應用創新科技提升建築工地職安健表現

黃天祥博士工程師 銅紫荊星章太平紳士
有利建築有限公司董事長

2024年7月31日

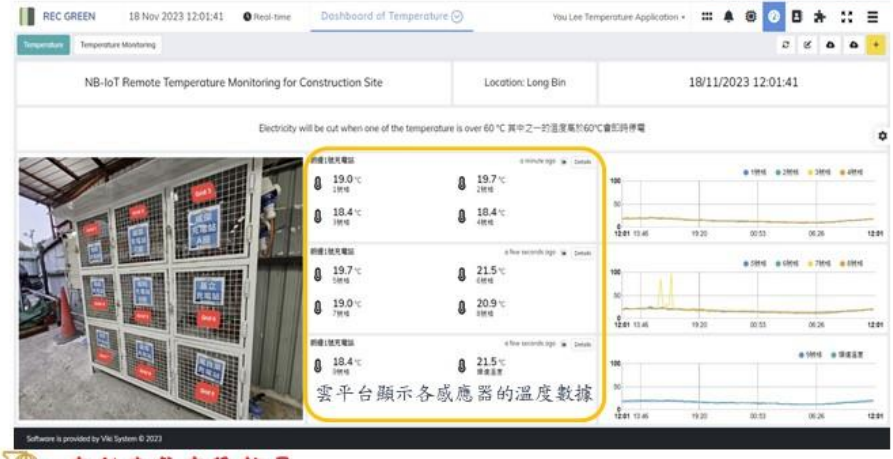
充電站NB-IoT溫度監控系統

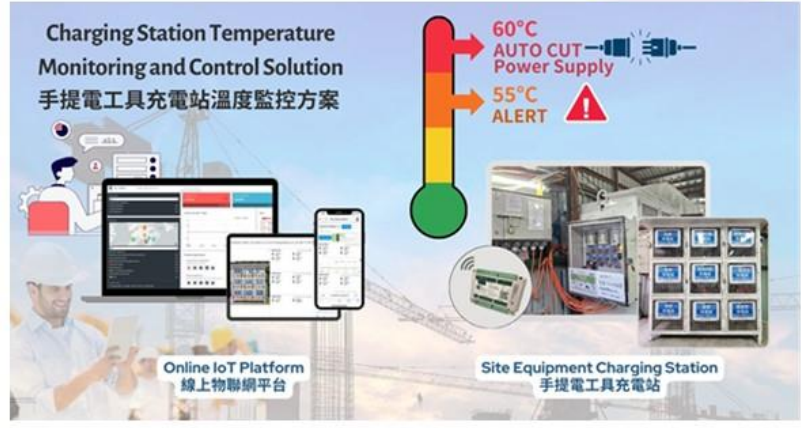
設立充電站NB-IoT溫度監控系統：
確保所有分包商的電動工具僅在該地點充電。
系統持續監控溫度水平，如果偵測到異常情況，立即斷開電源，及透過雲端平台向指定人員發送通知。

電力限制：
晚上7點後切斷分包商臨時辦公室和工人休息區的電源。

控制箱
- NB-IoT控制器
- 溫度感應器
- 供電顯示燈及選擇掣
- 索掣

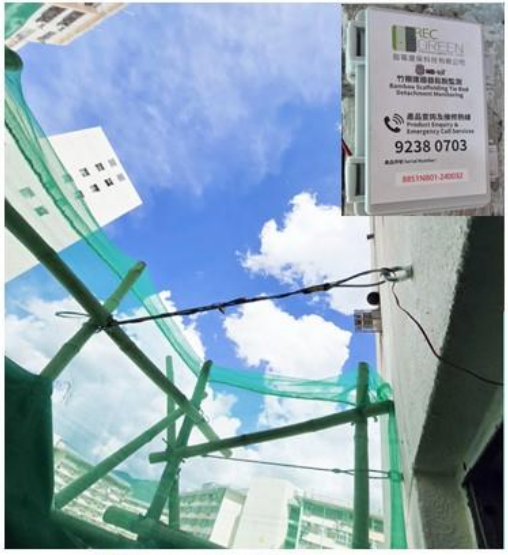
溫度感應接收器
連接到控制箱的溫度感應器



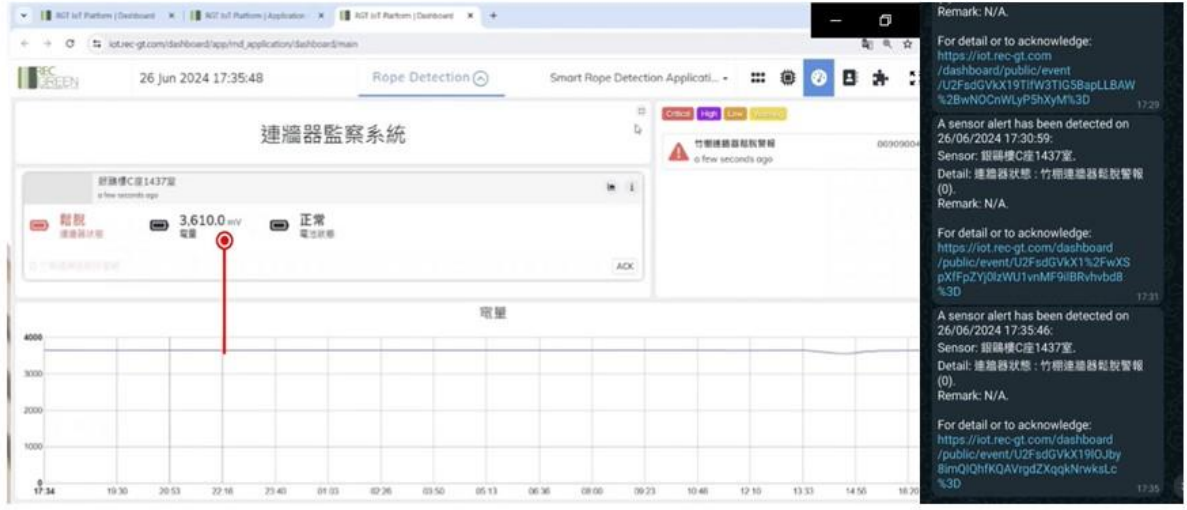


有利建築有限公司
Yau Lee Construction Co., Ltd.

