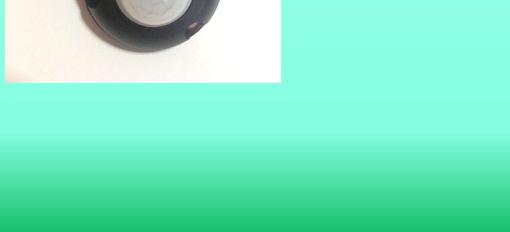
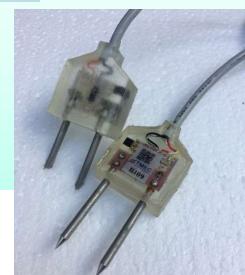


Sensors for Agriculture

- Temp & Humid Sensor
- Soil Moisture Sensor
- Light Intensity Sensor
- Pressure Sensor
- CO₂ Gas Sensor
- Conductivity Sensor
- pH Sensor



3

Sensor Network System: Gateway

Sensors
Analog Output : 0-5V

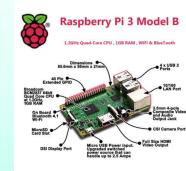
Sensors
Analog Output : 4-20mA

Sensors
Digital output



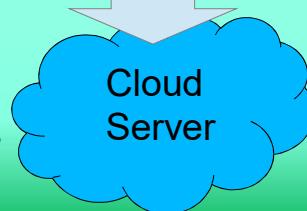
Data
Acquisition
Board
**RF receiver
LORA
ARDUINO**

Working Period: always



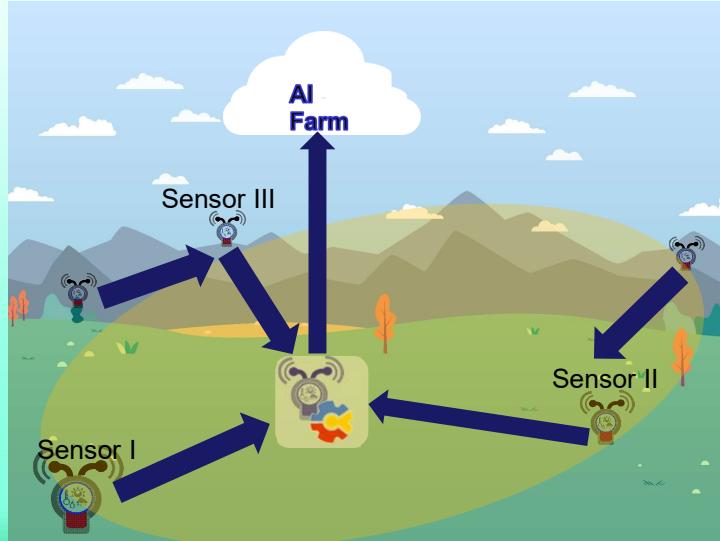
Singleboard
Computer
Raspberry Pi

10 or 15 min.



