# Test Project (Offline)

## BRICS-FS-16_Internet of Things

## 2022 BRICS Skills Competition

Day1

# Instructions for Contest

## *I. Contest Requirements*

1. Use tools correctly and operate safely;

2. In the event of any objection during the contest, you can tell the on-site examiners rather than disorder the venue;

3. Abide by the discipline of the venue, respect the examiners and obey the arrangement.

## *II. Professionalism and Safety Awareness*

1. Complete all the contest tasks in accordance with the safety operation specifications, and pay attention to the safety of electricity use;

2. Keep the surface of the console and workbench clean and tidy, and the placement of tools and wire heads conforming to vocational requirements;

3. Abide by the discipline and respect the staff; protect the devices on the venue.

## *III. Score Deduction*

1. During the contest, if any device is damaged or any accident occurs due to improper operation, 10-20 points will be deducted depending on the circumstances, and the contestants causing serious circumstances will be disqualified from the contest;
2. The contestants who do not conform to professional norms, such as dressing improperly, polluting the environment of the venue, disordering the venue, interfering with the referee's work, 5-10 points will be deducted depending on the circumstances, and those causing serious circumstances will be disqualified from the contest;
3. In the course of the contest, if false values or random values are used to answer a question and fake the values that are really acquired as the result of the contest to mislead the referee, once the code is verified, the score of this question will be zero, and the total score will be deducted by 3-5 points.

## *IV. Instructions to Contestants*

1. In the event of missing pages, unclear handwriting and other problems in the assignment document, please indicate to the referee in time for replacement; after the contest is

closed, all paper materials and USB flash drives provided for the contest shall not be taken away from the venue;

2. The devices shall be installed and configured in strict accordance with the requirements of the assignment document and process specifications;
3. The contestant teams shall complete the requirements in the assignment document within the specified time, store the documents formed during task realization in the designated directory of the "D disk" of the server computer, and copy the “deliverables” and store them in the designated location of the U flash disk. The documents not stored in the designated location will not be scored;
4. During the contest, if the contestants suspect the device damages and have clear evidence that the damage is not attributable contestants, they can submit a written statement to the referee. After judged by the technicians and approved by the chief referee, the device can be replaced and whether to make up time and the length of time will be decided by the chief referee; if they don’t have clear evidence that the damage is not attributable to the contestants, the device replacement and time make-up will be rejected.
5. After the referee group announces the end of the contest, the contestants shall immediately stop any operation of the contest devices and computers.

# Contest Devices and Precautions

The contestants shall complete the relevant operations and development tasks required in the assignment document according to the content of this contest project.

## *I. Precautions*

1. Check whether the hardware and computers are normal. Check all devices, software and contest materials essential to the contest;

2. All kinds of software tools, software installation files, etc. used in the contest task have been copied and stored in the USB flash disk (if a compressed package is provided, the contestants need to copy it to the D disk and unzip it). Please use them according to the requirements of the contest task;

3. During the contest, please install, configure, operate and use the Internet of Things devices in strict accordance with the description in the contest task. The devices that have been connected before the contest may have something to do with the subsequent contest task and shall not be changed;

4. After the contest task is completed, it is necessary to save the device configuration. Do not turn off any device, remove the hardware connection cable, nor encrypt any device at will.

## *II. Hardware Environment*

| S/N | Device name | Unit | Quantity |
|---|---|---|---|
| 1 | IoT All Stack Intelligent Application Training System | Set | 1 |
| 2 | IoT toolbox and consumables package | Set | 1 |
| 3 | Server (indicated on computers) | Set | 1 |
| 4 | Workstation (indicated on computers) | Set | 1 |

# Description of Project Background

A city intends to build a school and the Employer wants to construct certain areas of the campus by IoT to achieve intelligent management. The construction project is detailed as follows:

1. Digital management and monitoring center project.
2. Campus environment monitoring project.
3. Laboratory building security system project.
4. Catering center intelligent control project.
5. Interior natatorium environment monitoring project.
6. Gymnasium real-time management project.

