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 performace	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

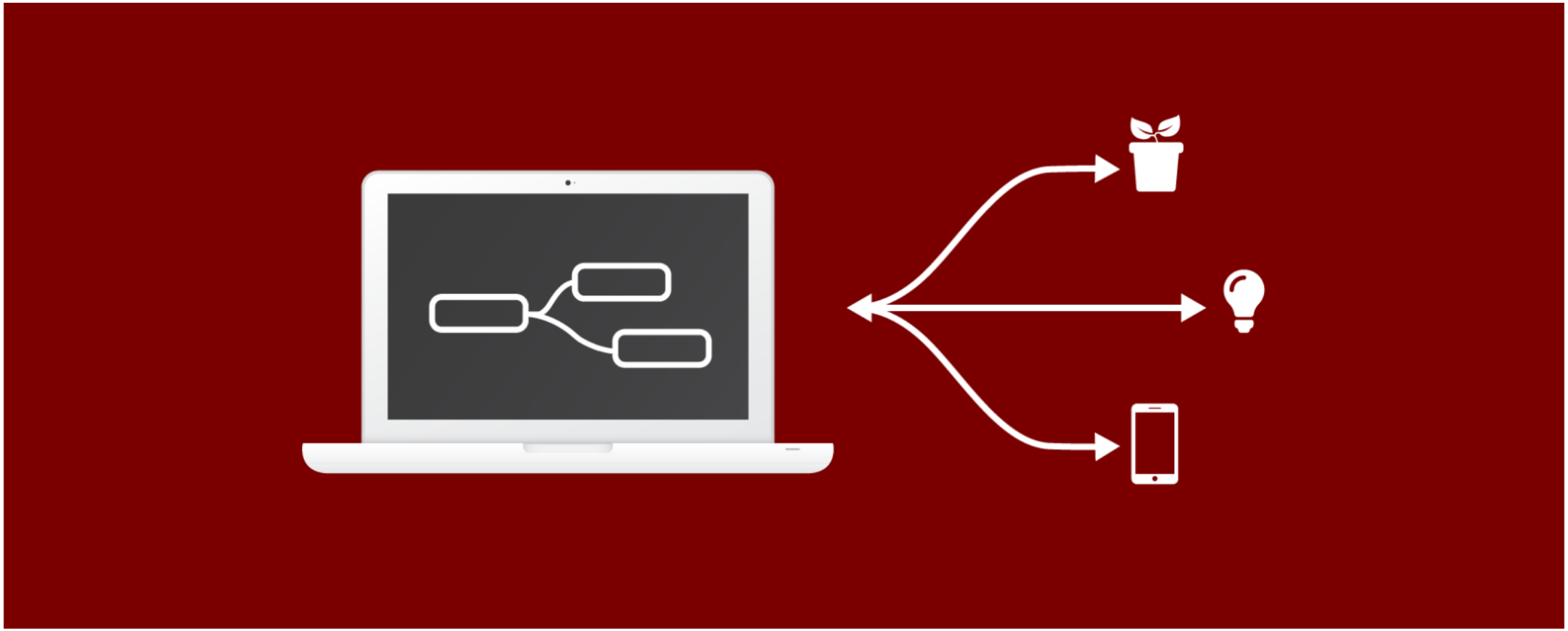
物聯網實作：Node-RED 萬物聯網視覺化(附光碟)

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)

https://www.books.com.tw/products/0010767362?sloc=main

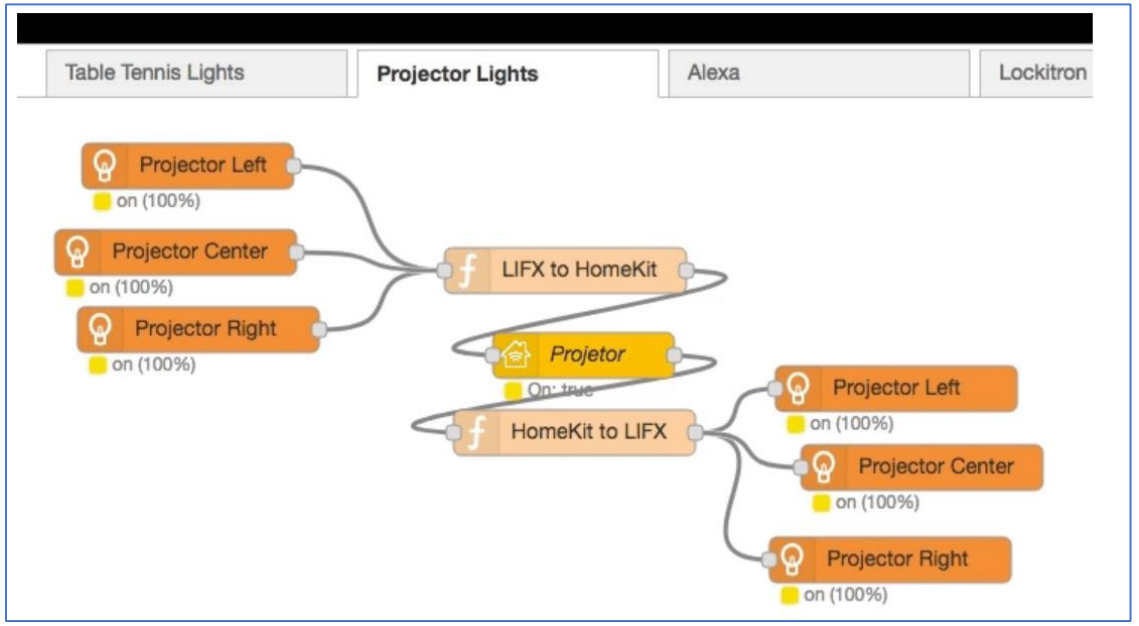
What is Node-RED?



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

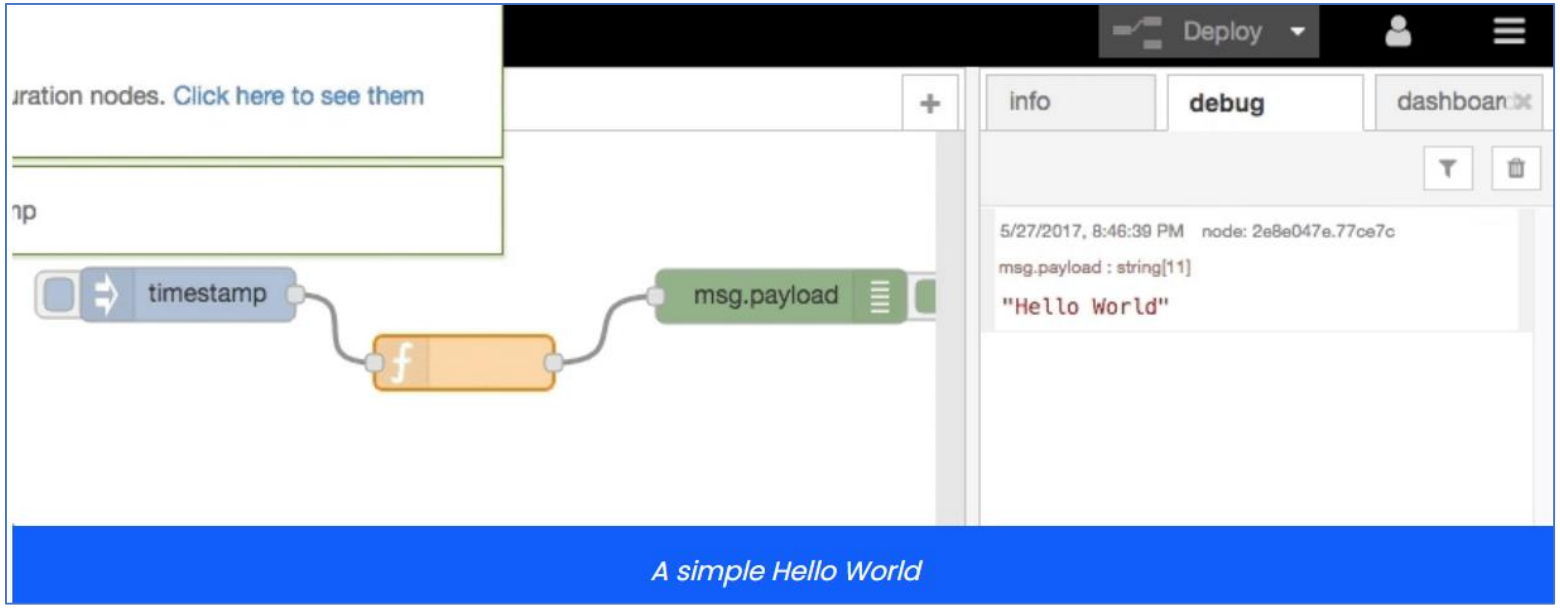
What is Node-RED?