4

Wireless Sensor Network in open Field



5

Master Node

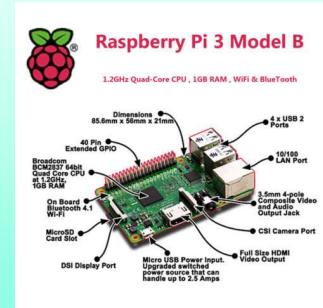


Up to 8 sensors



Arduino
-RF module
-LoRa module

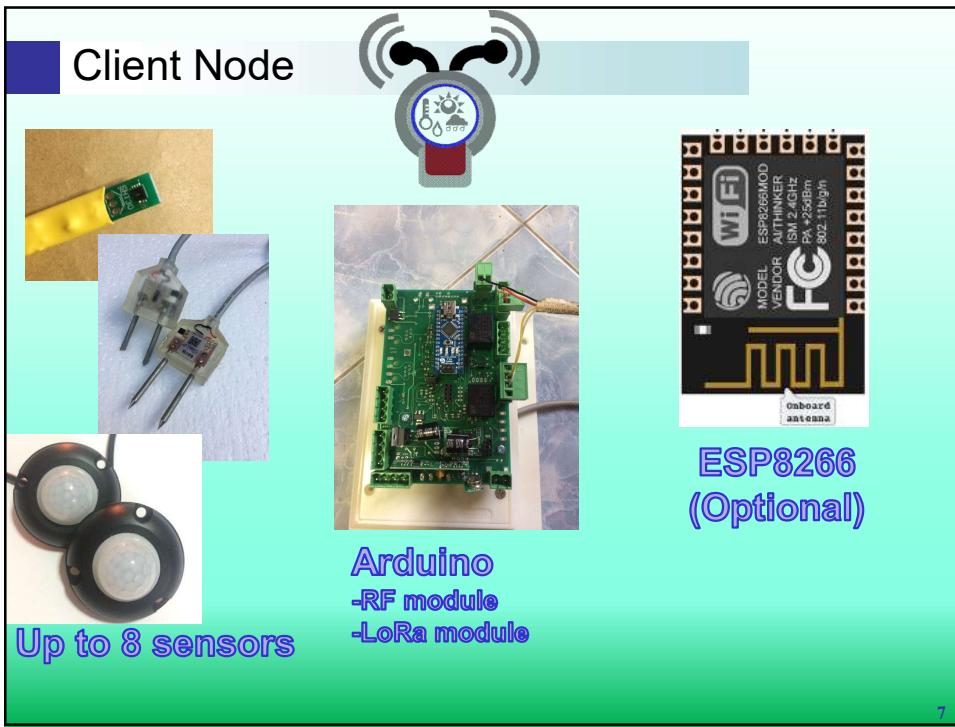
Gateway



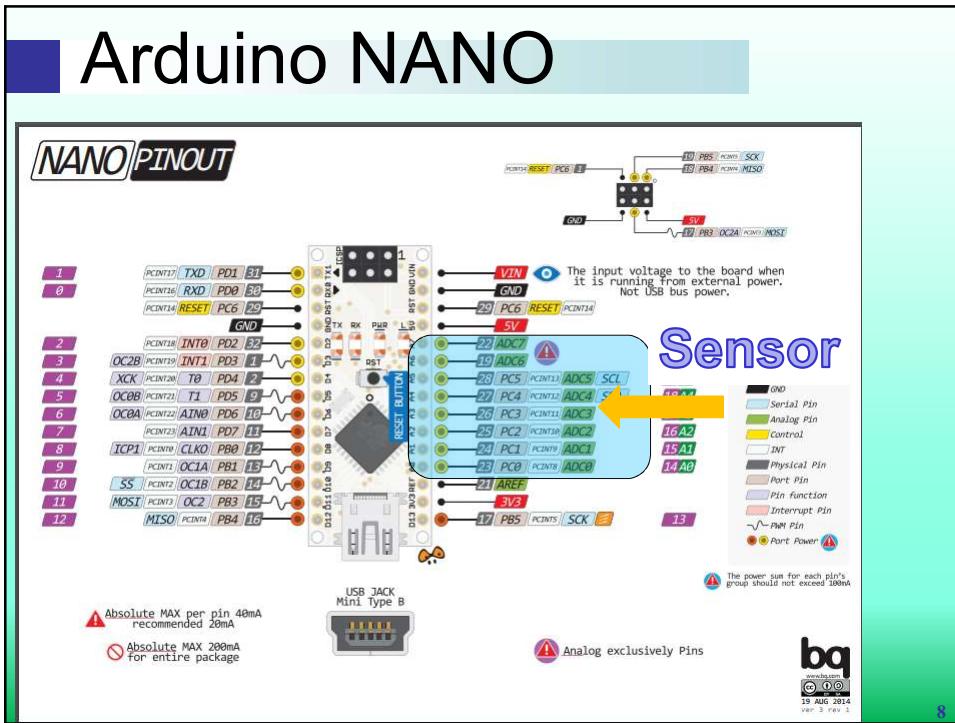
Raspberry Pi

- NETPIE
- Local Database
- FTP

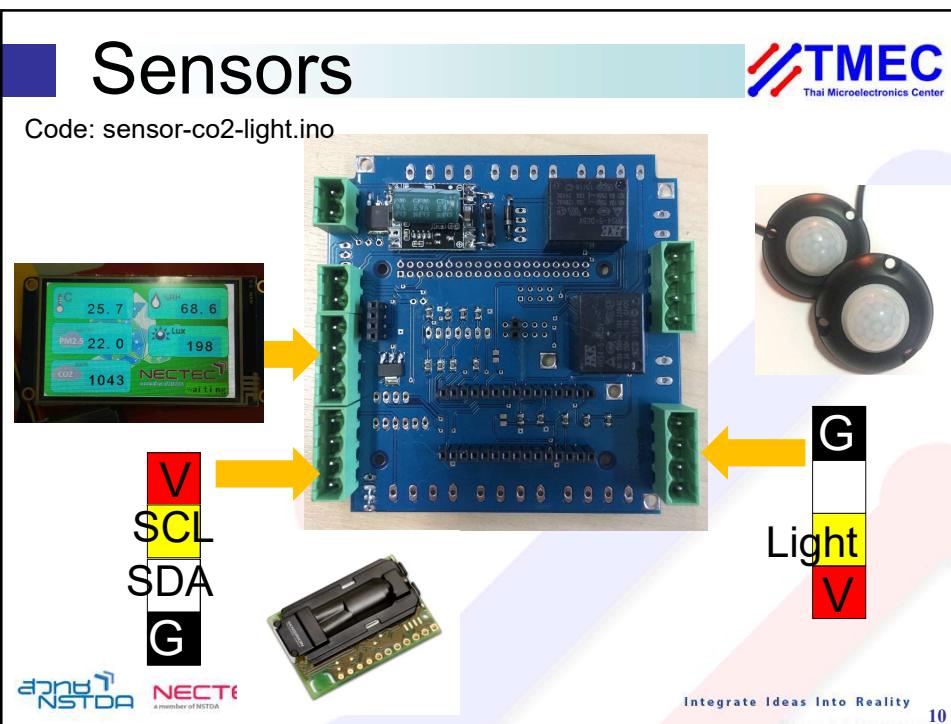
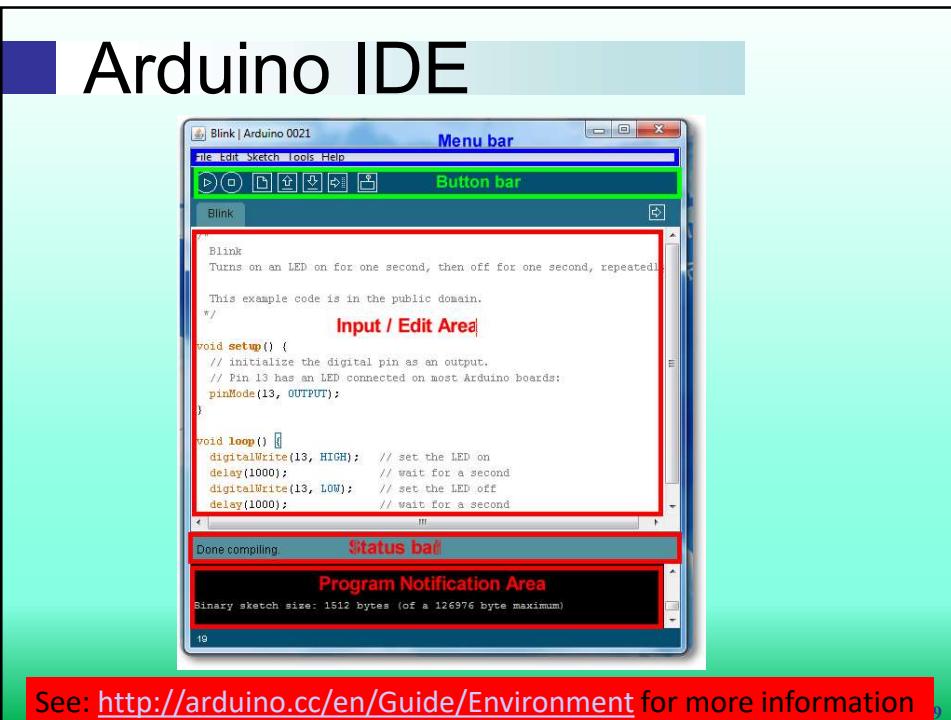
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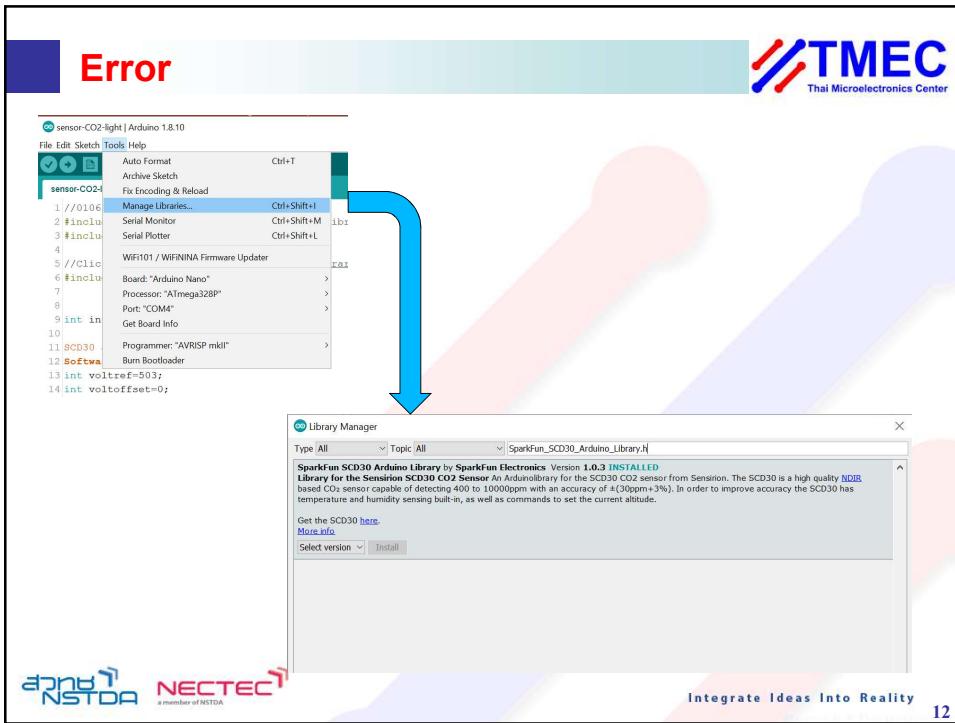
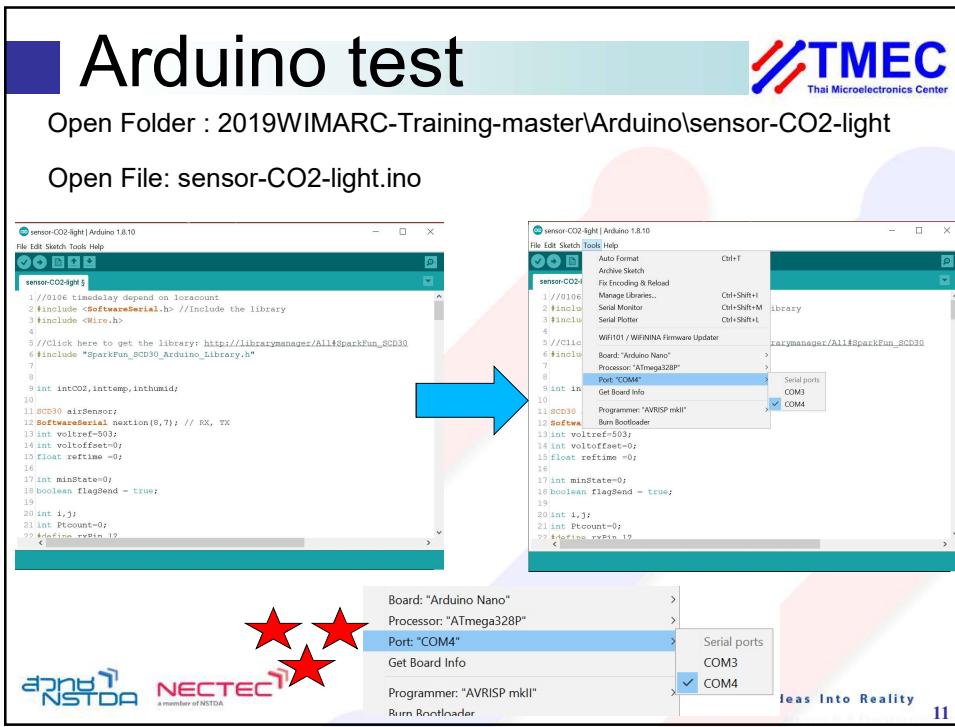


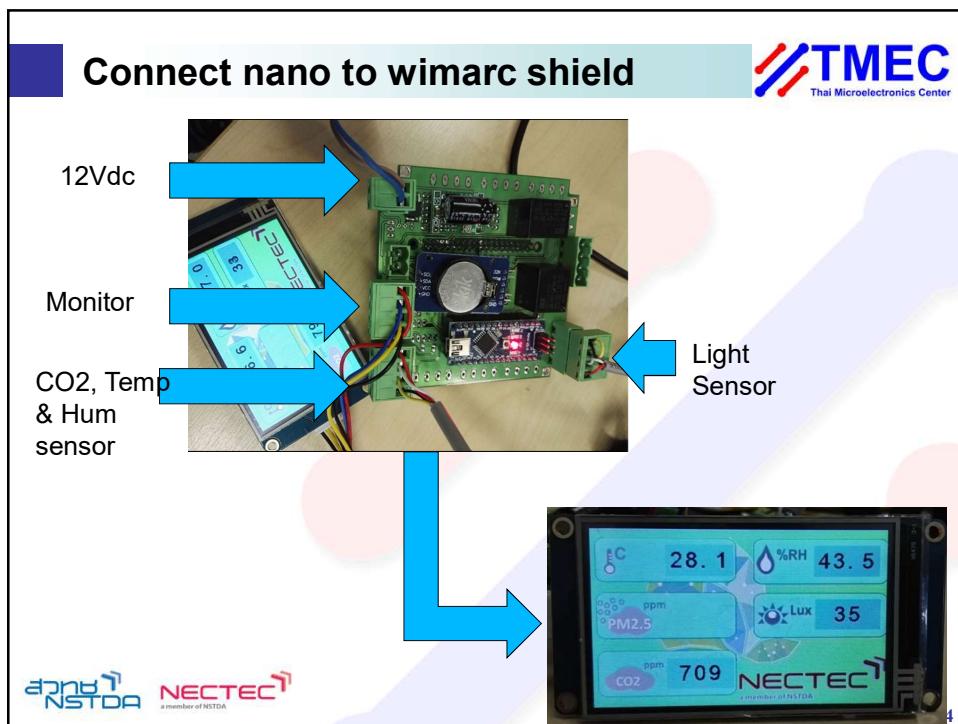
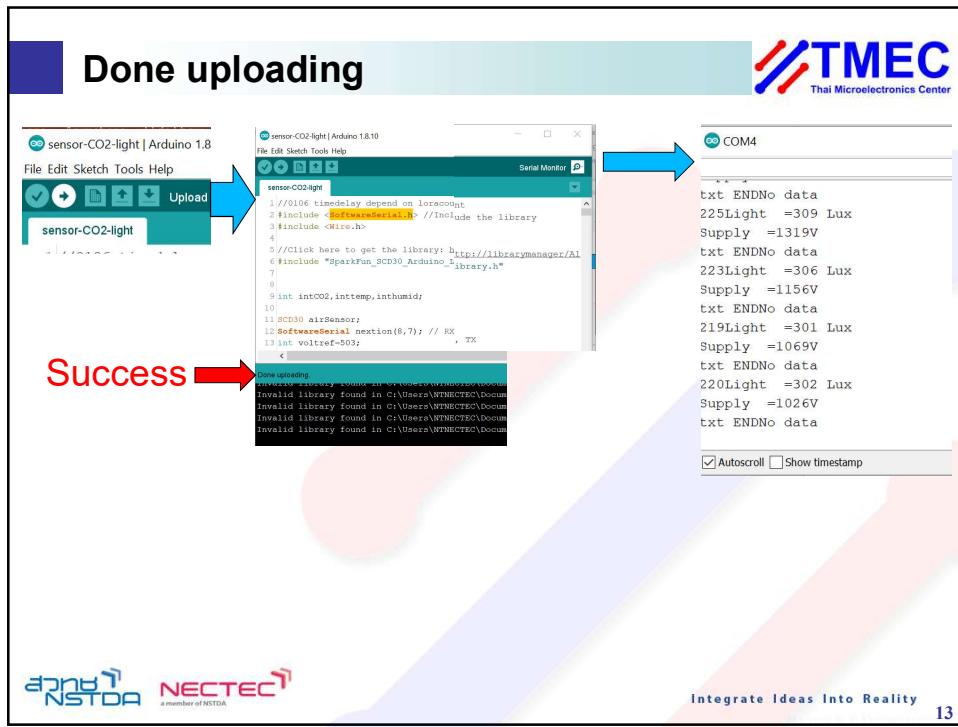
7



8







Master and Client

Master

Open Folder : 2019WIMARC-Training-master\Arduino\RX-LORA-NEXTION-CO2

Open File: RX-LORA-NEXTION-CO2.ino

```

RX-LORA-NEXTION-CO2 | Arduino 1.8.10
File Edit Sketch Tools Help
RX-LORA-NEXTION-CO2
1 #include <SPI.h>
2 #include <LoRa.h>
3 #include <SoftwareSerial.h> //Include the library
4 #include <Wire.h>
5 //Click here to get the library: http://librarymanager/
6 #include "SparkFun_SCD30_Arduino_Library.h"
7
8 long freq=923E6; ← Change Freq
9 SCD30 airSensor;
10 SoftwareSerial nextion(8,7); // RX, TX
11 //sps30
12 int ret;
13 u8 auto_clean_days = 4;
  
```

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Error

sensor-CO2-light | Arduino 1.8.10

File Edit Sketch Tools Help

sensor-CO2-light

1 //0106
2 #inclu
3 #inclu
4
5 //Clic
6 #inclu
7
8
9 int in
10
11 SCD30
12 Softwa
13 int volref=503;
14 int voltoffset=0;