The contestants are requested to divide the area on the contest station using black tape according to the requirements of the Employer and the area layout. Install the required devices in the area, complete device matching as required, assure the normal communication of devices, and complete other task requirements.

| | | |
|---|---|---|
| Gymnasium real-time management | Digital management and monitoring center | Laboratory building security system |
| Interior natatorium environmental monitoring | Catering center intelligent control | Campus environmental monitoring |

## *Module B: IoT Engineering Design and Implementation Scheme*

*Note: Complete the corresponding tasks as required. The result file of this module shall be saved in the folder **"D:\Deliverables\Module B" on the server computer**. If there is no such folder, the contestants shall create it by themselves. In addition, copy the entire folder and store it in the root directory of the U flash disk uniformly distributed. After the competition, the USB flash disk shall be delivered as the result of the contest.

# 1. Digital Management and Monitoring Center Project

The area needs the IoT network link environment and the corresponding devices such as router, switch, central gateway, ZigBee coordinator, NEWPorter, and integrated display screen. An external network cable is provided on the station to access the external network.

*Note: the network cables for this task shall be made by the contestants themselves. If the contestants propose to use the finished network cables, corresponding points will be deducted.

**Task requirements:**

- Select the correct device and install it in the specified area.
- Configure the router according to the requirements of "Appendix: Router Configuration Information".
- Configure the ZigBee according to the requirements of "Appendix: ZigBee Configuration Information".
- Configure the NEWPorter according to the requirements of "Appendix: NEWPorter Configuration Information".
- Assign the IP address of each device according to "Appendix: Device IP Address Configuration Information".

**To complete the task above, please implement the steps below:**

- Save the screenshot of the router Internet settings interface as B-1-1.jpg.
- Save the screenshot of the router wireless settings interface as B-1-2.jpg.
- Save the screenshot of the router LAN port settings interface as B-1-3.jpg.
- Save the screenshot of the router DHCP server settings interface as B-1-4.jpg.
- Save the screenshot of NEWPorter configuration management interface as B-1-5.jpg.
- 3. Scan the screenshot of the device IP in the station network using the IP scanning tool and save it as B-1-6.jpg.
- Access the screenshot of the cloud platform interface using the browser and save it as B-1-7.jpg.

# 2. Campus Environment Monitoring Project

In this area, monitor the temperature and humidity in the campus through the louver box sensor, monitor the $CO_2$ concentration through the $CO_2$ transmitter, and monitor the water level of the artificial lake through the water immersion sensor.

**Task requirements:**

- Select the correct device and install it in the specified area.
- It is required that the device can transmit data to the serial port terminal through the linkage controller. Serial port terminals can directly send data to the cloud platform.

- It is required to display the real-time monitoring results of the system on the integrated display screen.
- Create a cloud platform application according to the contents and requirements of the contest materials to achieve the real-time monitoring function application of the campus environment.

**To complete the task above, please implement the steps below:**

- Save the screenshot of the serial port terminal IP configuration page as B-2-1.jpg.
- Save the screenshot of the serial port terminal configuration directly connected to the cloud platform as B-2-2.jpg.
- After the contest, the real-time monitoring data of the system can be displayed on the integrated display screen.
- Save the screenshot of the designed application interface as B-2-3.jpg.

# 3. Catering Center Intelligent Control Project

To beautify the dining environment, color light strips shall be arranged in the catering center. The all-in-one sensor is used to monitor whether anyone passes by the restaurant entrance, and monitor the temperature, humidity and PM2.5 data of the dining area. To save energy consumption, the corridor of the restaurant needs to be provided with a time-lapse white light.

**Task requirements:**

- Select the correct device and install it in the specified area.
- The device is required to transmit data to the central gateway through the linkage controller and then to the cloud platform.
- It is required to control the device through the cloud platform.
- It is required that the white lighting in the corridor of the dining room only provides 10 seconds of lighting service when someone passes by, and the duration shall be controlled by a physical device.
- Create a cloud platform application according to the contents and requirements of the contest materials to achieve the intelligent control function application of the catering center.

**To complete the task above, please implement the steps below:**

- Save the screenshot of the editing page of the white light in the central gateway as B-3-1.jpg.
- Save the screenshot of the editing page of the color light strip configured in the central gateway as B-3-2.jpg.
- Save the screenshot of the page of sensors and actuators related to the catering center in the data monitoring page of the central gateway as B-3-3.jpg. It is required that the real-time monitoring data of the device are visible in the screenshot.
- It is required to draw the flow chart of lighting service in the corridor of the restaurant using Visio and save it as B-3-4.vsdx.
- Save the screenshot of the designed application page as B-3-5.jpg.