- 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.



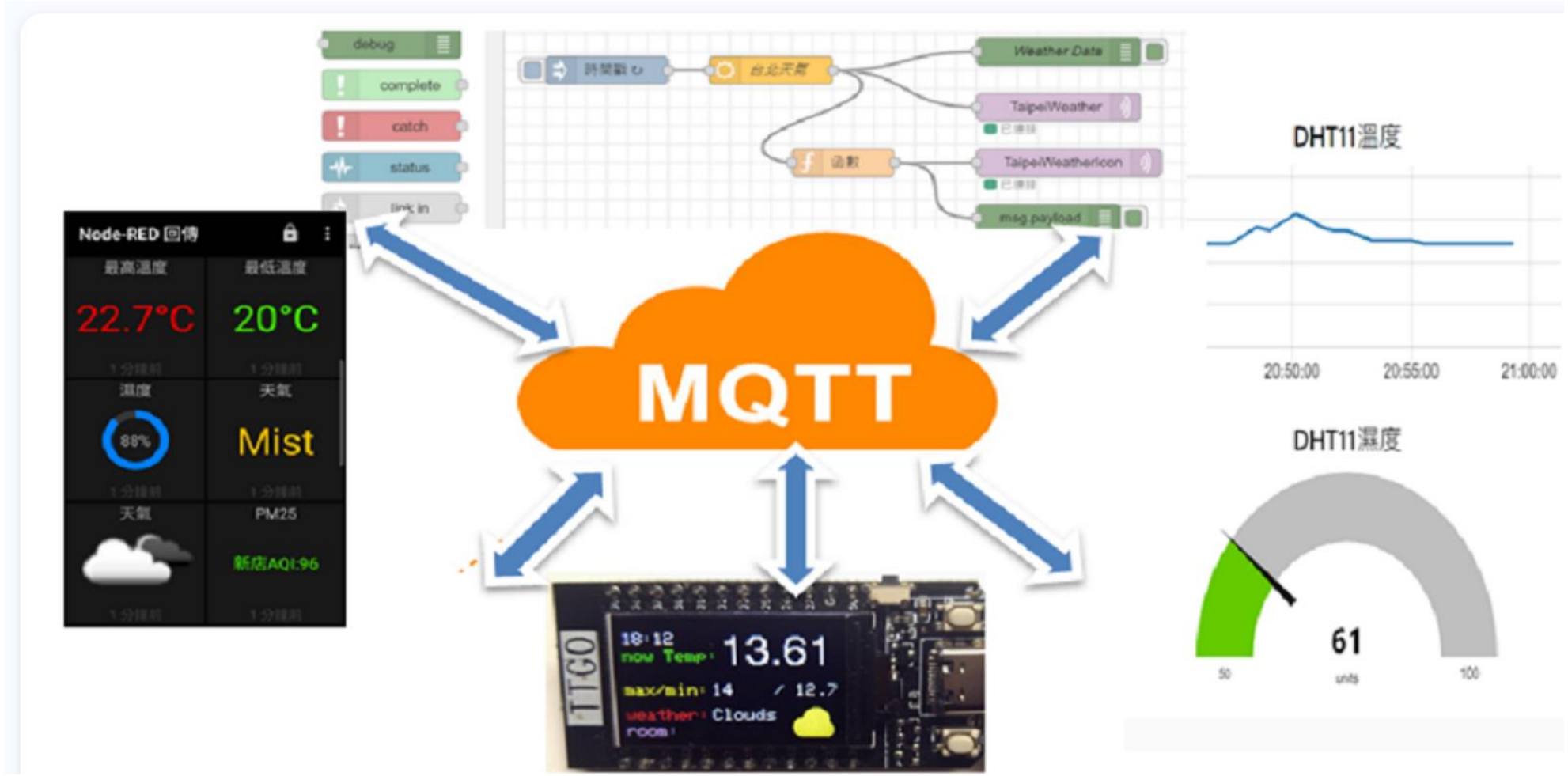
What is Node-RED?

- This tool is built on top of node.js, 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:



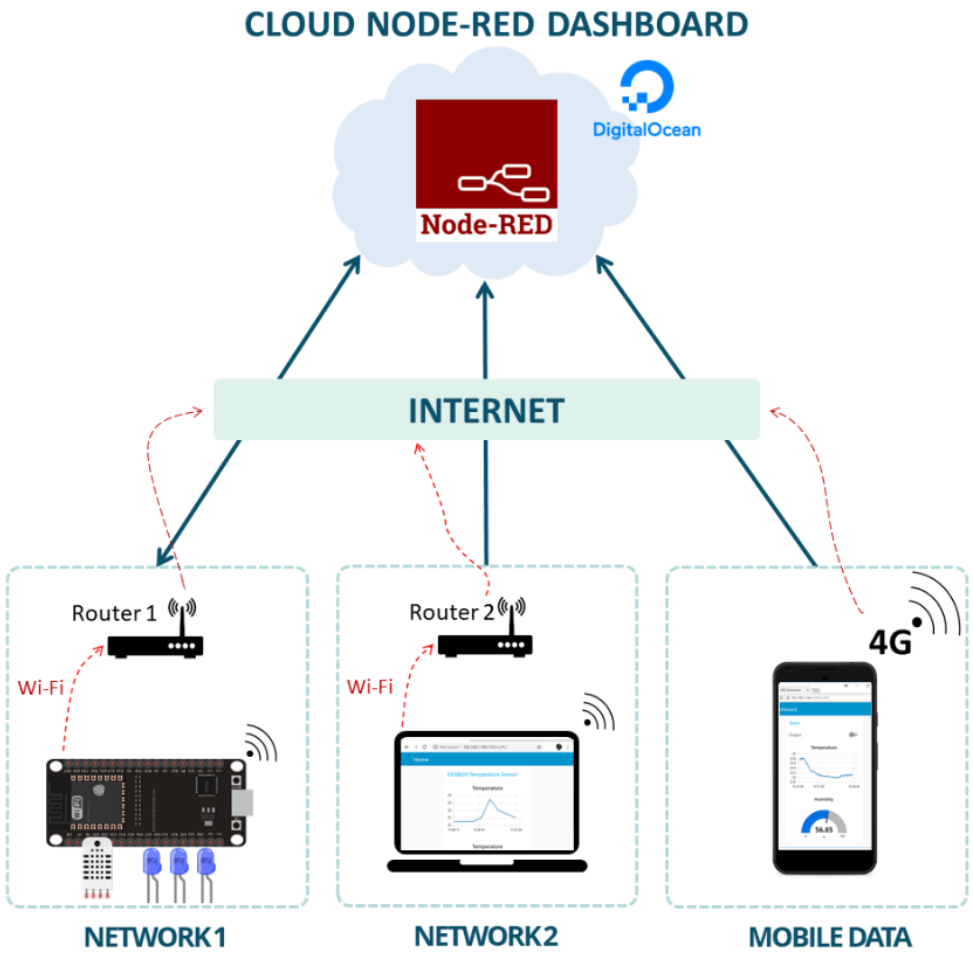
https://ckl-website-static.s3.amazonaws.com/wp-content/uploads/2017/06/hello.gif