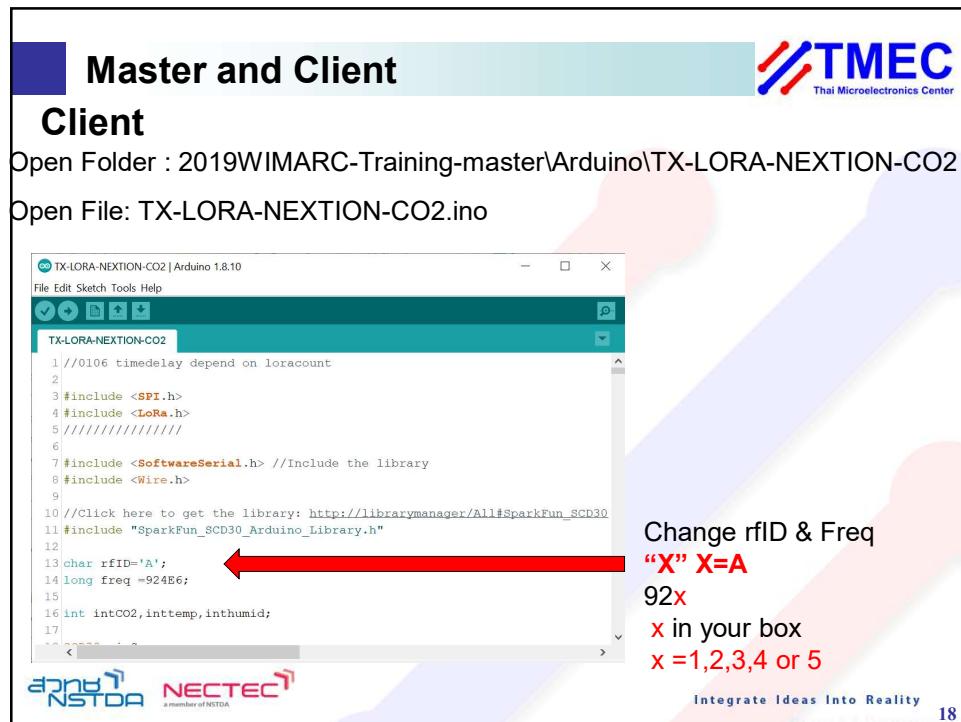
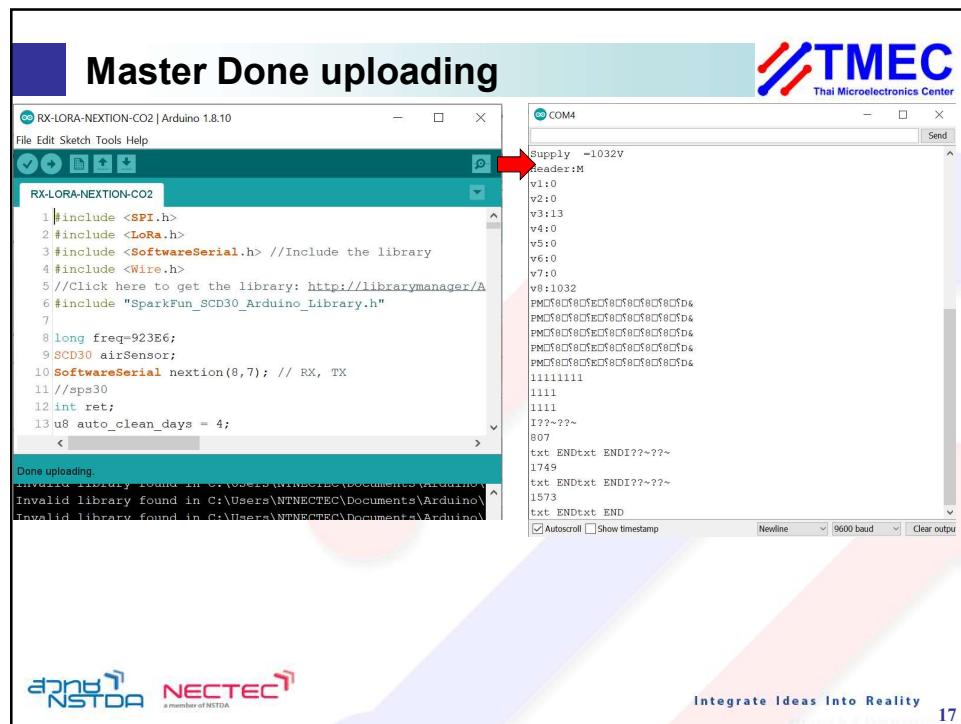
Library Manager

Type: All Topic: All LoRa

LoRa by Sandeep Mistry Version 0.6.1 INSTALLED
An Arduino library for sending and receiving data using LoRa radios. Supports Semtech SX1276/77/78/79 based boards/shields.
More info

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LoRa by Sandeep Mistry install



TX-LORA-NEXTION-CO2 | Arduino 1.8.10

```

File Edit Sketch Tools Help
TX-LORA-NEXTION-CO2

1 //0106 timedelay depend on loracount
2
3 #include <SPI.h>
4 #include <LoRa.h>
5 ///////////////////
6
7 #include <SoftwareSerial.h> //Include the
8 #include <Wire.h>
9
10 //Click here to get the library: http://li
11 #include "SparkFun_SCD30_Arduino_Library.h"
12
13 char rfID='A';
14 long freq=923E6;
15
16 int intCO2,inttemp,inthumid;
17

```

Done uploading.

COM4

```

PADS,□,□,□,□,□,□,□$ Header:V
v1:0
v2:0
v3:0
v4:0
v5:0
v6:0
v7:0
v8:1014
timecount = 77.19
Supply =1015V
txt ENDwaiting for Input packet loracount 4
.....Received packet 'I??~??~$IM$!fF>□$*□$|□$T) $00$0
' with RSSI -25
loopcount 845
packetSize 7
.....
ID:A sendtxt END.....send rfID:A
930 .....send rfID:A
??

```

Autoscroll Show timestamp Newline 9600 baud Clear output

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Master and Client

Master received packet from Client “A”

COM4

```

1111
I??~??~
807
txt ENDtxt ENDI??~??~
1749
txt ENDtxt ENDI??~??~
1573
txt ENDtxt ENDI??~??~
658
txt ENDtxt ENDI??~??~
930
txt ENDtxt ENDI??~??~

```

txt ENDtxt ENDwaiting for Input packet loopcount 0

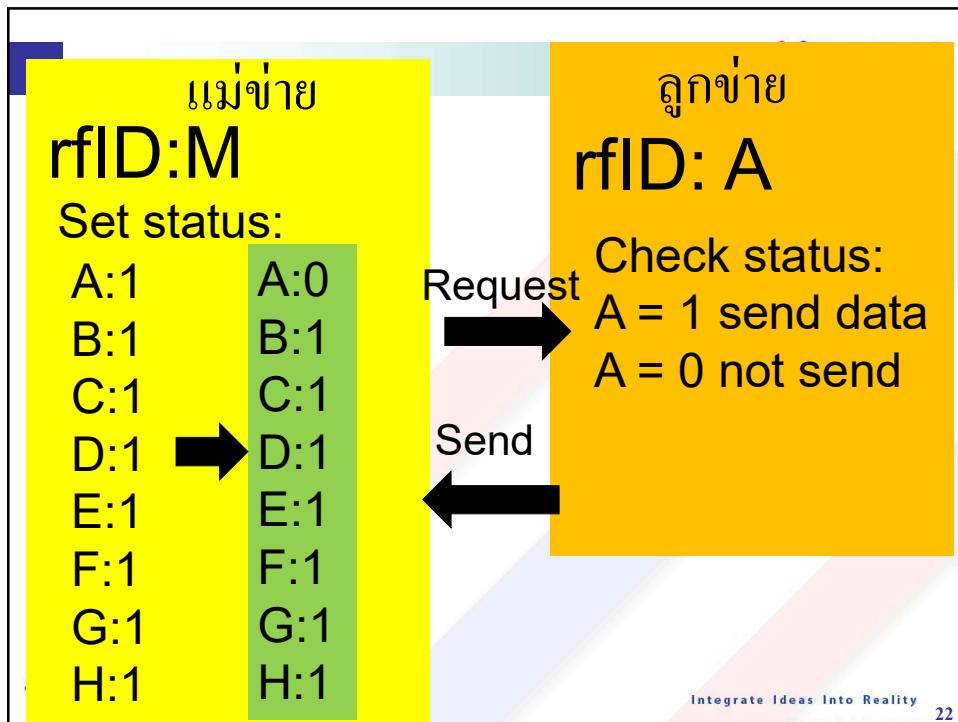
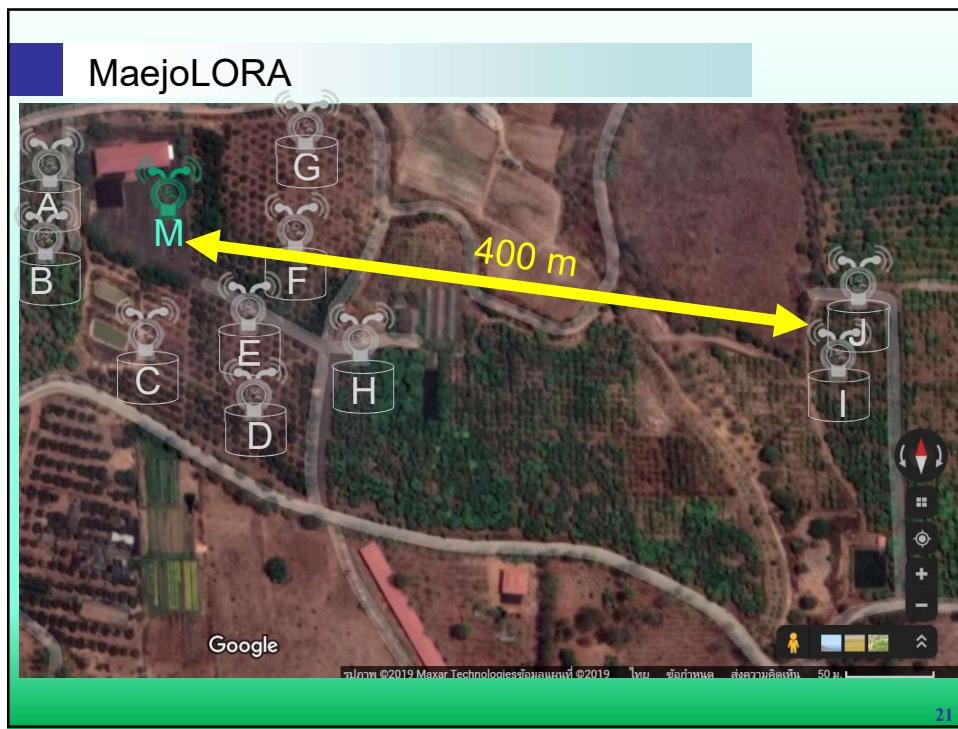
Received packet 'PADS,□,□,□,□,□,□\$'

' with RSSI -35

loopcount 16
packetSize 27
Input =
check =
txt ENDInput ID1111111
netpie: 00000;00000;00000;00000;00000;00000;00000;01012;
PADS,□,□,□,□,□,□,\$
PADS,□,□,□,□,□,□,\$
PADS,□,□,□,□,□,□,\$
PADS,□,□,□,□,□,□,\$
PADS,□,□,□,□,□,□,\$