## 4. Interior Natatorium Environment Monitoring Project

The campus interior swimming pool adopts wireless mode to monitor the temperature, humidity and illumination of the current environment, and uses wireless mode to control lighting and exhaust fans (replaced by common fans).

**Task requirements:**

- Select the correct device and install it in the specified area.
- It is required that the installed device is networked with ZigBee coordinator and deliver to the cloud platform
- It is required to control the device through the cloud platform.
- It is required that the configuration rule can achieve: when the illumination is lower than 300Lx, the light will be on.
- It is required that the configuration rule can achieve: when the illumination is equal to 300Lx, the light will be off.
- It is required that the configuration rule can achieve: when the temperature is greater than or equal to 26 ℃, the exhaust fan will be started.
- It is required that the configuration rule can achieve: when the temperature is less than 26 ℃, the exhaust fan will be stopped.
- Enable the rules required to be configured above.
- Create a cloud platform application to achieve the interior natatorium environment monitoring application according to the contents and requirements of the contest materials.

**To complete the task above, please implement the steps below:**

- Save the screenshot of the sensor data of the project visible on the data monitoring page of the central gateway as B-4-1.jpg.
- Save the screenshot of the result page of the cloud platform configuration rules controlling light on/off as B-4-2.jpg. It is required to circle the rules to be configured in red in the screenshot.
- Save the screenshot of the result page of the cloud platform configuration controlling exhaust fan start or stop rules as B-4-3.jpg. It is required to circle the rules to be configured in red in the screenshot.
- Save the screenshot of the designed application page as B-4-4.jpg.

## 5. Gymnasium Real-time Management Project

A number of small training rooms have been built in the campus gymnasium. It is required to install a green indicator light at the entrance of each training room to indicate whether the training room is serviceable (green light indicates that the training room is serviceable) and install a security device (replaced by laser shooting). When entering the training room, the athletes can control the door lock (replaced by electric lock) through the switch (replaced by one-wheel travel switch) to close the door of the training room. The training room is provided with light and air conditioner (replaced by fan). Moreover, the training room can monitor the real-time illumination; when the illumination is too low, the light will be automatically on. Athletes can control the start of the air conditioner in the training room through the switch (replaced by the limit switch), and

can control the stop of the air conditioner and the turn-off of the light in the training room through the switch (replaced by the proximity switch). During the training, if someone forcibly enters the training room (the security device receives the signal), the stroboscopic red light in the training room will be on.

**Task requirements:**

- Select the correct device and install it in the designated area,
- An IoT collector is installed in the gymnasium, and all devices in the training room are connected to the IoT collector.
- The IoT collector transmits data to the cloud platform through network connection.
- When someone forcibly enters (triggers the laser shooting device) during the training period, the stroboscopic red light will be on. It is required that the stroboscopic red light can flash repeatedly for 5 seconds through hardware and then keep non-flashing for 3 seconds.
- Rules required to be configured: rules controlling the door lock closing after athletes enter the training room.
- Rules required to be configured: rules controlling the automatic light-on.
- Rules required to be configured: rules controlling the automatic operation of air conditioner.
- Rules required to be configured: rules controlling the turn-off of air conditioner and light.
- Rules required to be configured: rules giving an alarm that someone forcibly enters the room.
- Enable the rules required to be configured above.
- Create a cloud platform application according to the contents and requirements in the contest materials to achieve the gymnasium real-time management function application.

**To complete the task above, please implement the steps below:**

- Save the screenshot of the page for configuring the IP address of the IoT collector as B-5-1.jpg.
- Save the screenshot of the cloud platform configuration: rules configuration page for controlling door lock closing as B-5-2.jpg.
- Save the screenshot of cloud platform configuration: rules configuration page for controlling automatic light-on as B-5-3.jpg.
- Save the screenshot of the cloud platform configuration: rules configuration page for controlling the automatic operation of the air conditioner as B-5-4.jpg.
- Save the screenshot of the cloud platform configuration: rules configuration for controlling the turn-off of air conditioner and light as B-5-5.jpg.
- Save the screenshot of the cloud platform configuration: rules configuration for giving an alarm that someone forcibly enters the room as B-5-6.jpg.
- Save the screenshot of the designed application interface as B-5-7.jpg.