Applications



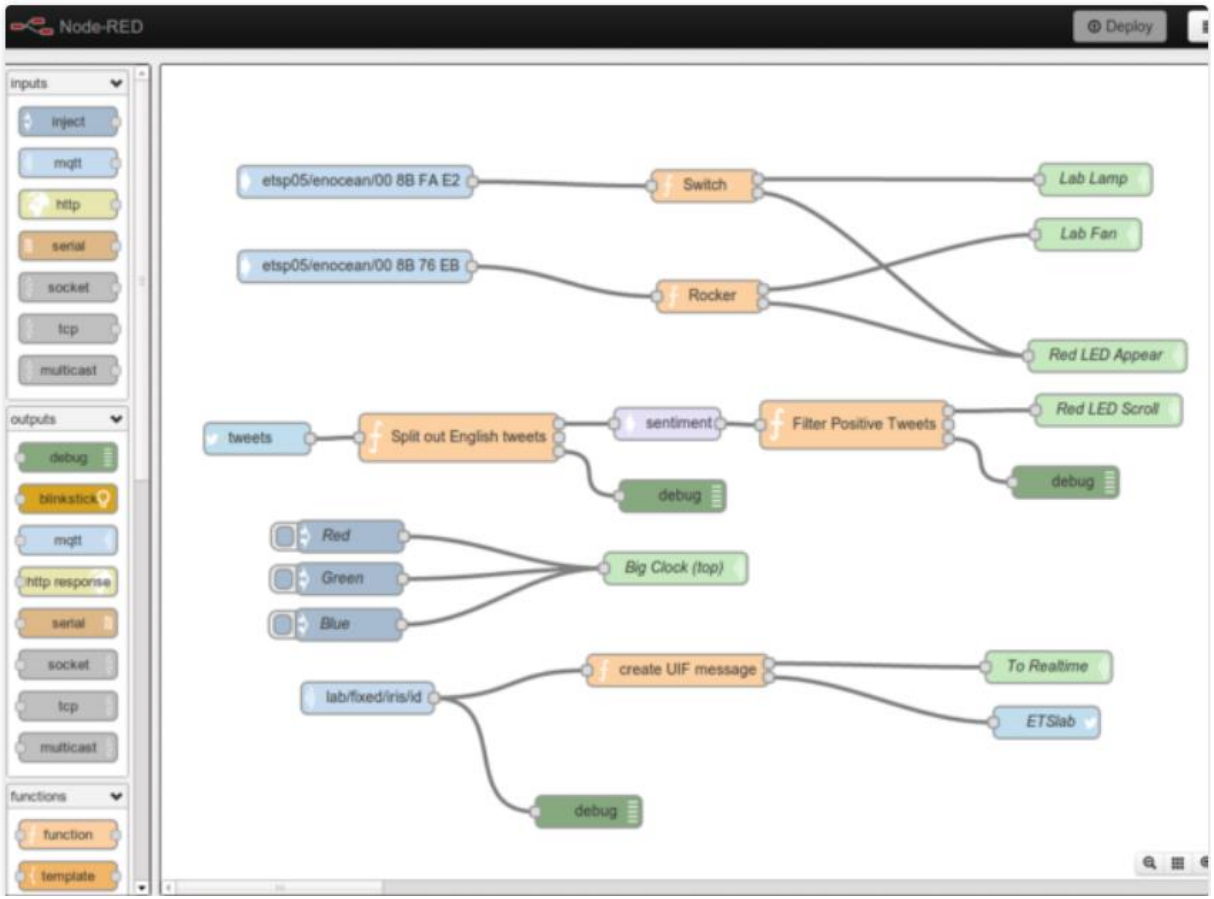
https://www.accupass.com/event/2107191245407617674700

Applications



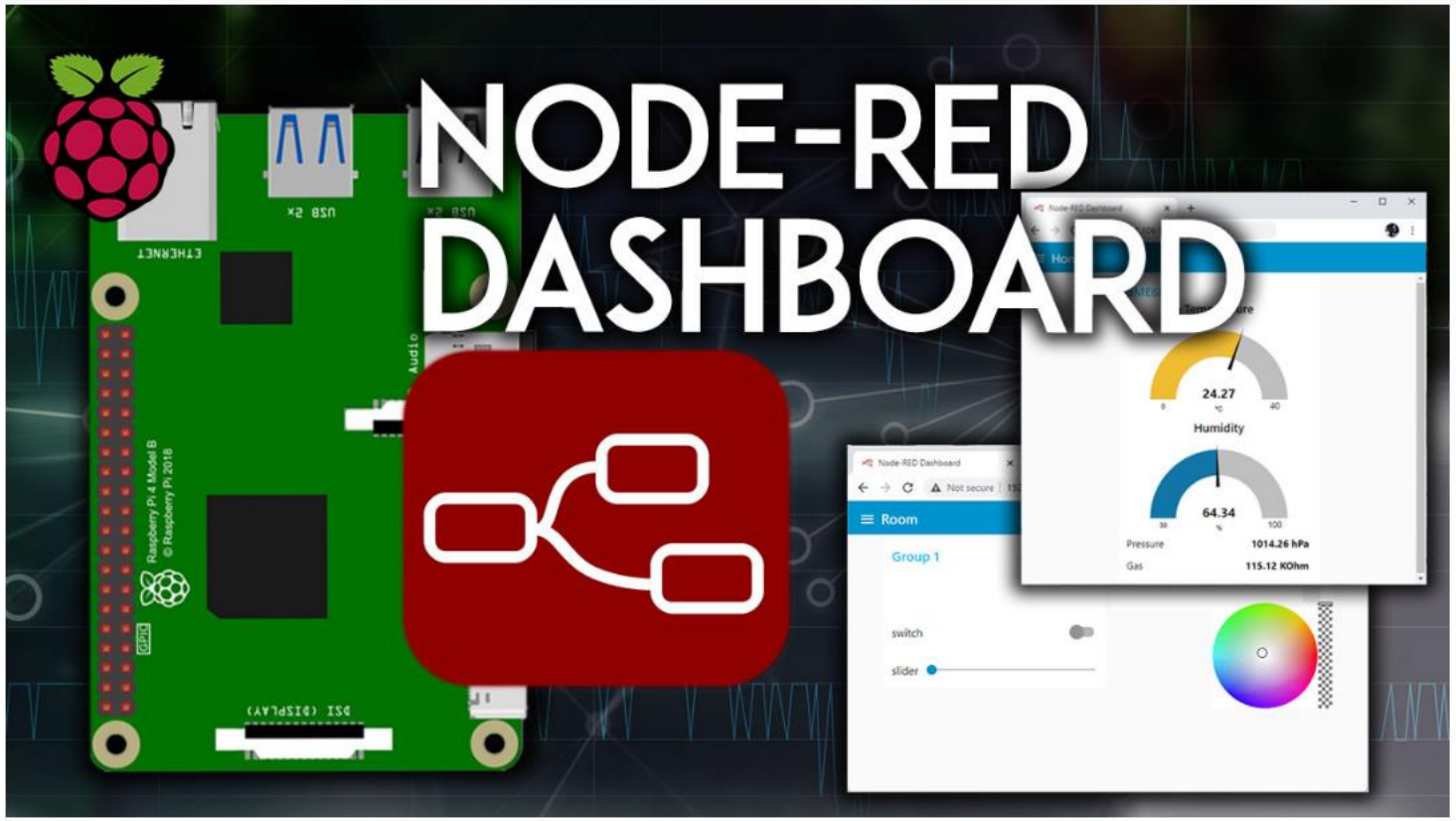
https://aprendiendoarduino.wordpress.com/2021/11/07/que-es-node-red-3/

Applications



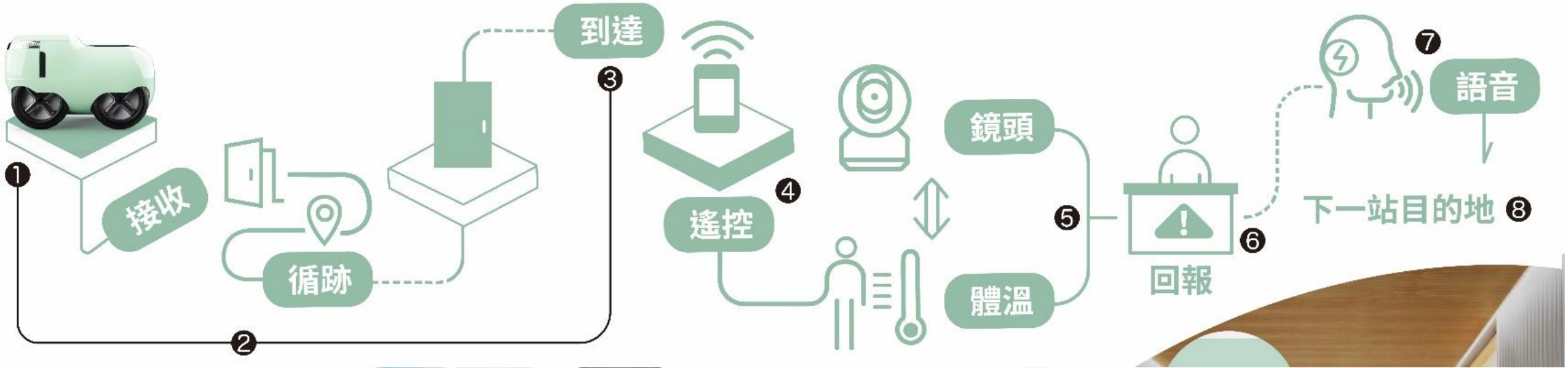
https://aprendiendoarduino.wordpress.com/2021/11/07/que-es-node-red-3/