Autoscroll Show timestamp Newline 9600 baud Clear output

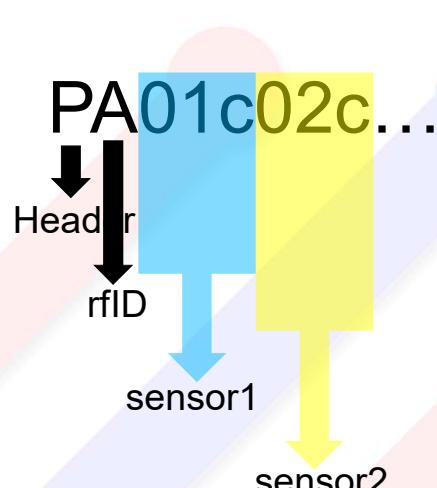
Integrate Ideas Into Reality 20



Data Protocol

TMEC
Thai Microelectronics Center

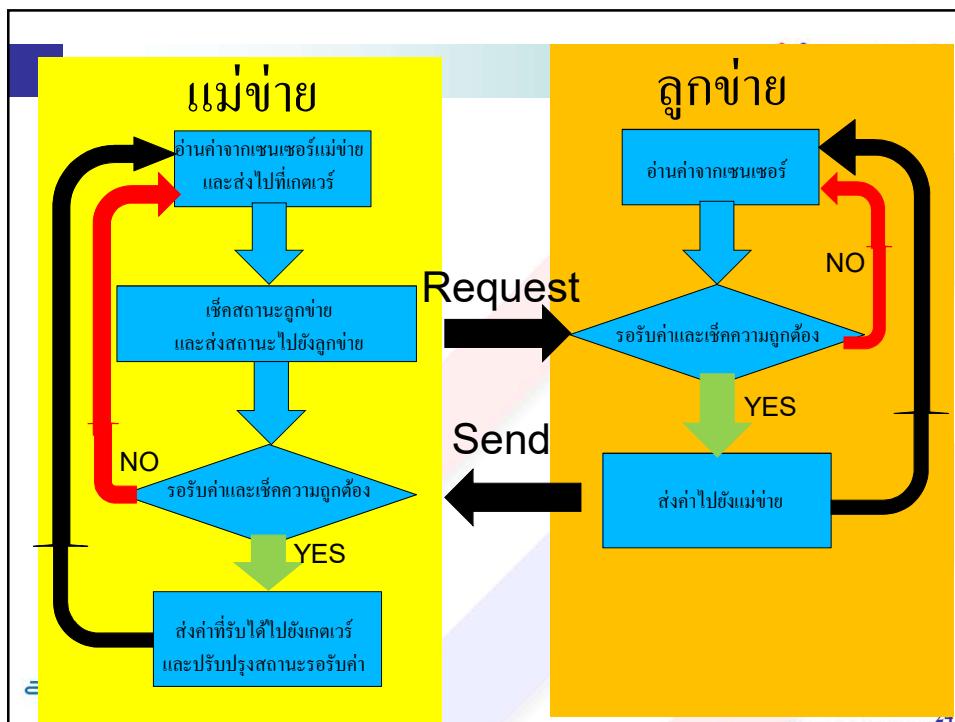
ลูกปั่ย
rfID: A
8 Sensors:
3 Bytes/sensor
-2 Data Bytes
-1 check Byte



NSTDA NECTEC
a member of NSTDA

Integrate Ideas Into Reality

23

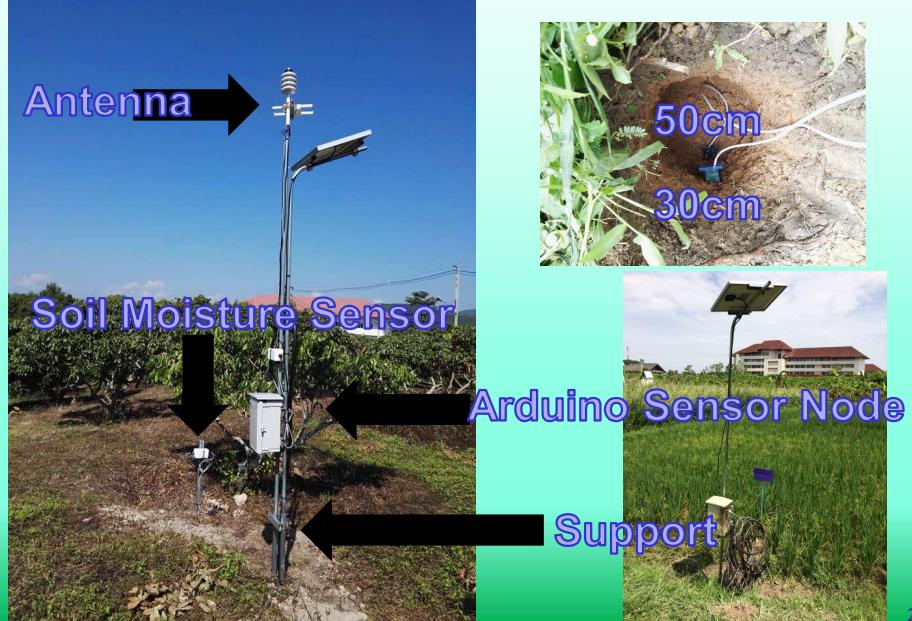


Master Node Open Field Installation



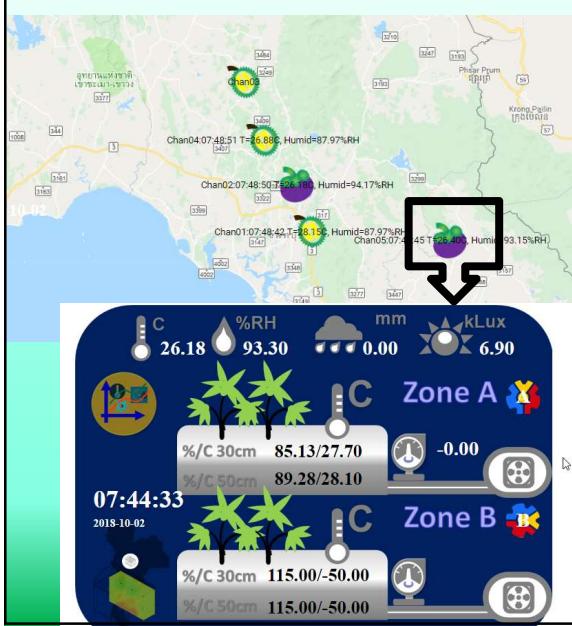
25

Client Node Open Field Installation



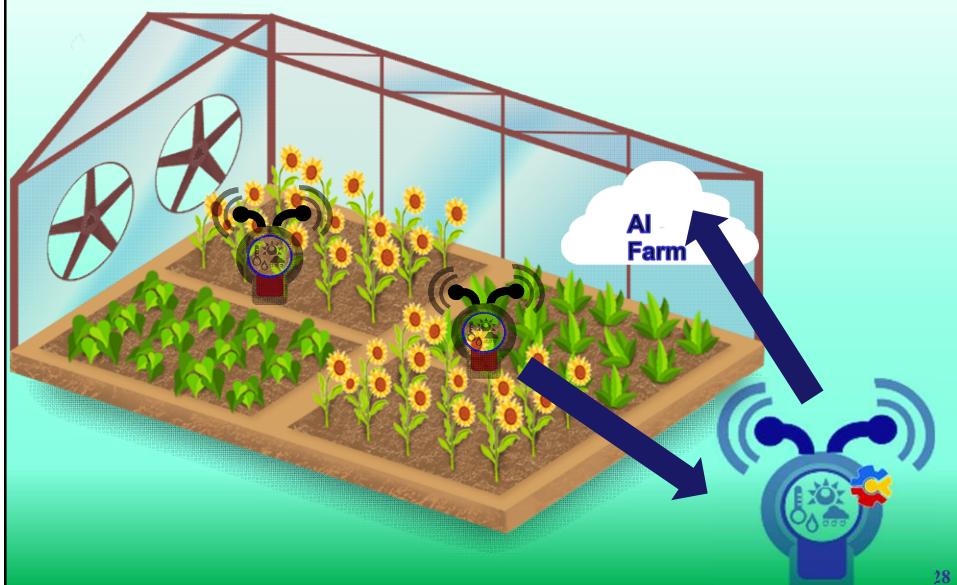
26

Open Field System



27

Wireless Sensor Network in Greenhouse



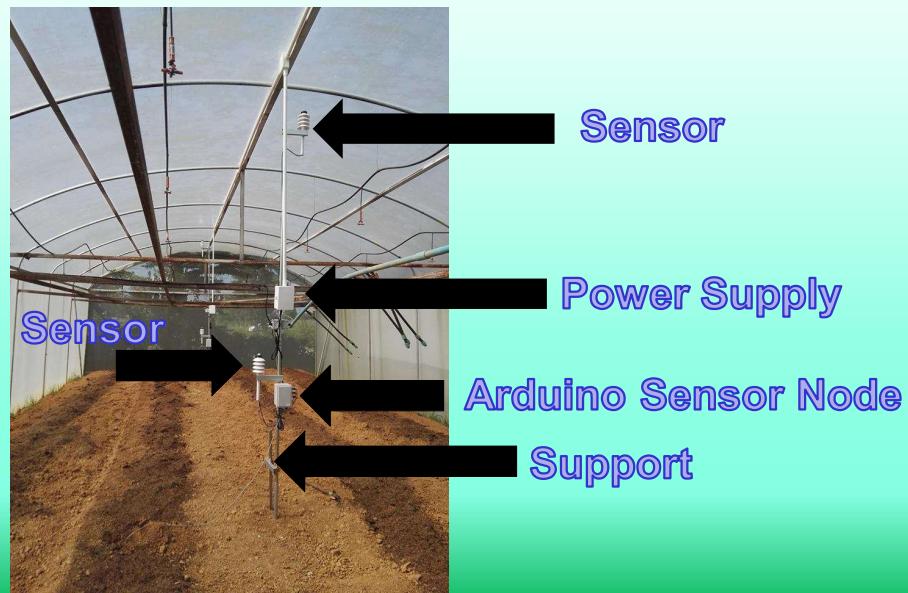
28

Master Node Greenhouse Installation



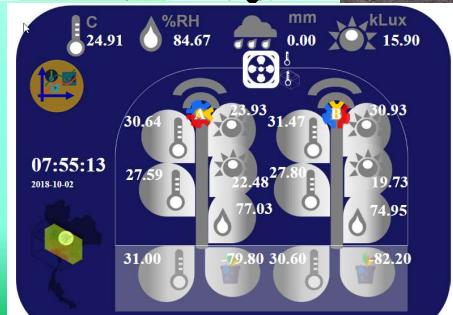
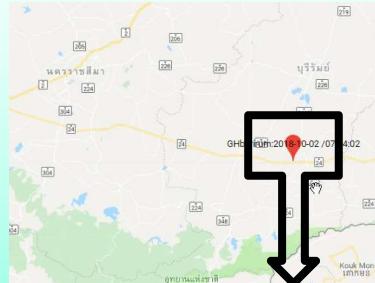
29

Client Node Greenhouse Installation



30

Greenhouse System



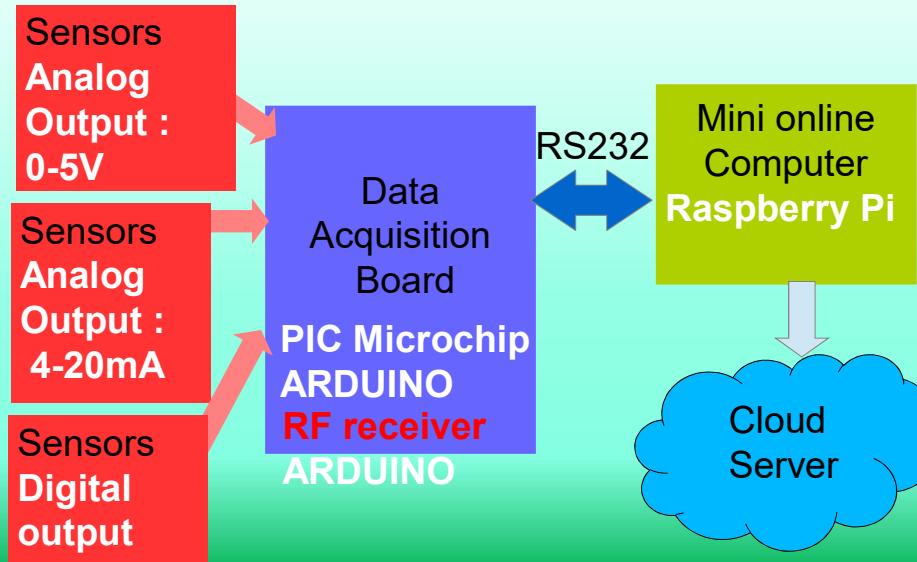
31

Case Study : Crop Requirement



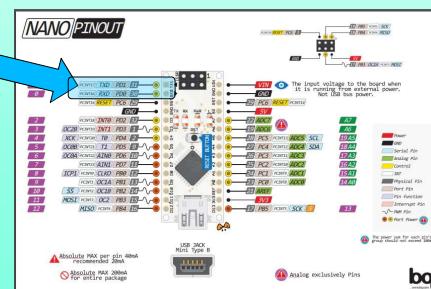
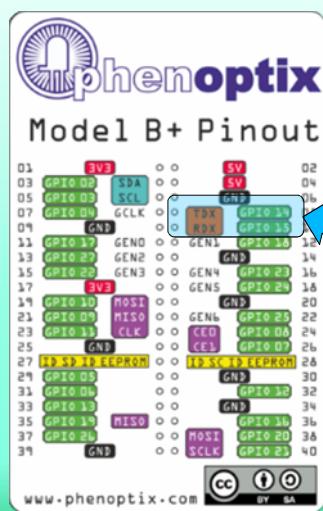
32