# 6. Laboratory Building Security Monitoring Project

It is required to install an access gate (replaced by an electric push rod) in the laboratory building, and all personnel entering and exiting the building will pass through the designated gate.

When someone is detected to enter (triggers the travel switch), the gate will automatically open. When the security curtain sensor senses that the personnel have walked out of the gate, the gate will automatically close. Monitor the noise, smoke and flame of the current environment in the laboratory building. When smoke sensing signal is detected, the yellow strobe light in this area will be on (otherwise, it will be off). When fire information is detected, the warning light in this area will be on (otherwise, it will be off).

**Task requirements:**

- Select the correct device and install it in the specified area.
- The IoT collector is installed in the laboratory building, and all devices in the laboratory building is connected to the IoT collector.
- The IoT collector transmits data to the cloud platform through network connection.
- Rules required to be configured: achieving gate opening business.
- Rules required to be configured: achieving gate closing business.
- Rules required to be configured: achieving the smoke sensing early warning business in the laboratory building.
- Rules required to be configured: achieving the strobe yellow light off business logic.
- Rules required to be configured: achieving the fire early warning business in the laboratory building.
- Rules required to be configured: achieving the warning light off business logic.
- Enable the rules required to be configured above
- Create an application in the project generator according to the contents and requirements of the contest materials to achieve the security monitoring function application in the laboratory building.

**To complete the task above, please implement the steps below:**

- Save the screenshot of the sensor data of the project visible in the data monitoring page of the central gateway as B-6-1.jpg.
- Save the screenshot of the editing page of the relevant connector of the central gateway configuration laboratory building as B-6-2.jpg.
- Save the screenshot of the page where the curtain sensor is configured in the central gateway as B-6-3.jpg.
- Save the screenshot of cloud platform configuration: rules result page for achieving the gate opening as B-6-4.jpg.
- Save the screenshot of cloud platform configuration: rules result page for achieving the gate closing as B-6-5.jpg.
- Save the screenshot of cloud platform configuration: rules result page for achieving the strobe yellow light on/off as B-6-6.jpg. It is required to circle relevant rule information in red in the screenshot.
- Save the screenshot of cloud platform configuration: rules result page for achieving the warning light on/off as B-6-7.jpg. It is required to circle relevant rule information in red in the screenshot.
- Save the screenshot of the designed application interface as B-6-8.jpg.

# 7. Campus Systems Maintenance and Optimization

During daily operation, all campus systems may encounter device damage, software failure, software/ hardware upgrade, etc. The contestants are requested to complete the daily maintenance and optimization of systems according to the requirements below.

**Task requirements:**

- Query the monitoring value of PM2.5 in the all-in-one sensor through the instructions sent by the serial port commissioning assistant.
- Configure rules on server computers, which requires that "computers outside the workstation are prohibited from connecting to any local port or program, and this rule is not enabled temporarily".
- Restore the Ubuntu system in the virtual machine of the computers in the workstation. Configure the local IP of the Ubuntu system according to the requirements of "Appendix: Ubuntu System Configuration Information".
- Configure the Ubuntu system firewall information in the terminal according to the requirements of "Appendix: Ubuntu System Configuration Information".

**To complete the task above, please implement the steps below:**

- Query the screenshot of the result page of PM2.5 monitoring value in the all-in-one sensor through the instructions sent by the serial port commissioning assistant, and save it as B-7-1.jpg. It is required that the sent query instructions and the received return instructions are visible in the screenshot.
- Save the screenshot of the rule result page that the server computer is configured to disable access to a specific computer as B-7-2.jpg. The specific configuration information are visible in the screenshot.
- Save the screenshoot of the page for querying IP of Ubuntu system using the terminal interface of the Ubuntu system as B-7-3.jpg. It is required to circle the specific IP required to be configured in red in the screenshot.
- Save the screenshoot of the page for enabling ufw function using the terminal as B-7-4.jpg. It is required to circle the specific instructions in red in the screenshot.
- Save the screenshoot of the page for completing ufw configuration and allowing 85 port TCP access using the terminal as B-7-5.jpg. It is required to circle the specific instructions in red in the screenshot.
- Save the screenshot of the page for completing ufw configuration and disabling the access of the IP 172.30.30.30 to the computer using the terminal as B-7-6.jpg. It is required to circle the specific instructions in red in the screenshot.