Applications



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

A dashboard UI for Node-RED


❶
接收
循跡
到達
❸
❷
❹
遙控
鏡頭
體溫
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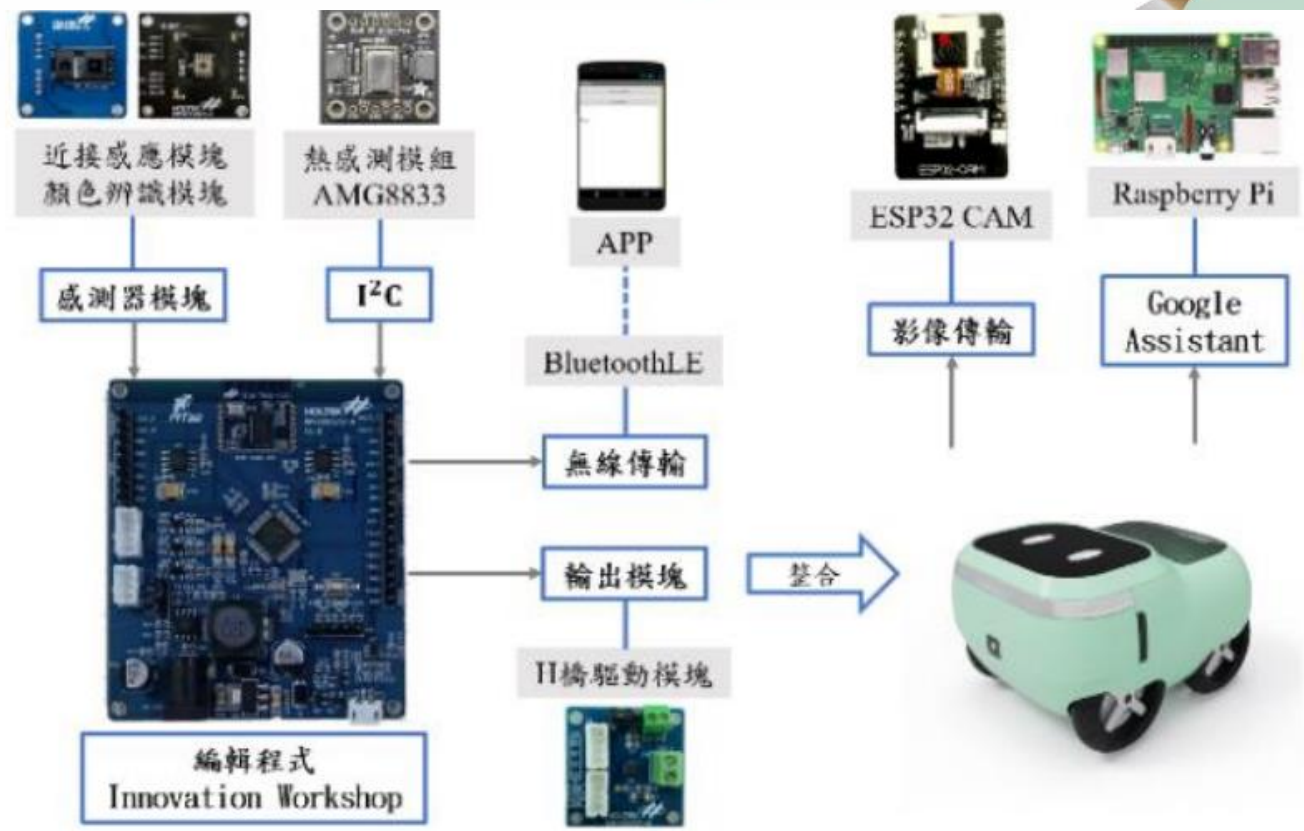
❻
回報
❼
語音
下一站目的地 ❽


近接感應模塊
顏色辨識模塊
感測器模塊
熱感測模組
AMG8833
I²C
APP
BluetoothLE
無線傳輸
輸出模塊
H橋驅動模塊
編輯程式
Innovation Workshop
ESP32 CAM
影像傳輸
Raspberry Pi
Google
Assistant
整合

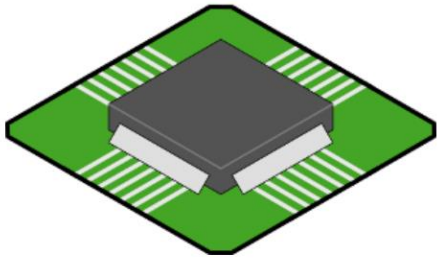
Part 1-software installation & cloud service registration

- 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.

- Node-RED Introduction
  https://nodered.org/

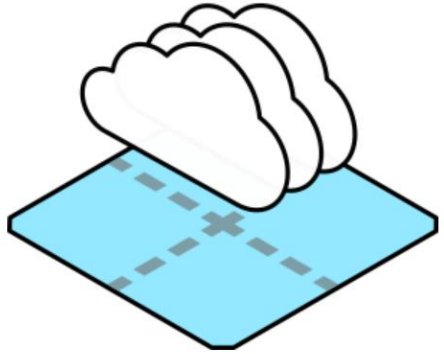
Run locally

- Getting started
- Docker



On a device

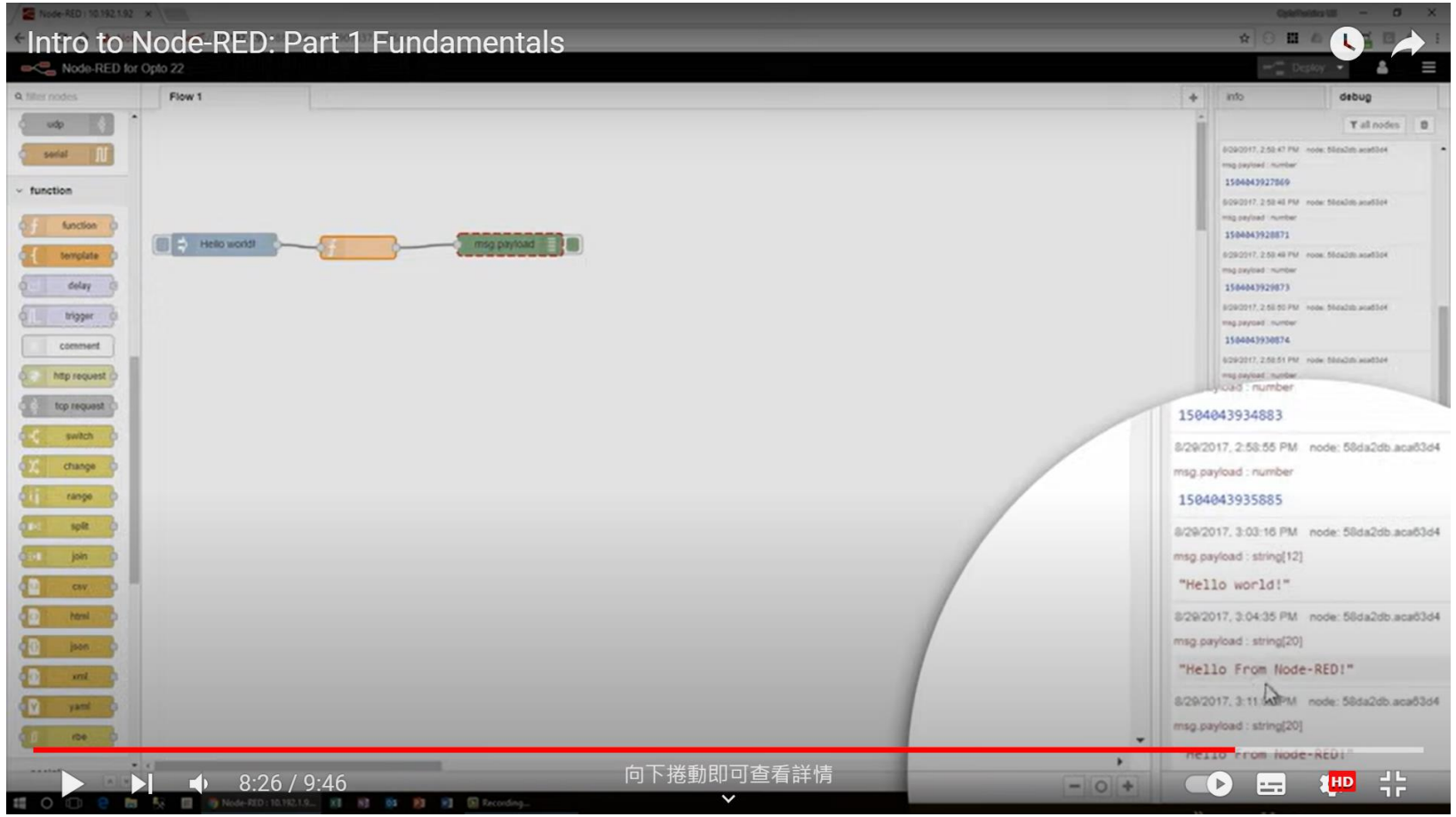
- Raspberry Pi
- BeagleBone Black
- Interacting with Arduino
- Android



