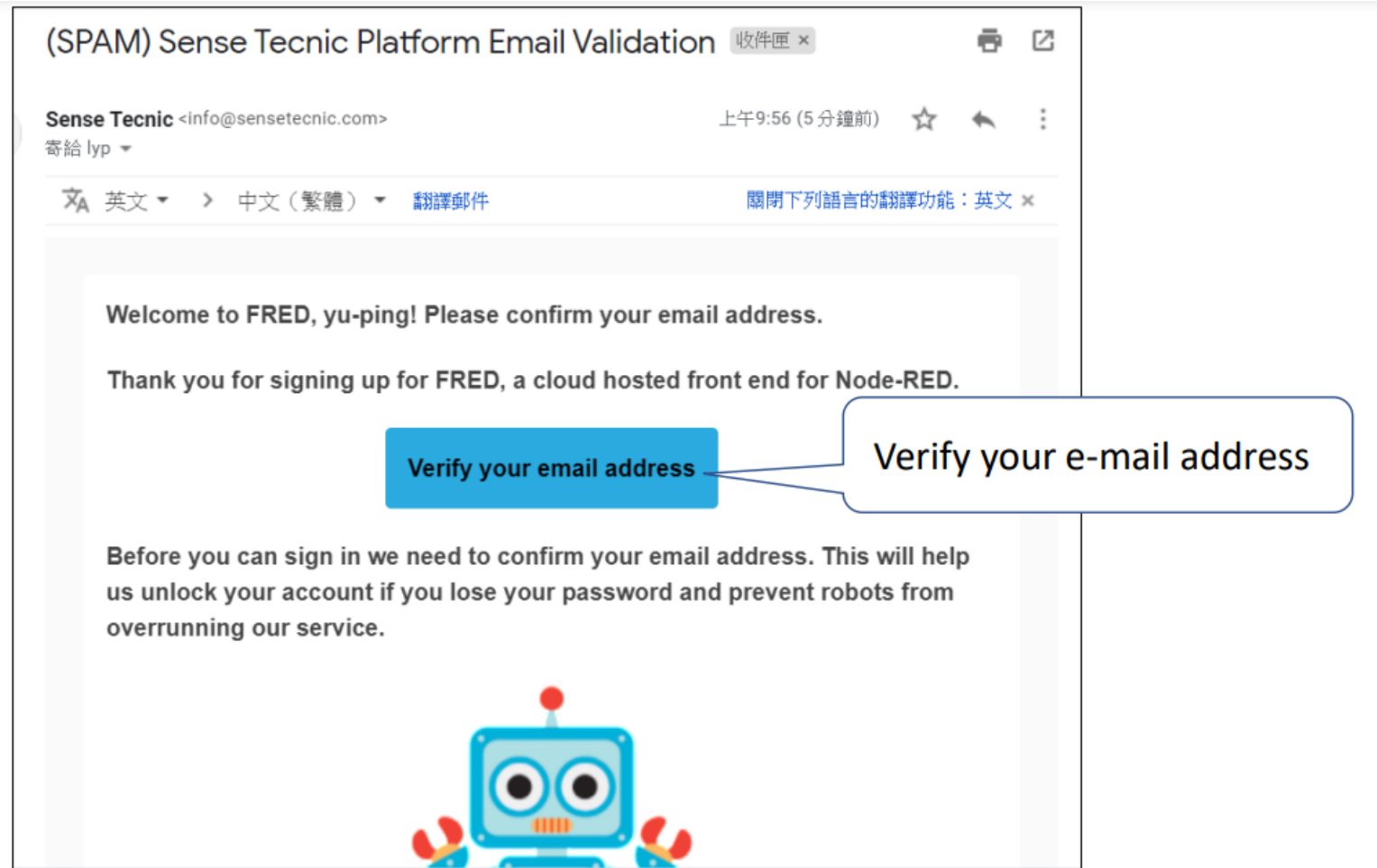
STS Accounts | USER REGISTRATION

Registration complete! Please check your e-mail to activate your account.