Master Sensor Network System



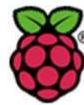
33

Mini online Computer Raspberry C

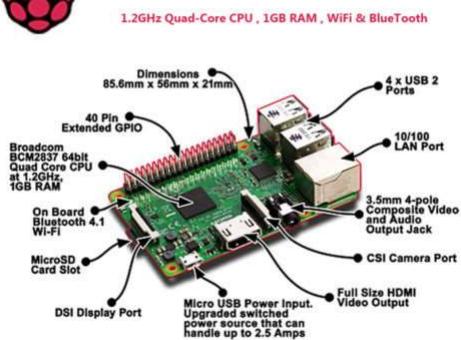


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Raspberry Pi



Raspberry Pi 3 Model B



SD card : 16GB
OS: Linux Raspbian Stretch
Php Server
phpMyadmin :MySQL
Python 2.7
FTP

Server, Database



Server

Database : MySQL
Web site :html5,php
File
Etc.

Client

IoT platform



NETPIE vs DB server



DB Server



-slow
-long header



- DB flexible



-realtime



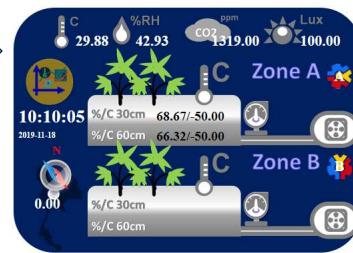
-DB not configurable



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Image →



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Database display

The screenshot shows a web browser window with the TMEC logo at the top right. Below it, there's a search bar and a navigation menu with options like 'FROM' and 'UNTIL'. A large blue arrow points from the text 'Database display' to a graph titled 'Temperature'. The graph plots 'Air Temperature' against time, with data points shown as yellow circles. The x-axis represents dates from November 17 to November 18, 2019. The y-axis represents temperature in degrees Celsius, ranging from 29.5 to 31.5. At the bottom of the graph, it says 'Powered by 000webhost'. The footer of the page includes the NECTEC logo and the text 'Integrate Ideas Into Reality'.

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The screenshot shows the NETPIE.io website homepage. The header features the NETPIE logo and the TMEC logo. The main banner has the text 'CONNECT EVERYTHING' and 'A SOCIAL PLATFORM FOR THINGS TO INTERACT'. Below the banner are two buttons: 'GET STARTED NOW' and 'WATCH THE VIDEO'. The footer of the page includes the NECTEC logo and the text 'Integrate Ideas Into Reality'.

<https://netpie.io>

<https://github.com/netpiemaker/netpie-training>

ให้บริการฟรี 100 credits ตลอดไป

39

Application ID

APPID: iotdemo

Key: oSCDOGWSIyngY
Secret: 5qXX8OyuotaTMASUDYgdk

Key, Secret

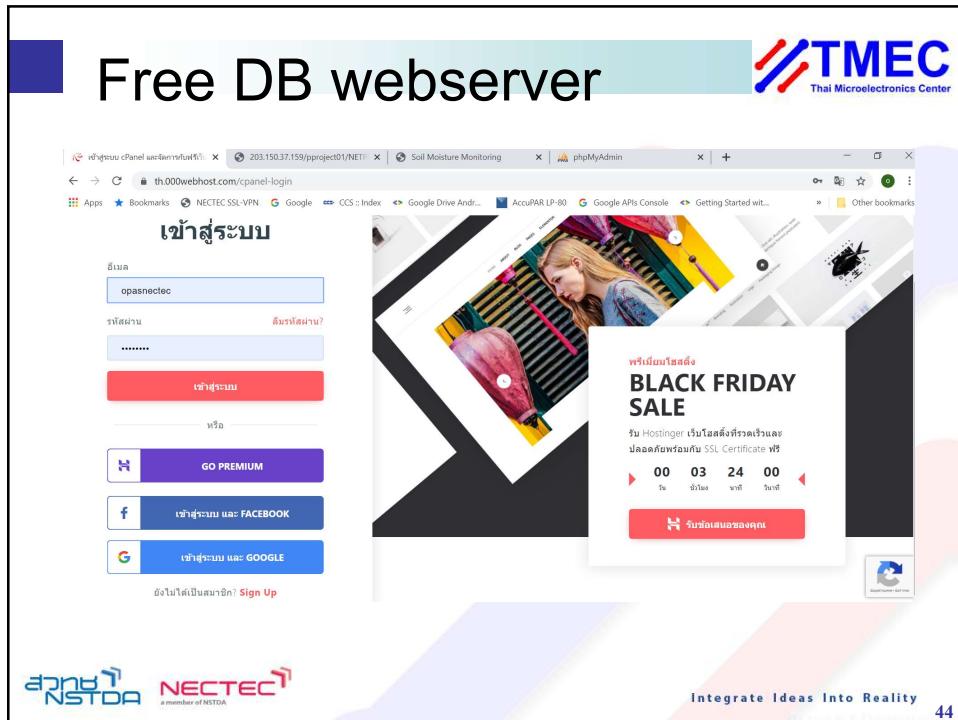
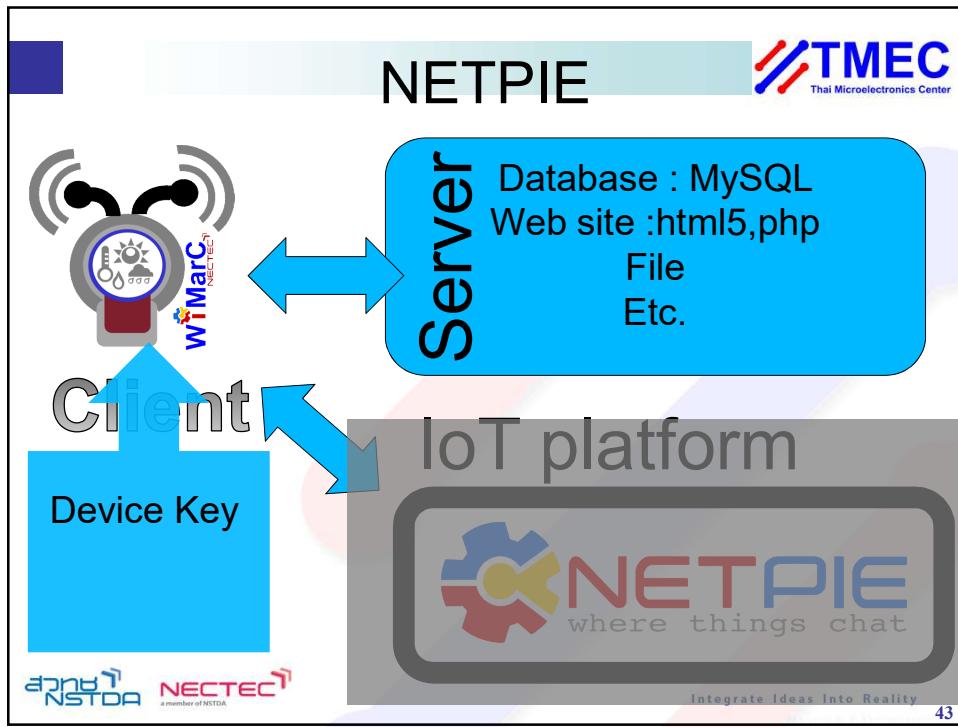
NETPIE | Where things chat | NECTEC | a member of NSTDA | Integrate Ideas into Reality | 41

NETPIE

App ID: 2019wimarc

Device Key → Session Key

NETPIE | Where things chat | NECTEC | a member of NSTDA | Integrate Ideas into Reality | 42



Build your website

The dashboard shows the following resource usage statistics:

- Monthly Bandwidth Quota (10 000 MB): 0.25% USED
- Disk Space Quota (1000 MB): 1.94% USED
- Inode Usage Quota (20 000): 3.82% USED
- Sendmail Daily Quota (50): 0% USED

Website tools available:

- Website Builder
- Install WordPress
- Error Pages
- SEO Toolkit
- Learn to Code
- Earn Money

Files section.

Logos: NECTEC, a member of NSTDA; TMEC Thai Microelectronics Center.

Page Number: 45

Build your Web Database

My Databases table:

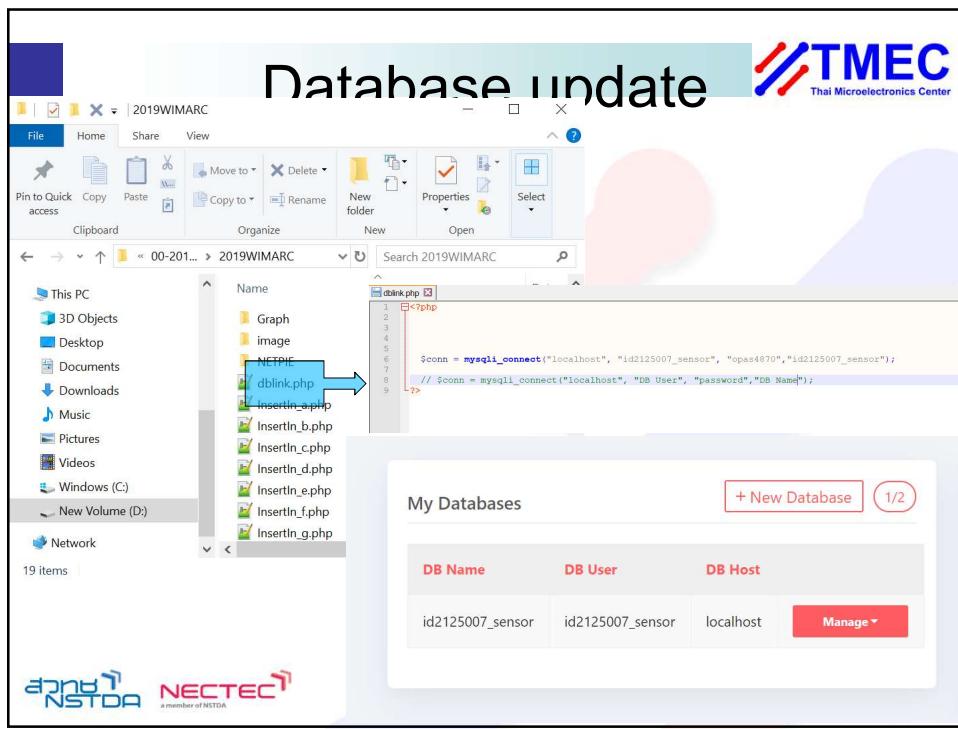
DB Name	DB User	DB Host
id2125007_sensor	id2125007_sensor	localhost

Database Manager details:

- Here you can create and manage all your databases.
- Database Space Limit: 1GB
- Database Table Limit: 200 Tables
- Manage your database at databases.000webhost.com
- Use localhost as a connection hostname.