# Appendix: Router Configuration Information

| Network configuration item | Configuration content |
|---|---|
| **Network settings** | |
| Internet settings | Fixed IP address |
| IP address | 192.168.0. [Workstation No.] |
| Subnet mask | 255.255.255.0 |
| Gateway | 192.168.0.254 |
| **Wireless settings** | |
| Wireless function | Off |
| **LAN settings** | |
| LAN port IP settings | Manual |
| IP address | 172.20. [Station No.]. 1 |
| Subnet mask | 255.255.255.0 |
| **DHCP server** | |
| DHCP server | On |
| DPCP pool | From 172.20. [Station No.]. 150, a total of 30 IP addresses are allocated |

# Appendix: ZigBee Configuration Information

| ZigBee configuration information | |
|---|---|
| Channel | In discretion |
| PAN ID | Two-digit station number+two-digit station number<br>For example, station 2 uses 0202, station 14 uses 1414, and so on |
| S/N | In discretion |

# Appendix: NEWPorter Configuration Information

| NEWPorter configuration information | |
|---|---|
| COM1 | 6001, 9600 |
| COM2 | 6002, 9600 |
| COM3 | 6003, 9600 |
| COM4 | 6004, 9600 |
| COM5 | 6005, 9600 |
| COM6 | 6006, 9600 |

# Appendix: Device IP Address Configuration Information

| Device IP address configuration information | | |
|---|---|---|
| **S/N** | **Device name** | **Device IP** |
| 1 | Server computer | 172.20. [Station No.]. 11 |
| 2 | Workstation computer | 172.20. [Station No.]. 12 |
| 3 | NEWPorter | 172.20. [Station No.]. 15 |
| 4 | Central gateway | 172.20. [Station No.]. 16 |
| 5 | IOT acquisition module installed in the gymnasium | 172.20. [Station No.]. 20 |
| 6 | IOT acquisition module installed in the laboratory building | 172.20. [Station No.]. 20 |
| 7 | Serial terminal | 172.20. [Station No.]. 22 |

# Appendix: Ubuntu System Configuration Information

| Ubuntu system configuration information | | |
|---|---|---|
| S/N | Configuration item | Configuration value |
| 1 | Configuration IP | 172.20. [Station No.]. 17 |
| 2 | ufw-related configuration | 1. Enable ufw firewall<br>2. Allow 85 port TCP access<br>3. Disable the access of the IP 172.30.30.30 to the computer |

Day2

## *Module C: IoT Application Development and Commissioning*

*Note: complete the corresponding tasks as required. The result file of this module shall be saved in the "D:\Deliverables\Module C" folder on the server computer. If there is no such folder, the contestants shall create it by themselves. In addition, copy the entire folder and store it in the root directory of the U flash disk uniformly distributed. After the competition, the USB flash disk shall be delivered as the result of the contest.

The contestants are requested to divide the area on the contest station using black tape according to the area layout. Install the required devices in the area according to the requirements of the topic, complete device matching, assure the normal communication of the devices, and complete other task requirements.

| | | |
|---|---|---|
| Illumination control function | Link device area | Data communication function |
| Access system function | | Meteorological monitoring function |

# 1. Link Device Installation and Commissioning

Complete installation and commissioning of relevant devices in the link device area to provide subsequent subsystems with stable network transmission links.

*Note: the network cables for this task shall be made by the contestants themselves. If the contestants propose to use the finished network cables, corresponding points will be deducted.

**Task requirements:**

- Install router, switch, central gateway, NEWPorter, and IOT collector in the link device area.
- Configure the router according to the requirements of "Appendix: Router Configuration Information" to complete the configuration of the station network.

**To complete the task above, please implement the steps below:**

- Save the screenshot of the router Internet settings interface as C-1-1.jpg.
- Save the screenshot of the router wireless settings interface as C-1-2.jpg.
- Save the screenshot of the router LAN port settings interface as C-1-3-jpg.
- Save the screenshot of the scan result interface of station network device IP using IP scanning tool as C-1-4.jpg.
- Save the screenshot of the interface of the access to the cloud platform homepage using

the browser as C-1-5.jpg.

## 2. Light Control Function Development

Complete the function development using a blue ZigBee node box, combined with dual relay, stroboscopic yellow light and constant white light and according to the requirements of the topic. After the development is completed, install the relevant devices to the designated position on the station, power on and wait for the referee to score.