In the cloud

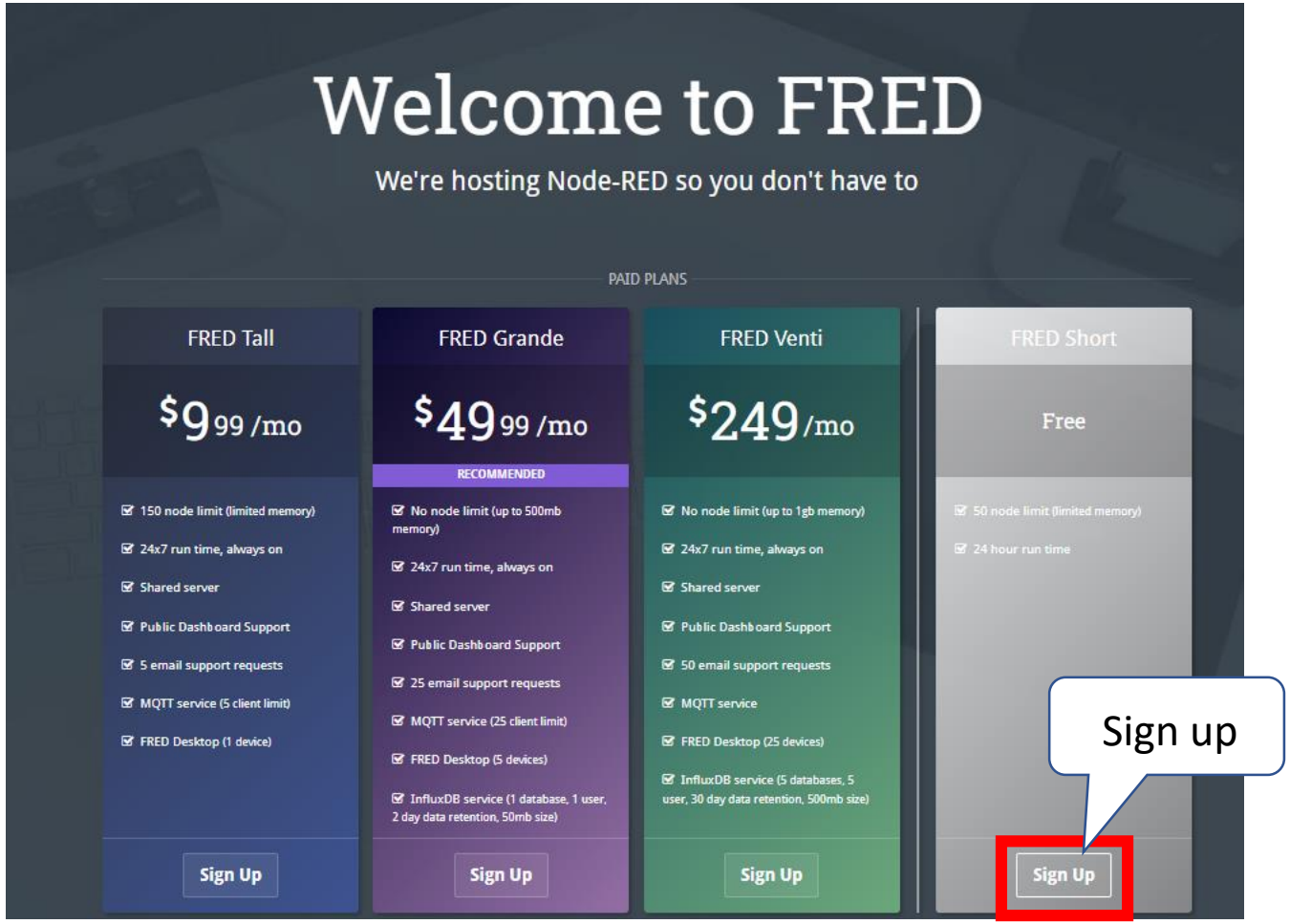
- IBM Cloud
- SenseTecnic FRED
- Amazon Web Services
- Microsoft Azure
- FlowForge

Intro to Node-RED: Part 1 Fundamentals



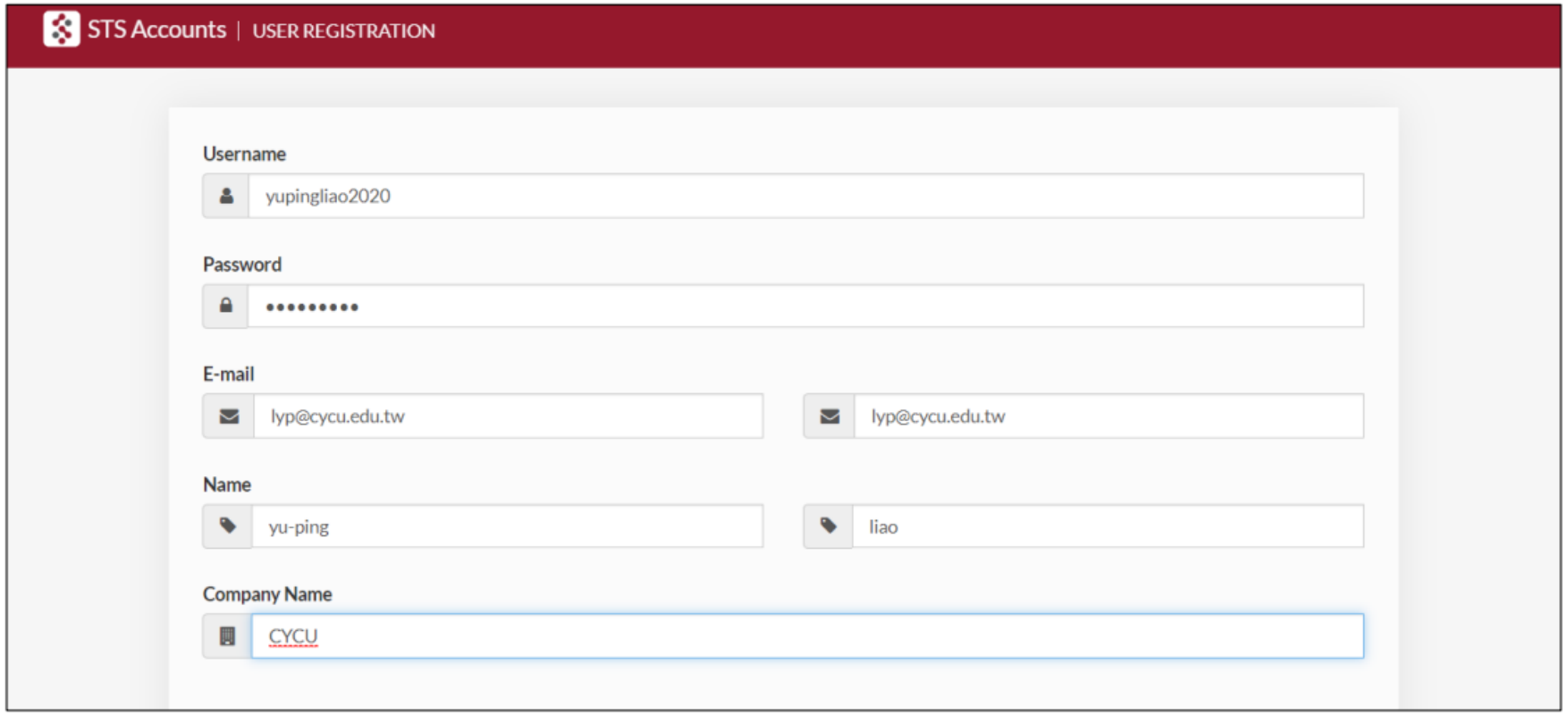
https://www.youtube.com/watch?v=3AR432bguOY&t=346s