Logos: NECTEC, a member of NSTDA; TMEC Thai Microelectronics Center.

Page Number: 46



Import database

databases-auth.000webhost.com/index.php

phpMyAdmin

Recent Favorites

Databases SQL Status Export Import Settings Variables Characters Engines

General settings

Server connection collation: utf8mb4_unicode_ci

Importing into the current server

File to import:

Browse your computer: Choose File No file chosen (Max: 10MB) You may also drag and drop a file on this page.

Select from the web server's temporary directory /var/lib/phpMyAdmin/upload/. There are no files to upload!

File

Date modified

2019WIMARC

jquery-ui-1.12.1

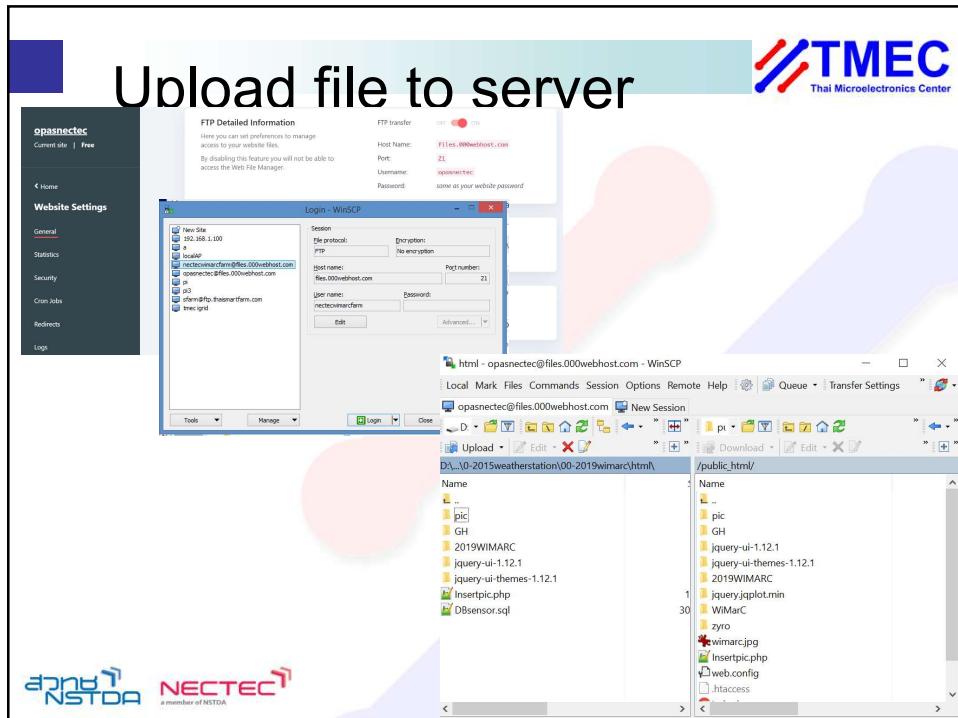
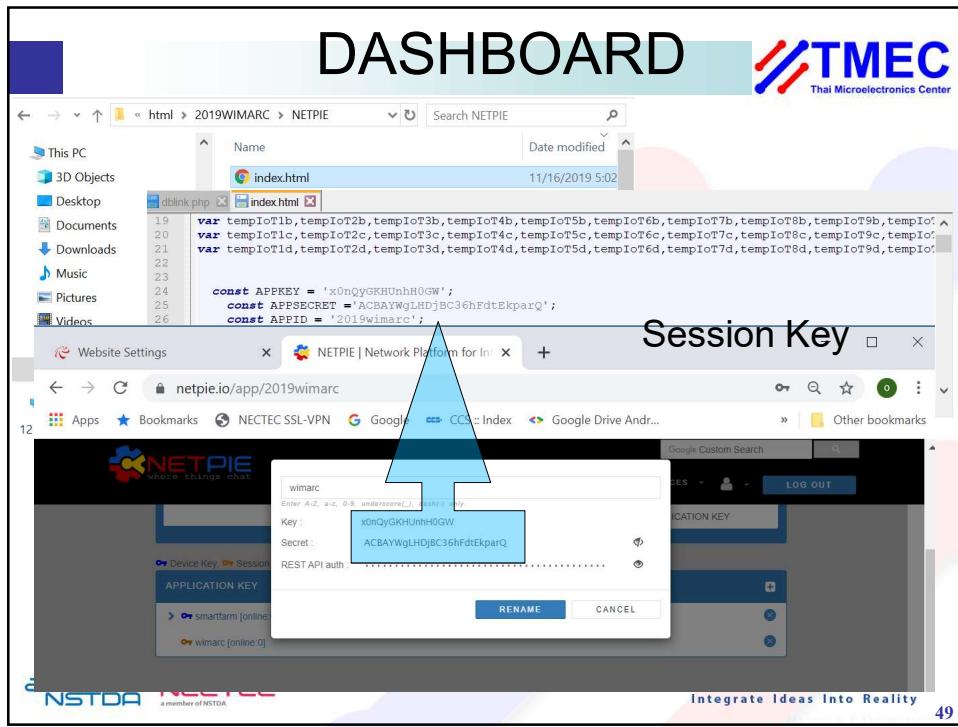
jquery-themes-1.12.1

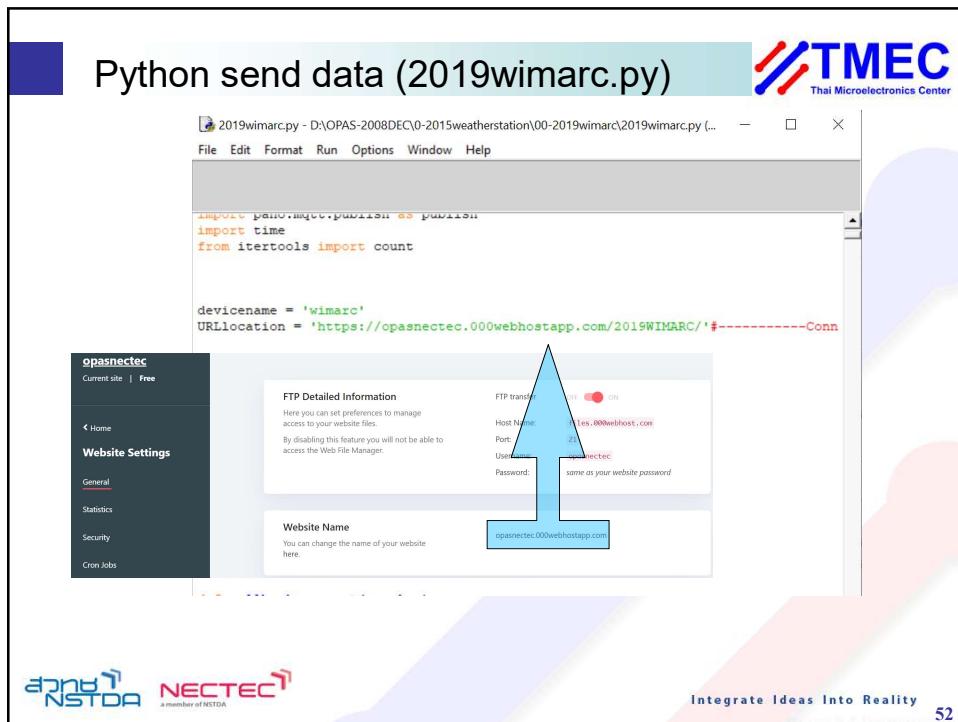
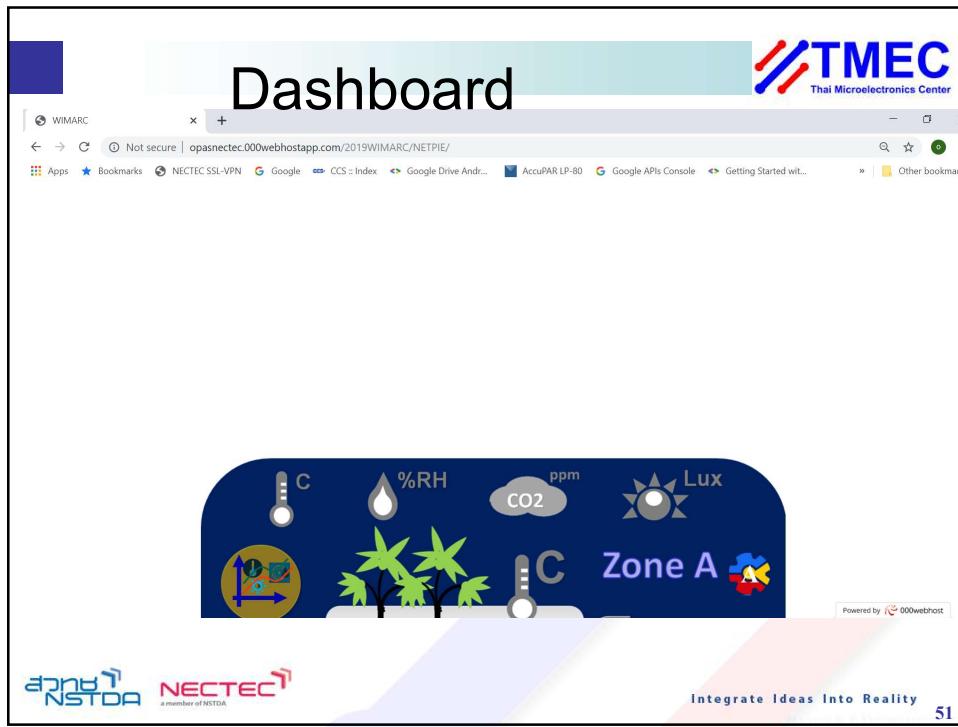
pid