**Task requirements:**

- Connect the stroboscopic yellow light and the normally-on white light to the two-wire relay respectively, and install the two-wire relay to the blue ZigBee node box.
- It is required to click SW1 once to make LED1 light flash every 0.5 seconds and the stroboscopic yellow light connected to the two-wire relay on. Click SW1 again to control the LED 1 light and the yellow strobe light to be off. This function can be implemented repeatedly.
- It is required to double click SW1 quickly to make the effect of LED 2 light as breathing light and the white light connected through the two-wire relay normally on. Double click SW1 quickly again to turn off the LED 2 light and the normally-on white light. This function can be implemented repeatedly.

**To complete the tasks above, please operate as follows:**

- Burn the developed program into the ZigBee node box, and install the device in the "light control function" area of the station, power on and wait for the referee's scoring.
- Copy the complete project code to the "D:\ Deliverables\Module C\2\" directory of server computers.

## 3. Data Communication Function Development

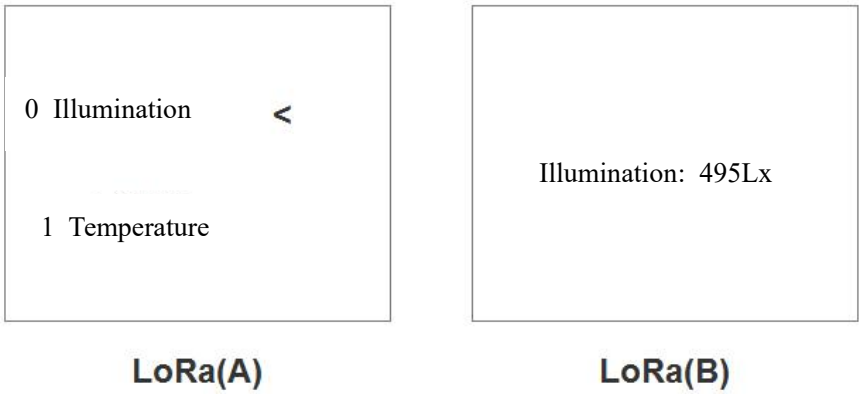
Select two LoRa modules, name them LoRa (A) and LoRa (B), and complete the function development according to the requirements of the topic. After the development is completed, install the two modules to the designated position on the workstation, power on and wait for the referee's scoring.

**Task requirements:**

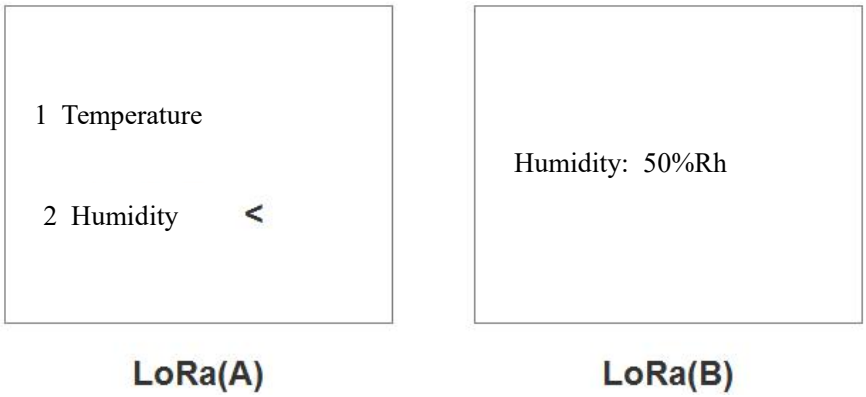
- The contestants shall select the correct devices, install them in the designated area of the workstation, complete device matching and assure the normal communication of the devices.
- Network LoRa (A) and LoRa (B) modules through wireless communication. For wireless communication parameters, refer to "Appendix: Communication Configuration Information of LoRa Module" for configuration.
- Connect illumination, temperature and humidity two-in-one module of the light to LoRa (A) module, and display relevant menus on the OLED screen of LoRa (A) module (only 2 menus can be displayed on each page). The menu of LoRa (A) module is displayed in sequence as: 0 illumination, 1 temperature, 2 humidity, a total of 3 menus.
- Click Key2 of LoRa (A) module to control the selection arrow "<" to move up, and click Key3 of LoRa (A) module to control the selection arrow "<" to move down. When the

screen is not enough for menu display, the menu can be scrolled up or down (e.g. Reference Interface I and Reference Interface II).