Sensetecnic-FRED

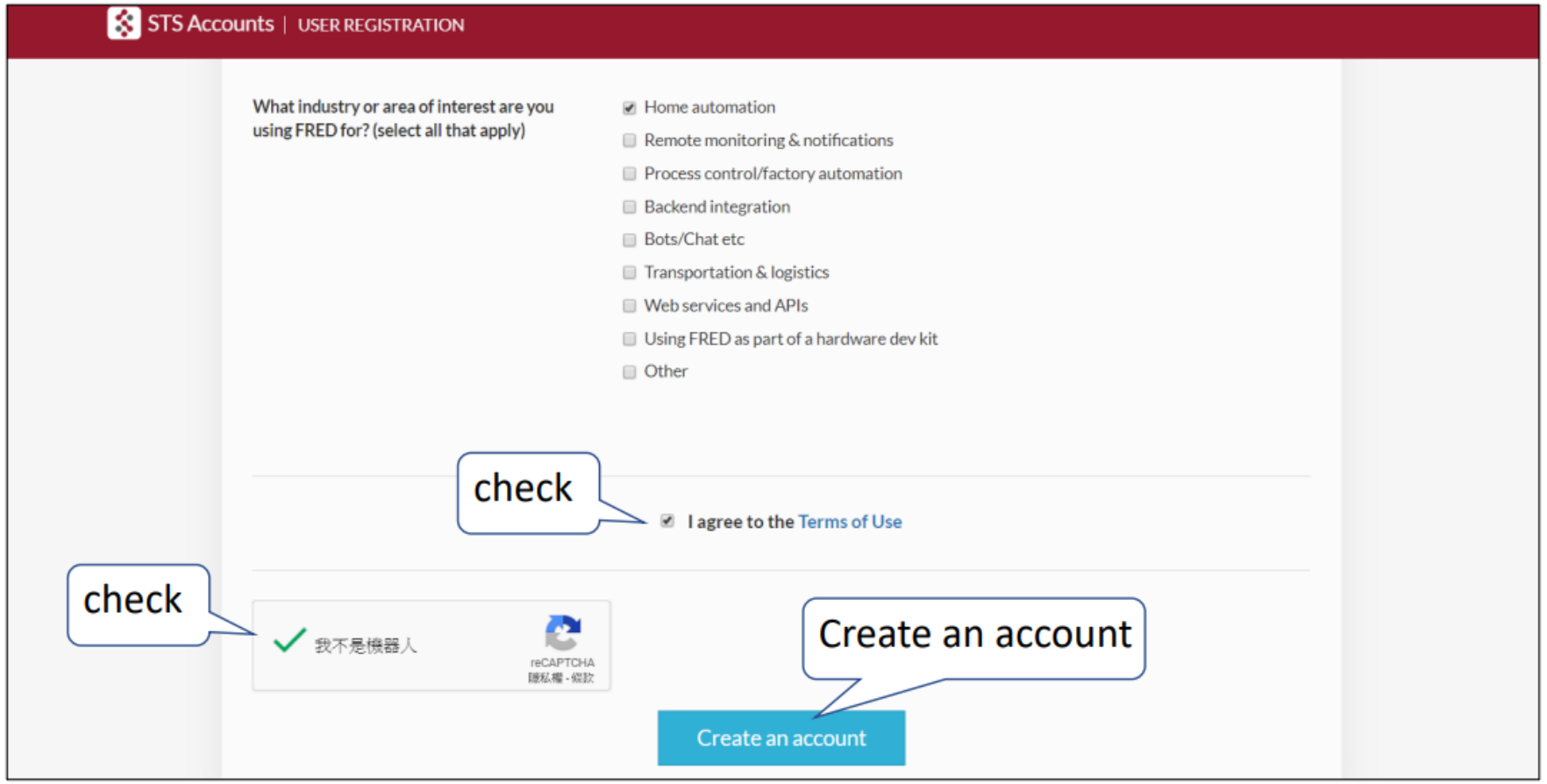


https://fred.sensetecnic.com/

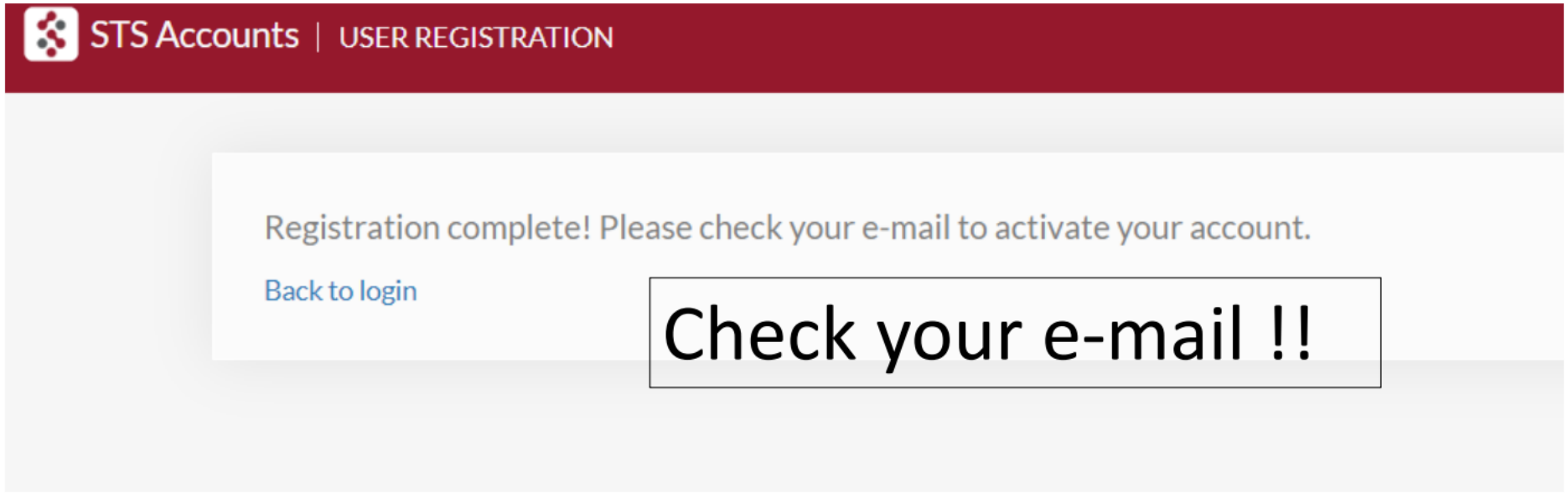
USER REGISTRATION



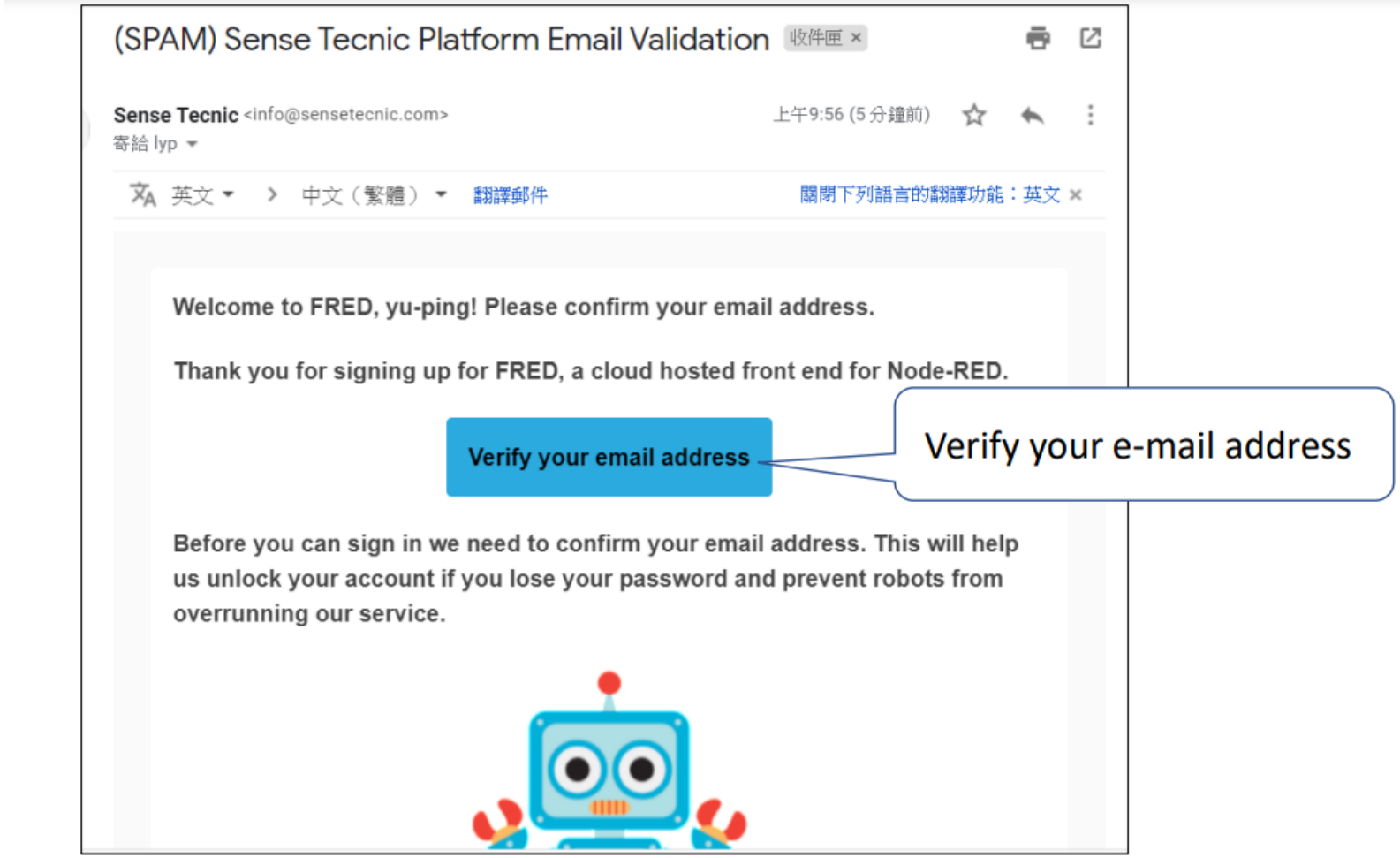
USER REGISTRATION(scroll down)