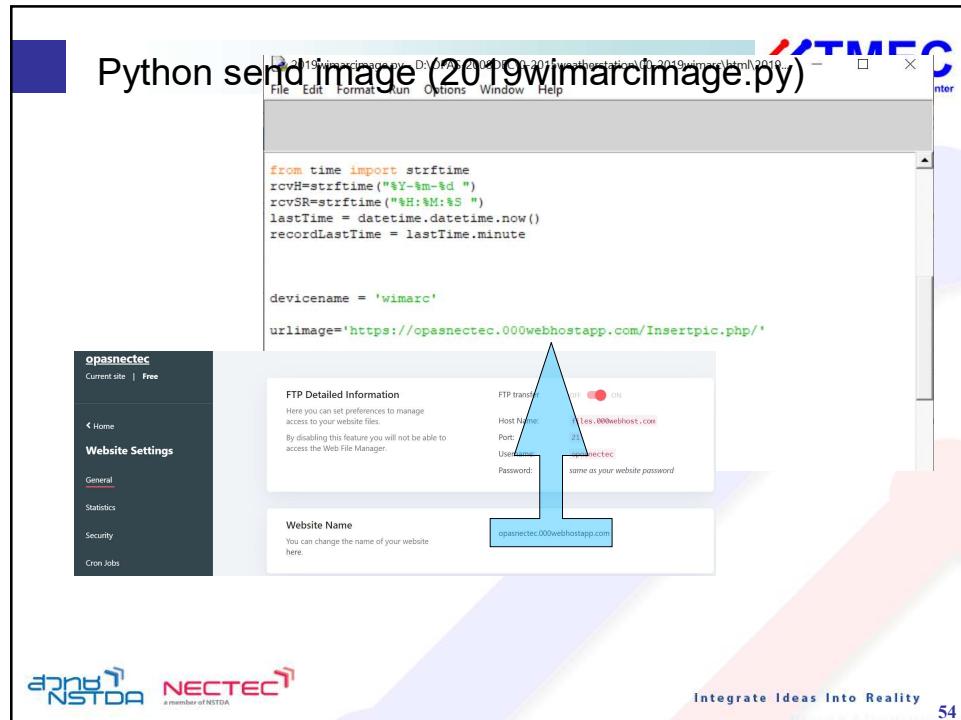
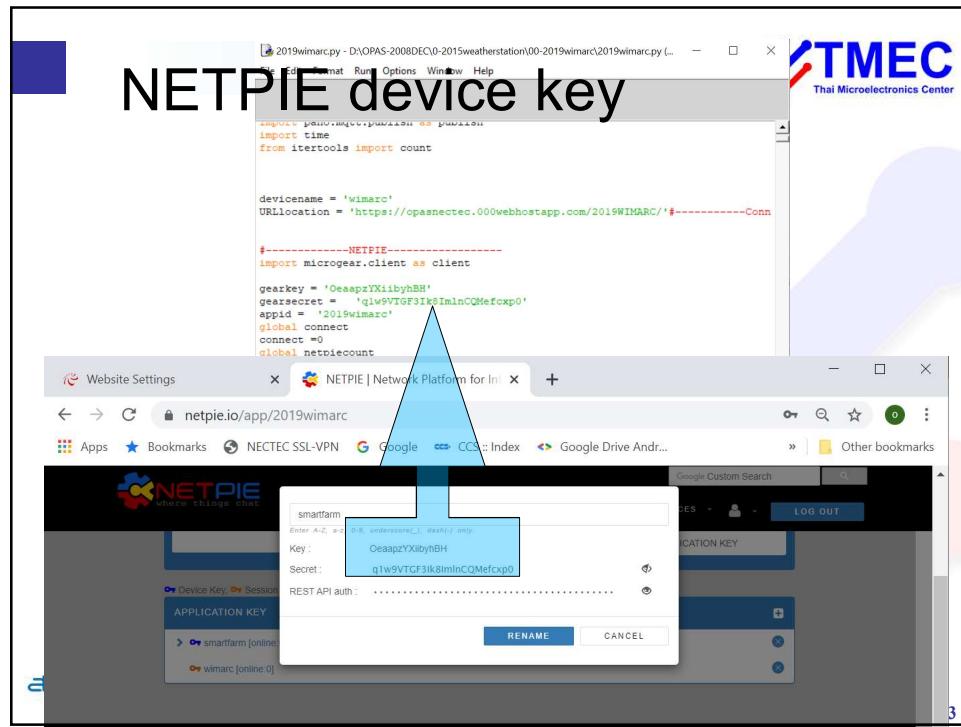
Dilensore.sql

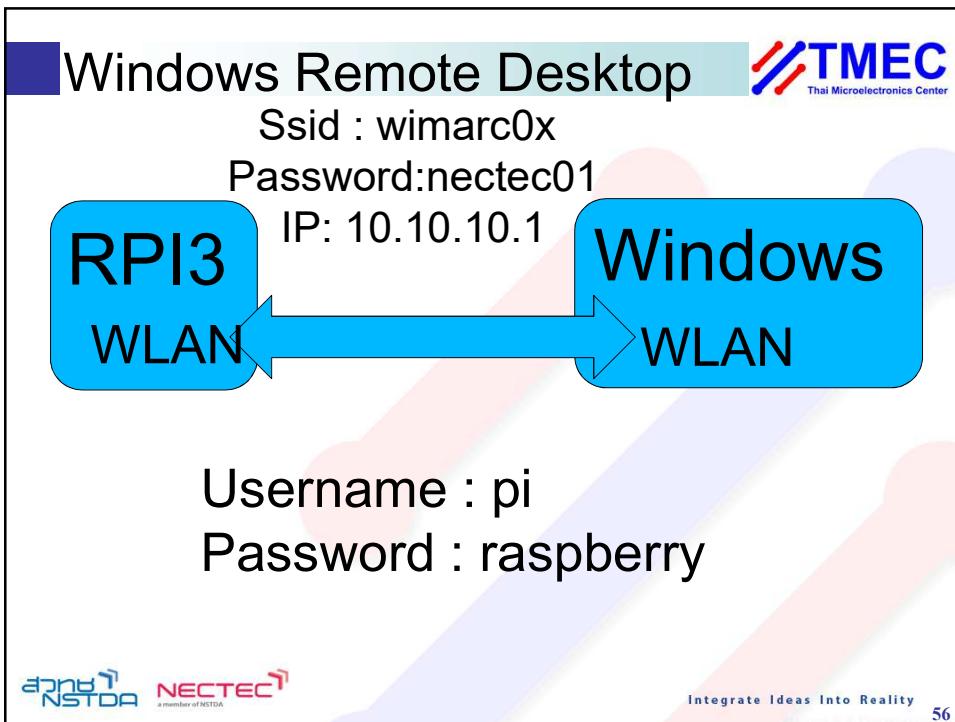
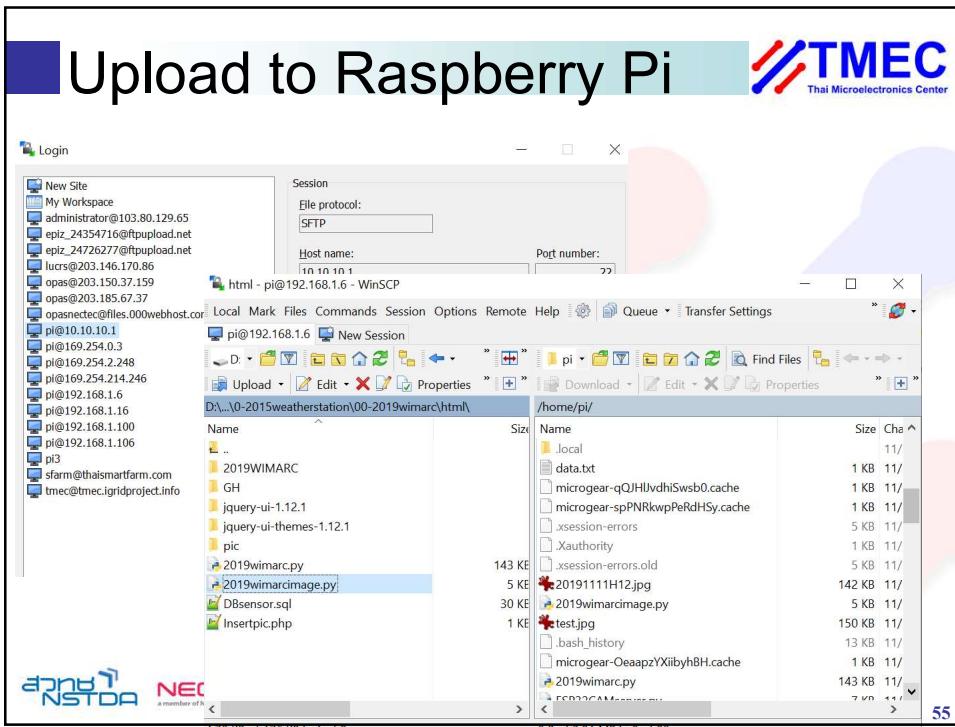
Insertpic.php

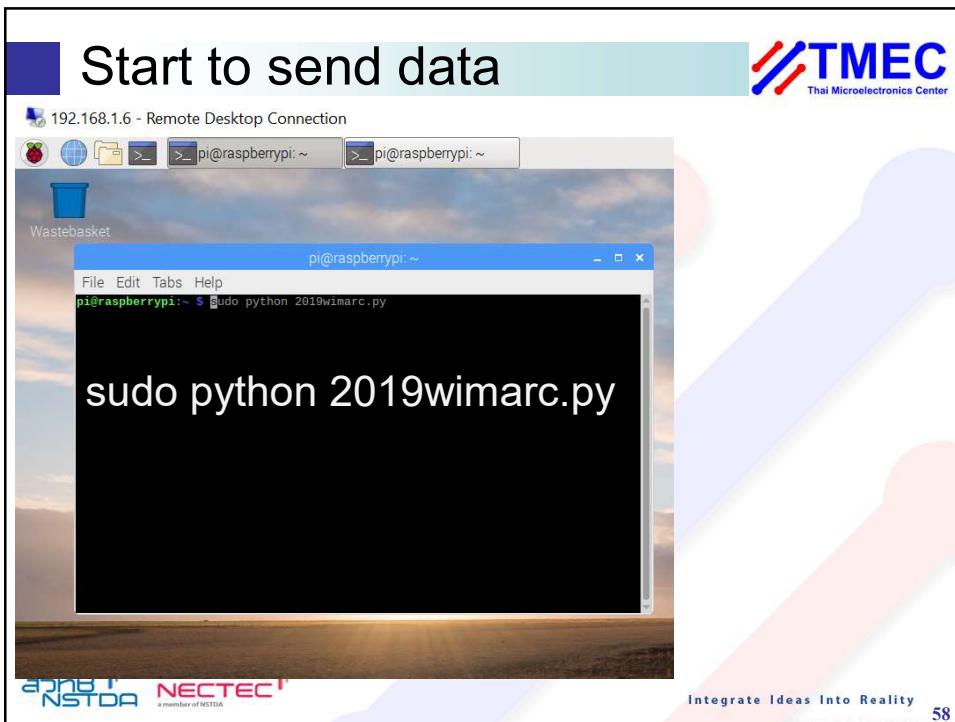
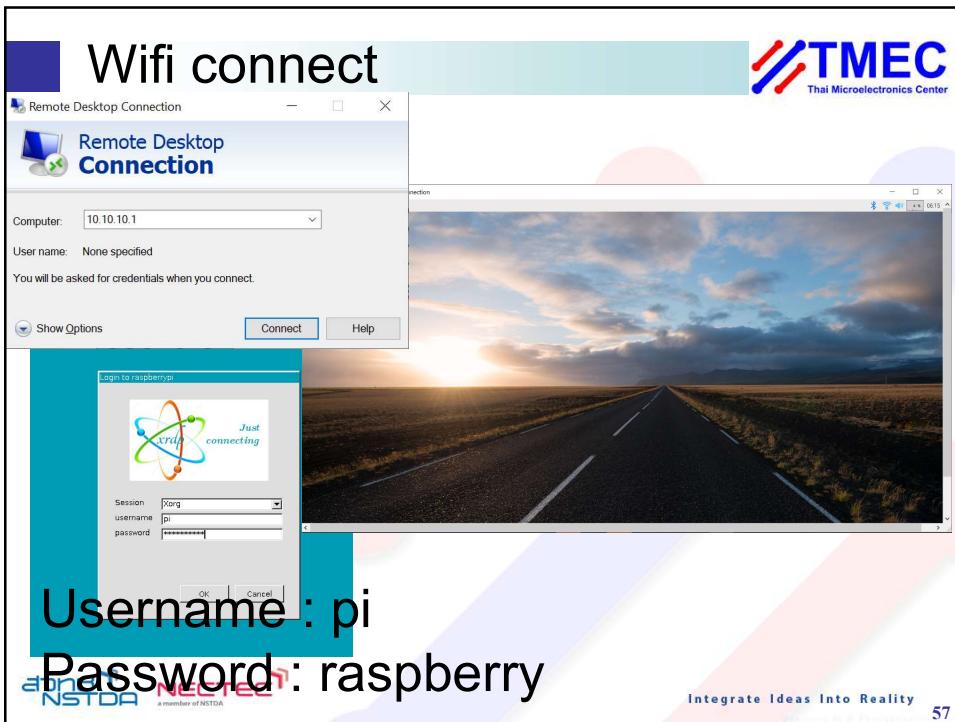
INTEGRATE IDEAS INTO REALITY 48