- The selection arrow supports moving in order in menus numbered 0-2. When the arrow is in menu 0, click Key2, and the arrow will move to menu 2. When the arrow is in menu 2, click Key 3, and the arrow will move to menu 0.
- Click Key4 of the LoRa (A) module, and the LoRa (B) module OLED display screen will display the data corresponding to the LoRa (A) module selection menu.
- The specific reference interfaces of the two modules are shown in the figure below




Reference Interface I




Reference Interface II

**To complete the tasks above, please operate as follows:**

- Write the developed program into two LoRa modules, install it in the "Data Communication Function" area of the station, power on, and wait for the referee's scoring. In addition, label the antenna of LoRa (A) module with "B-3-A". Label the LoRa (B) module antenna with "B-3-B".
- Copy the complete project code to the "D:\ Deliverables\Module C\3\" directory of server computers.

## 4. Access Control System Function Development

Complete Python application development on computers according to task requirements. Select the correct devices and install them in the designated area on the station. Complete device matching and commissioning, and wait for the referee's scoring.

**Task requirements:**

- It is required to complete the system function development using UHF RF reader writer and other auxiliary devices.
- The application requires acquiring data through the IoT cloud platform.
- Print two tickets (containing “Zhang San” and “Li Si” respectively) using the ticket printer and paste them onto two UHF cards to represent different personnel’s information.
- It is required to sense UHF cards through the UHF RF reader writer, record the corresponding personnel’s information of the cards in the form, and put the latest information recorded in the first line.
- The application interface reference is shown as follows

| S/N | Time | Person |
|---|---|---|
| 1 | 2022-09-20 18:51:10 | Zhang San |
| 2 | 2022-09-20 18:41:22 | Li Si |
| 3 | 2022-09-20 18:40:55 | Zhang San |

**To complete the tasks above, please operate as follows:**

- Install the devices in the "Access Control System Function" area on the work station, power on, and wait for the referee’s scoring. Compile the developed program into a Python application named "Access Control System" and save it in the "D:\Deliverables\Module C\4" directory of server computers, and ensure that the application can be used normally.
- Copy the complete project code to the "D:\ Deliverables\Module C\4\" directory of server computers.

## 5. Meteorological Monitoring Function Development

Complete Python application development on computers according to task requirements. Select the correct devices and install them in the designated area on the station. Complete device matching and commissioning, power on and wait for the referee’s scoring.

**Task requirements:**

- It is required to install IoT acquisition module in this area. Collect the temperature and humidity monitoring values through the IoT acquisition module and send them to the cloud platform.
- The program shall be able to read temperature and humidity data through the cloud platform.
- The program shall be able to display the monitoring data of temperature and humidity in the last 3 minutes in a line chart.

**To complete the tasks above, please operate as follows:**

- Install the devices in the "Meteorological Monitoring Function" area on the work station, power on and wait for the referee’s scoring. Compile the developed program into a Python application named "Meteorological Monitoring" and save it in the directory "D:\Submittals\Module C\5\" of server computers, and ensure that the application can be used normally.

- Copy the complete project code to the "D:\ Deliverables\Module C\5\" directory of server computers.

# Appendix: Router Configuration Information

| Network configuration item | Configuration content |
|---|---|
| **Network settings** | |
| Internet settings | Fixed IP address |
| IP address | 192.168.0. [Workstation No.] |
| Subnet mask | 255.255.255.0 |
| Gateway | 192.168.0.254 |
| **Wireless settings** | |
| Wireless function | Off |
| **LAN settings** | |
| LAN port IP settings | Manual |
| IP address | 172.20. [Station No.]. 1 |
| Subnet mask | 255.255.255.0 |
| **DHCP server** | |
| DHCP server | On |
| DPCP pool | From 172.20. [Station No.]. 150, a total of 30 are allocated |

# Appendix: LoRa Module Communication Configuration Information

| LoRa module communication configuration information | |
|---|---|
| Work station | 01 (configured by station and distributed on site) |
| LoRa module communication frequency band | 411000000 Hz (configured by station and distributed on site) |

# Appendix: Cloud Platform User Name Information

| Cloud platform user name information | |
|---|---|
| User name | Configured by station and distributed on site |
| Password | Configured by station and distributed on site |