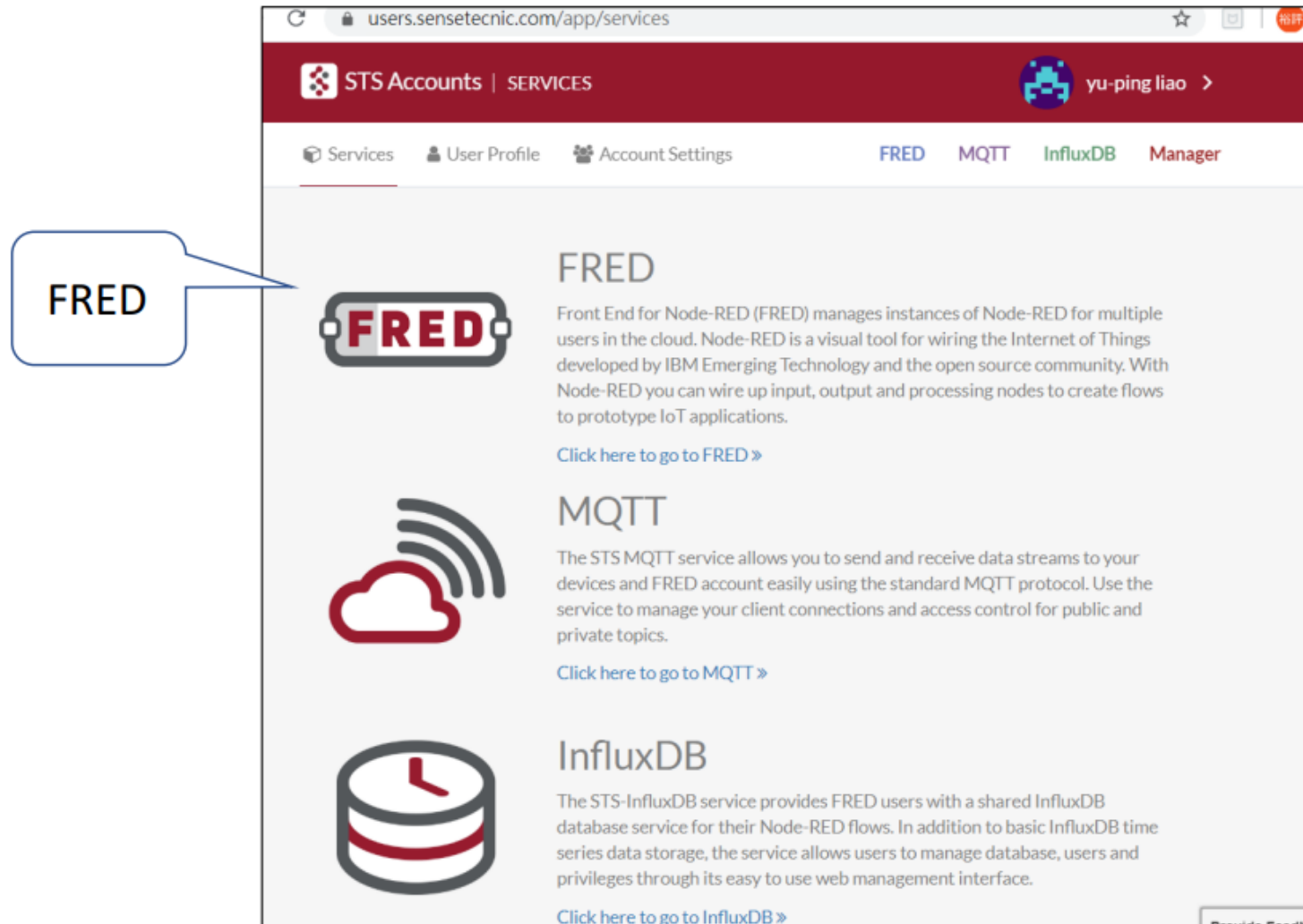
[Back to login](#)

Check your e-mail !!

Sense Tecnic Platform Email Validation



STA Accounts



The screenshot shows a web browser window at `users.sensetecnic.com/app/services`. The page has a dark red header with the STS Accounts logo and the word "SERVICES". Below the header is a navigation bar with links for "Services", "User Profile", and "Account Settings". To the right of these links are four service buttons: "FRED" (blue), "MQTT" (purple), "InfluxDB" (green), and "Manager" (red). The main content area lists three services: FRED, MQTT, and InfluxDB. Each service has an icon, a title, a description, and a link to go to the service. A blue callout bubble with the word "FRED" points to the FRED service icon.

FRED

Front End for Node-RED (FRED) manages instances of Node-RED for multiple users in the cloud. Node-RED is a visual tool for wiring the Internet of Things developed by IBM Emerging Technology and the open source community. With Node-RED you can wire up input, output and processing nodes to create flows to prototype IoT applications.

[Click here to go to FRED »](#)

MQTT

The STS MQTT service allows you to send and receive data streams to your devices and FRED account easily using the standard MQTT protocol. Use the service to manage your client connections and access control for public and private topics.