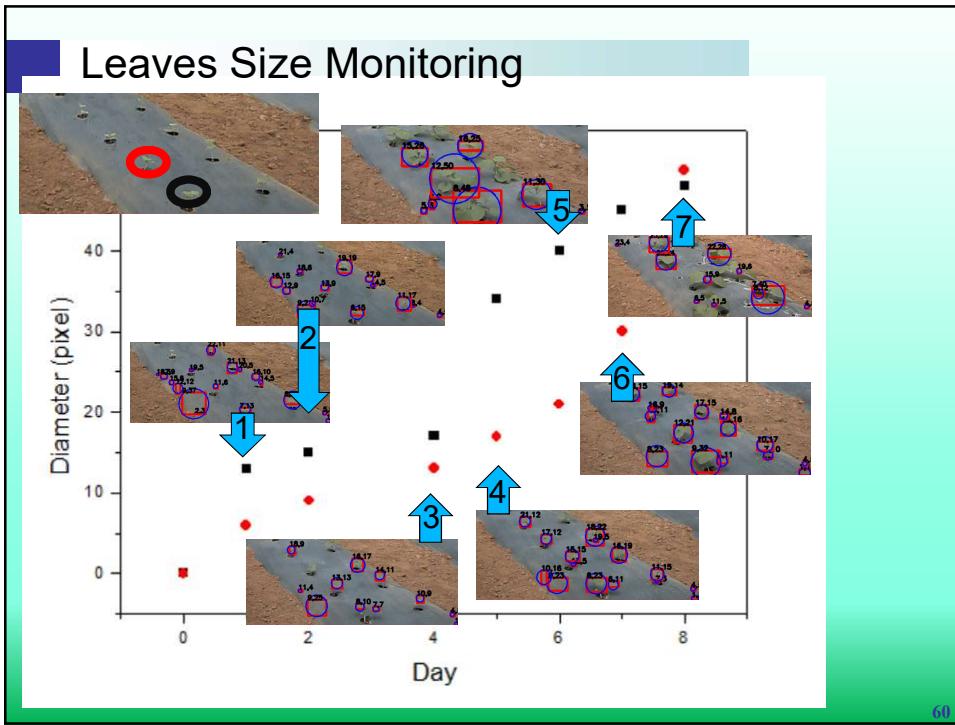
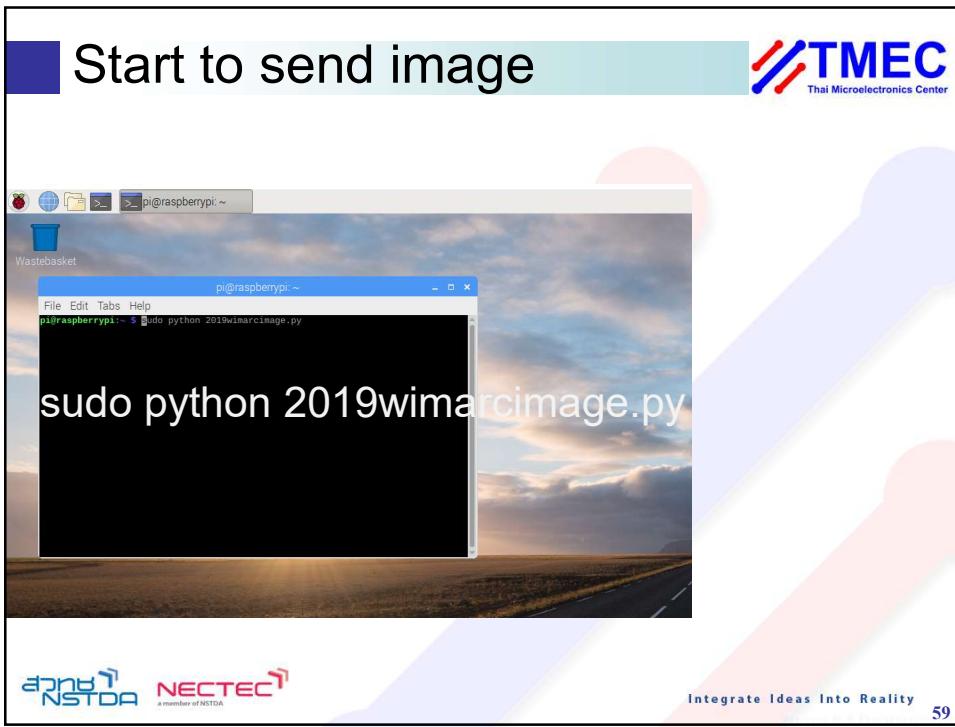


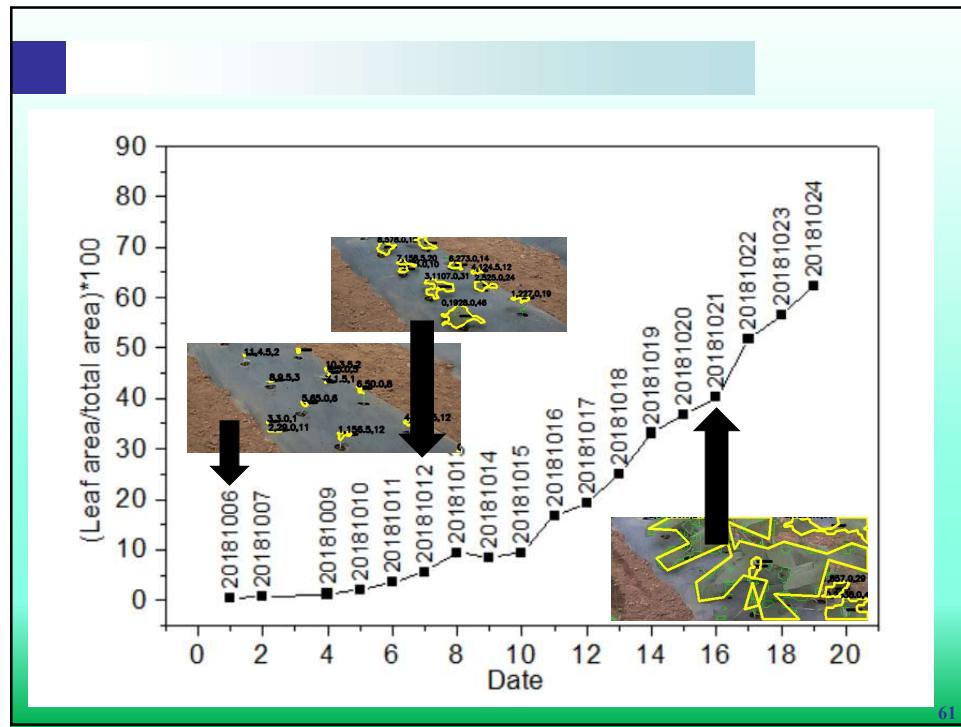




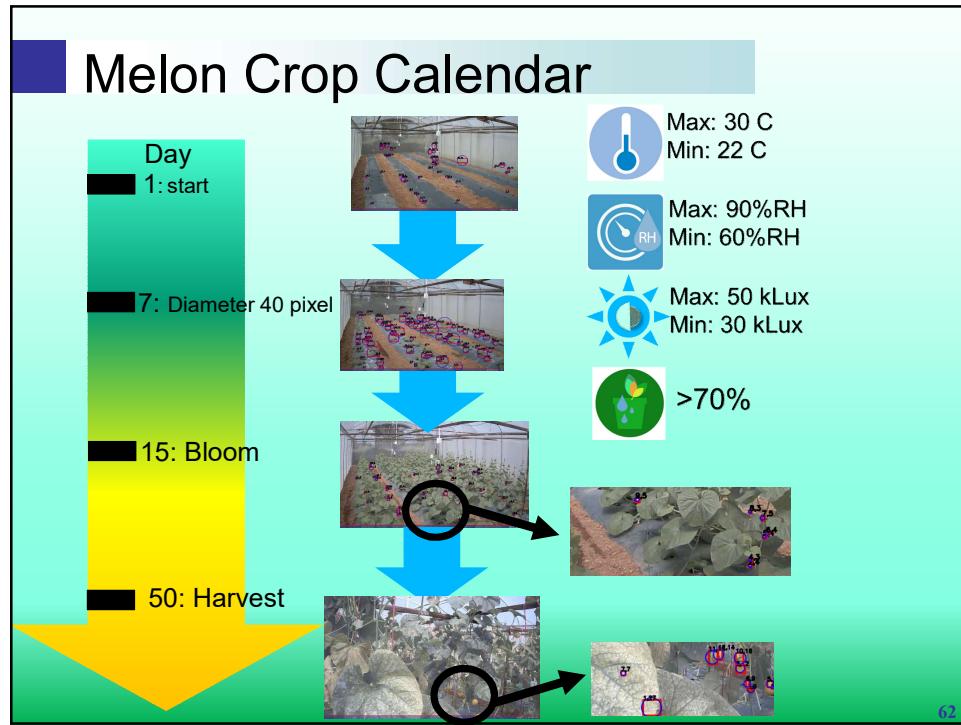




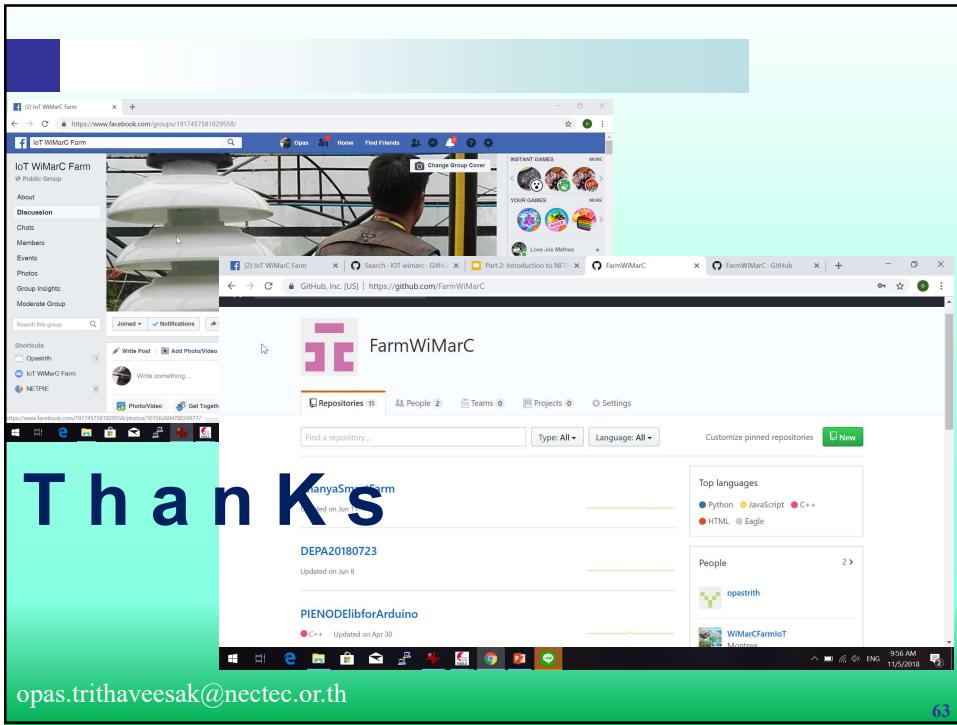




61



62



opas.trithaveesak@nectec.or.th

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