Registration complete

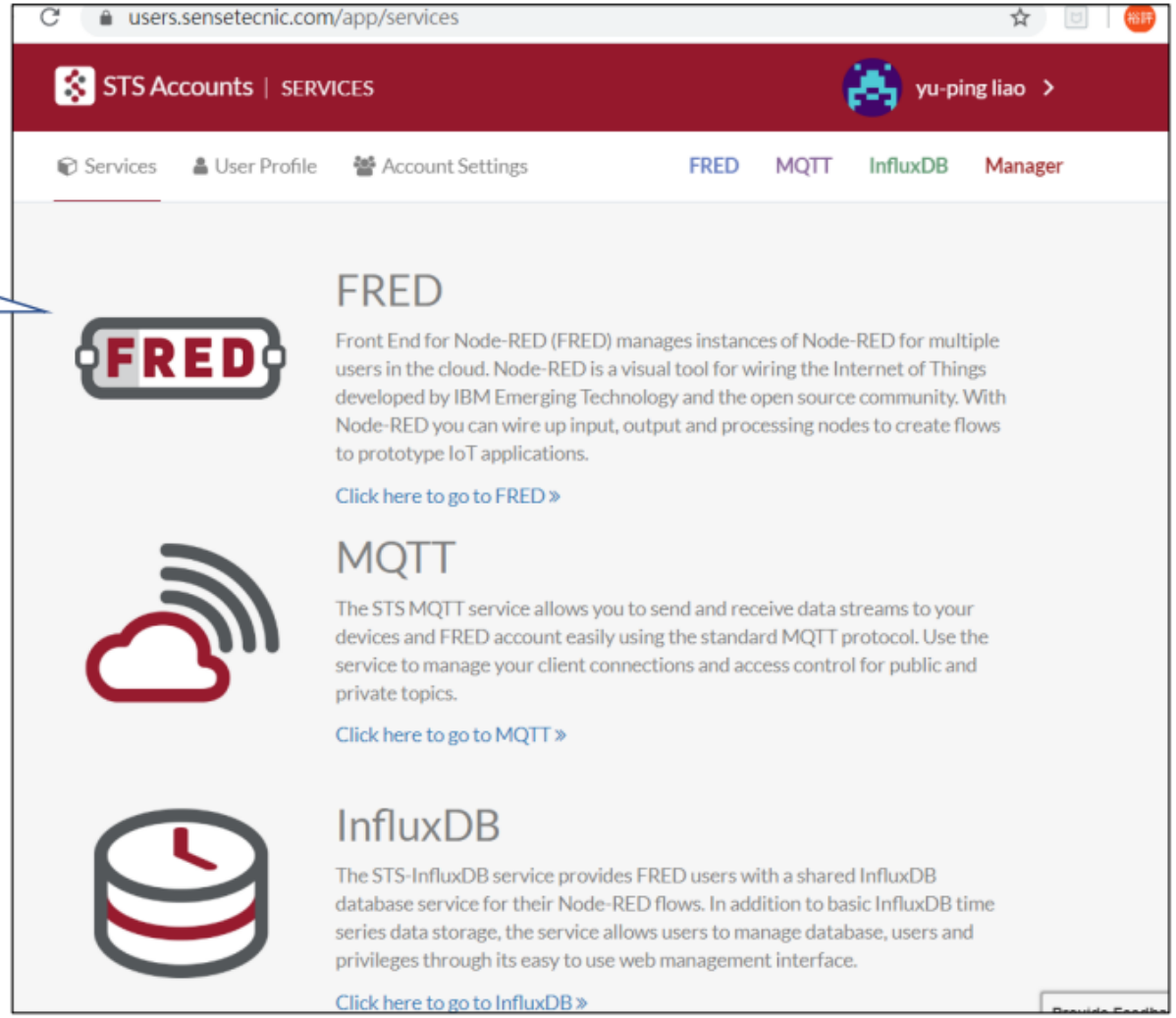


Sense Tecnic Platform Email Validation

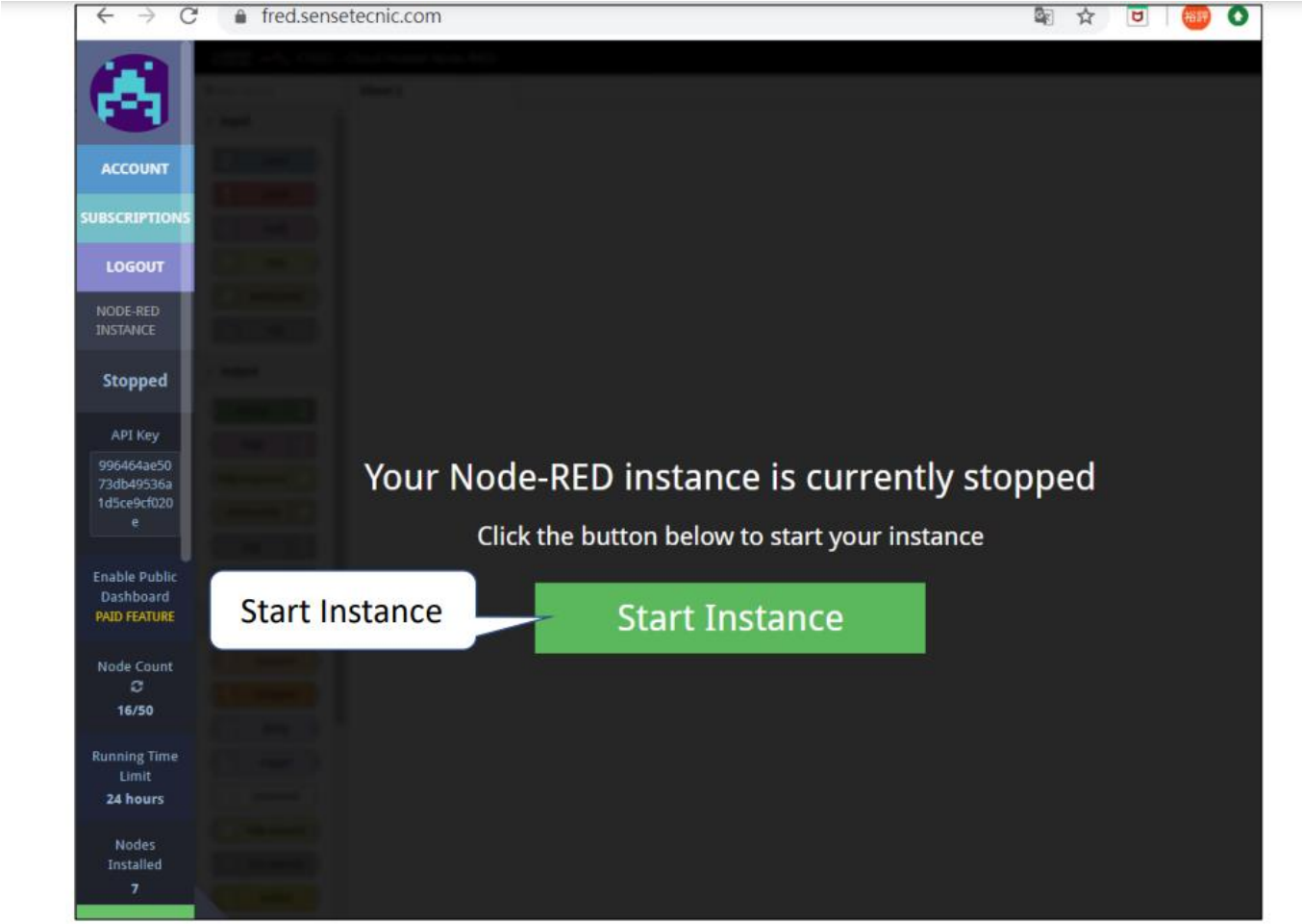


STA Accounts

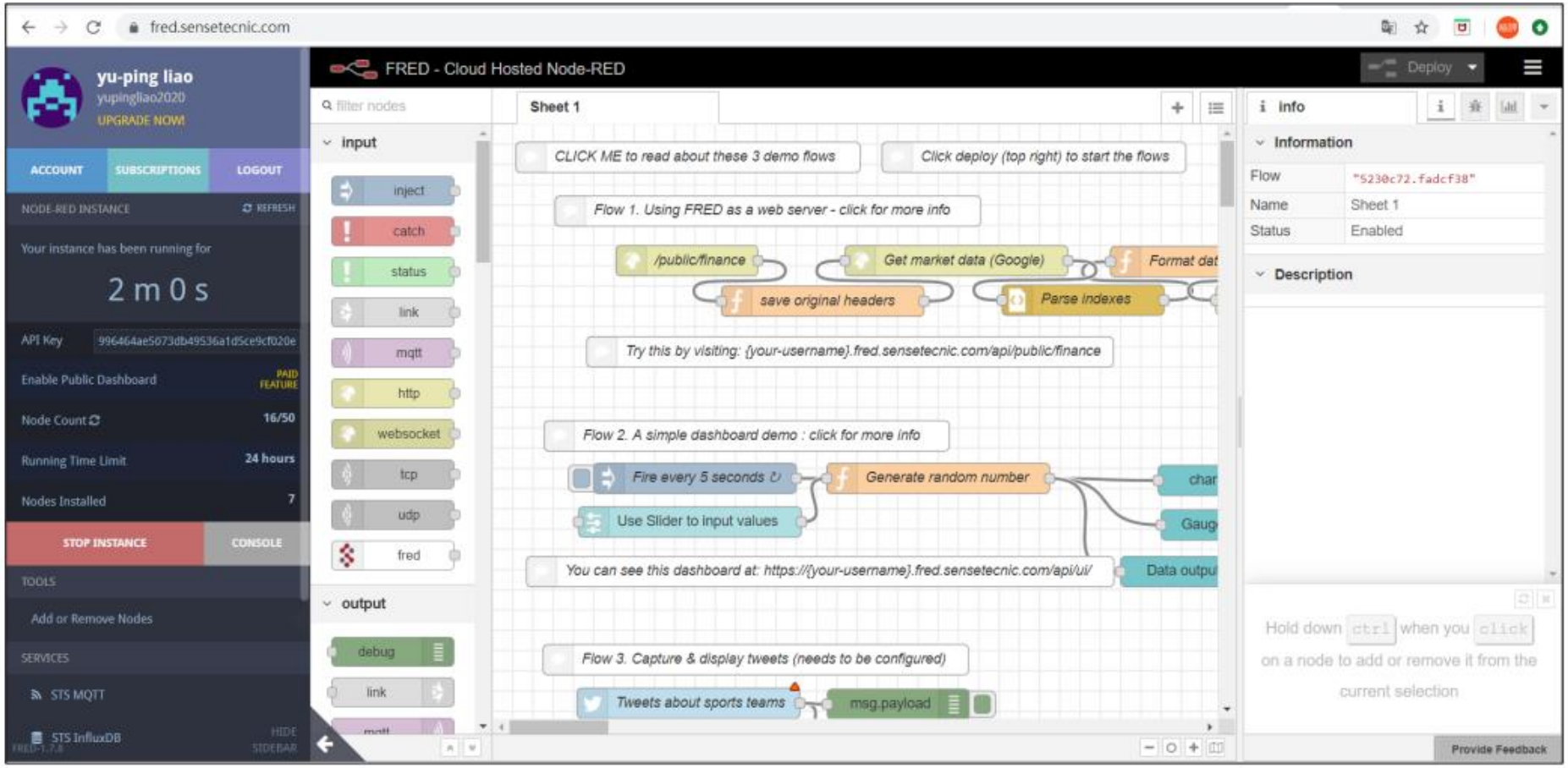
FRED



Start Instance

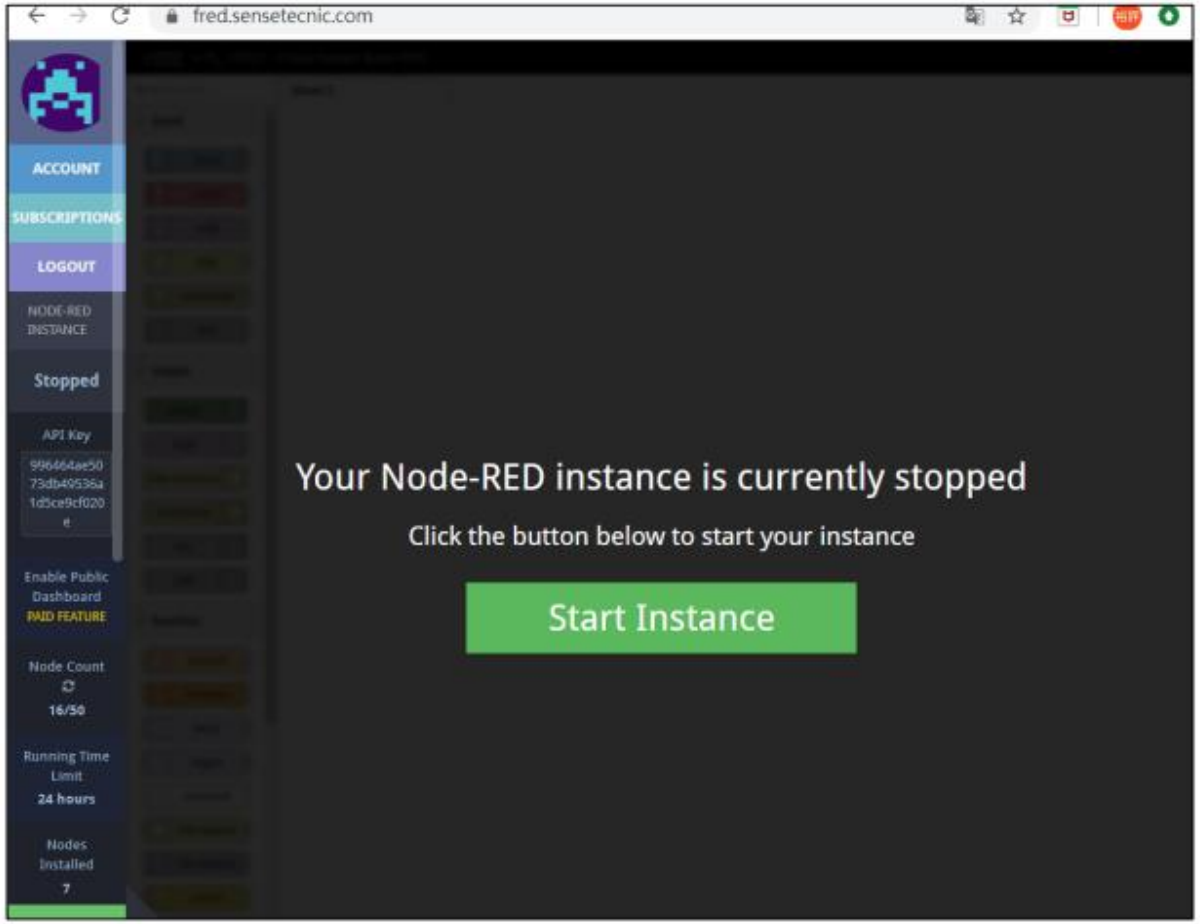


Node-Red


fred.sensetecnic.com
yu-ping liao
yupingliao2020
UPGRADE NOW!
ACCOUNT
SUBSCRIPTIONS
LOGOUT
NODE-RED INSTANCE
REFRESH
Your instance has been running for
2 m 0 s
API Key
996464ae5073db49536a1d5ce9cf020e
Enable Public Dashboard
PAID FEATURE
Node Count
16/50
Running Time Limit
24 hours
Nodes Installed
7
STOP INSTANCE
CONSOLE
TOOLS
Add or Remove Nodes
SERVICES
STS MQTT
STS InfluxDB
HIDE SIDEBAR
FRED - Cloud Hosted Node-RED
Deploy
filter nodes
Sheet 1
input
inject
catch
status
link
mqtt
http
websocket
tcp
udp
fred
output
debug
link
CLICK ME to read about these 3 demo flows
Click deploy (top right) to start the flows
Flow 1. Using FRED as a web server - click for more info
/public/finance
Get market data (Google)
Format dat
save original headers
Parse Indexes
Try this by visiting: {your-username}.fred.sensetecnic.com/api/public/finance
Flow 2. A simple dashboard demo : click for more info
Fire every 5 seconds
Generate random number
Use Slider to input values
You can see this dashboard at: https://{your-username}.fred.sensetecnic.com/api/ui/
Data outpu
Flow 3. Capture & display tweets (needs to be configured)
Tweets about sports teams
msg.payload
info
Information
Flow
"5230c72.fadcf38"
Name
Sheet 1
Status
Enabled
Description
Hold down ctrl when you click on a node to add or remove it from the current selection
Provide Feedback

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