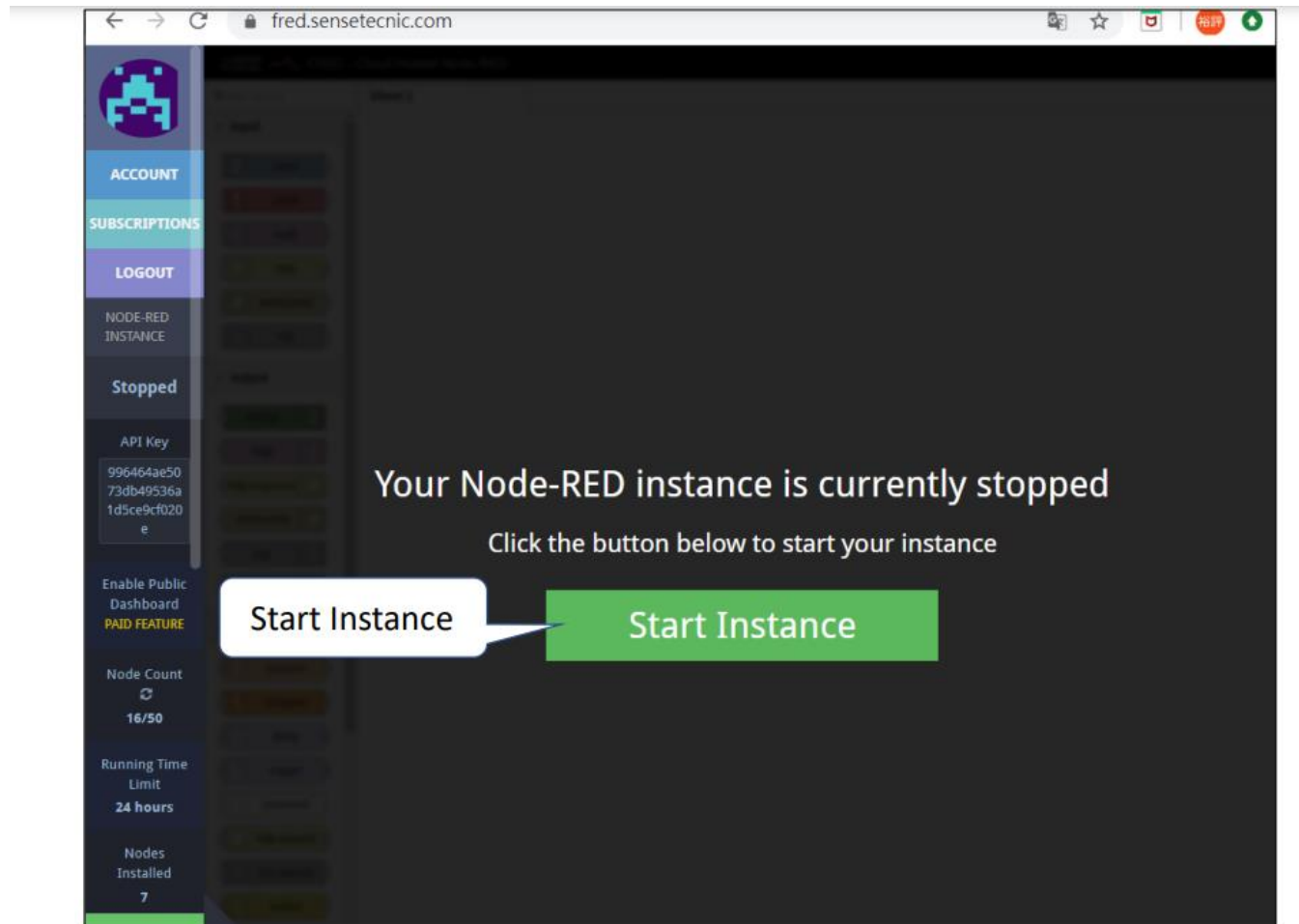
[Click here to go to MQTT »](#)

InfluxDB

The STS-InfluxDB service provides FRED users with a shared InfluxDB database service for their Node-RED flows. In addition to basic InfluxDB time series data storage, the service allows users to manage database, users and privileges through its easy to use web management interface.

[Click here to go to InfluxDB »](#)