竹棚架連牆器監測儀



- 防止棚架因連牆器損壞而發生倒塌意外
- 將感應線緊附於連牆器上，並連接NB-IoT模組
- 如連牆器被剪斷時，感應線透過NB-IoT模組(約15秒)發送警報信號予管理人員



飛棚安全門

管理人員可“遙距”檢查飛棚狀態及相關安全措施並批准圍欄出入。

NB-IoT

This is a clip from the 31 July 2024 recording of the

Hong Kong Housing Authority

"Safety Forum 2024 for Works and Property Management Services"

The speaker on stage is Ir Dr Conrad Wong, BBS, JP

Managing Director, Yau Lee Construction Company Limited

His topic is

"Innovations for Enhancing OSH in Construction Sites"

****

(00:26)

Hello everyone, I see many familiar faces here

so I will get straight to the point due to time constraints

Thank you to the organiser for the invitation

I know many of you will introduce Smart Site Safety Systems

so I won't go into much detail today

but that does not mean our company doesn't have system

I have prepared three new technologies to share with you

The first is an Internet of Things application

Two years ago, there was a fire at a construction site

It was found that many people were using various handheld tools

The batteries of the tools all need to be charged

but the quality of batteries nowadays varies

As a result, some construction sites have experienced fires due to battery issues

So, we have now created some small boxes

As you can see in the lower left corner

It is required that all workers on the construction site charge their tools inside the boxes

Of course, it is not that simple

I installed an IoT controller inside

Then added a temperature sensor

If the temperature exceeds 60 degrees Celsius

it immediately cuts the power supply

Once the power supply is cut off, there will be no electricity available

Then, send a message to our colleagues

We receive a fire alert right away

this central charging station is now used on all our sites

It has greatly reduced the risk of fire

the second item is about truss-out bamboo scaffolds used in maintenance projects

There have been accidents involving this type of scaffolding

which often causes me sleepless nights

So we looked for ways to improve the situation

We are now using a new IoT device

It is installed next to the truss-out bamboo scaffolds

As we are all aware

some accidents occurred earlier this year

that greatly saddened everyone

Workers were cutting off certain anchor points without authorisation

Therefore, we started experimenting

with using glue to secure the sensor wires to the anchor points

to prevent workers from cutting them off easily

As soon as an anchor point is cut

it will trigger a sensor that activates an alarm after 15 seconds

Our colleague will be notified

However, it's not that simple

Even with the alarm system in place

we need to ensure there is a power supply for it to function

Therefore, our IoT devices will monitor the power supply

As everyone has seen in the simulation, when an anchor point is cut, an alarm sound will be triggered

Then after 15 seconds

colleagues will immediately receive a message on their phones

to take immediate action

We hope that with this system in place

it will prevent workers from

improperly cutting the anchor points

and of course, we can call the workers back to a safe location

Use a smartphone to record violations and issue warnings

Everyone is well aware

that the entire system is cloud-connected

allowing us to access

relevant records for each worker

At the same time, we are now starting to

install a gate at the entrances and exits of the truss-out scaffold

similar to the black gate shown in the picture

An IoT device will also be placed there

What is the Internet of Things?

To put it simple

It is a low-cost mobile network

Why use IoT?

Because the amount of data we transmit is low

and the monthly cost is affordable, just over ten dollars

Even if we install a hundred devices, it won't be expensive

And this allows us to monitor each construction site

Before colleagues enter the truss-out bamboo scaffold
they must secure their safety harnesses and take photos
then send the information to the Centralised Management System
Only when the Centralised Management System grants permission
will the gate open

Here is a video for everyone to watch
The first step is to verify if safety training is complete
and whether workers have valid work permits
Typically, we can complete this task using a smartphone
Once qualified, we can scan the phone
to see if there are any inappropriate records
If there are any, they're not allowed to work

Everyone can see that this is the gate
installed outside the window
When a worker taps their card
The supervisor will perform an inspection
to confirm that they have the proper equipment and screws
Ensure the bottom area is properly enclosed
and confirm the worker is wearing a safety harness
Then this information is sent to the safety officer
who remotely press a button
to allow the worker to access the scaffold
If the safety officer identifies any issues
they can press a button to deny the worker to access
So now we require colleagues
to send this information back to our headquarters
after completing their checks each day

The safety officer will review the information

and only then press the button to open the door, allowing the workers to enter

It looks simple, but it is actually very complex

why?

We also have a safety system in place

If any situation arises inside the scaffolding

there is a button within the scaffolding

that can be pressed, allowing workers to return from outside

Because if someone faints

and can not get back out from outside

That would be a serious issue

It may look simple

In fact, our colleagues spent sometimes

nearly twelve months or even more

to develop this system

And some professional electronic engineers

worked with us to create this IoT setup

We have started piloting it on a Housing Authority project

We hope these new safety measures

Utilising advanced technology, will make our projects

safer and more efficient

allowing me to sleep soundly at night

thank you all

Thank you for watching

(06:30)