Start Instance

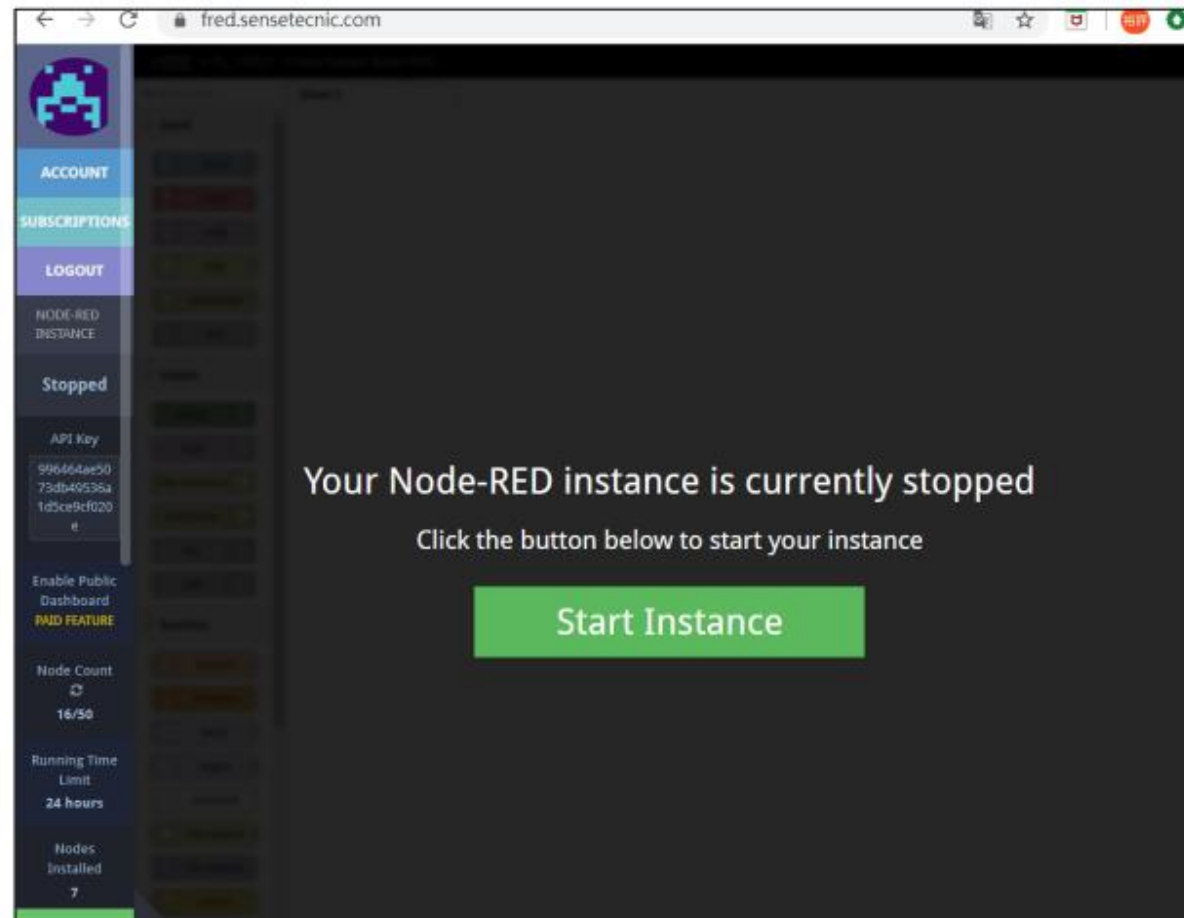


Node-Red

The screenshot displays the FRED - Cloud Hosted Node-RED web interface. The browser address bar shows `fred.sensetecnic.com`. The left sidebar contains user information for **yu-ping liao** (yupingliao2020) with an **UPGRADE NOW!** button. Below this are tabs for **ACCOUNT**, **SUBSCRIPTIONS**, and **LOGOUT**. A section titled **NODE-RED INSTANCE** shows the instance has been running for **2 m 0 s**. It also displays an **API Key** (996464ae5073db49536a1d5ce9cf020e), an option to **Enable Public Dashboard** (marked as a **PAID FEATURE**), **Node Count** (16/50), **Running Time Limit** (24 hours), and **Nodes Installed** (7). At the bottom of the sidebar are **TOOLS** (Add or Remove Nodes) and **SERVICES** (STS MQTT, STS InfluxDB). The main workspace is titled **FRED - Cloud Hosted Node-RED** and shows **Sheet 1**. It contains three demo flows:
1. **Flow 1. Using FRED as a web server**: Includes nodes for `/public/finance`, `Get market data (Google)`, `Format data`, `save original headers`, and `Parse indexes`.
2. **Flow 2. A simple dashboard demo**: Includes `Fire every 5 seconds`, `Use Slider to input values`, `Generate random number`, and `Data output`.
3. **Flow 3. Capture & display tweets**: Includes `Tweets about sports teams` and `msg.payload`.
The right sidebar shows **info** for the selected flow, including its ID (`*5230c72.fadcf38`), name (`Sheet 1`), status (`Enabled`), and a description area. A **Deploy** button is located in the top right corner.

Exercise 1-1

- Create your FRED account



Exercise 1-2

- <http://noderedguide.com/examples/>
- <http://noderedguide.com/node-red-lecture-2-building-your-first-flows-15/>

Once you have logged in to your FRED account, you'll see the standard Node-RED UI which consists of three main panes, as shown in Fig 2.1

