優質教育基金
Quality Education Fund

優質教育基金主題網絡計劃
2023-2024
QTN 透過活的科學：促進中小學創意STEM教育

Sharing by Participated School:

Mr. Chan Ping Yiu, William

St. Paul's College

Head of Information Services and Technology Department
& STEM Education Coordinator

FOUNDED 1851

Special thanks to:

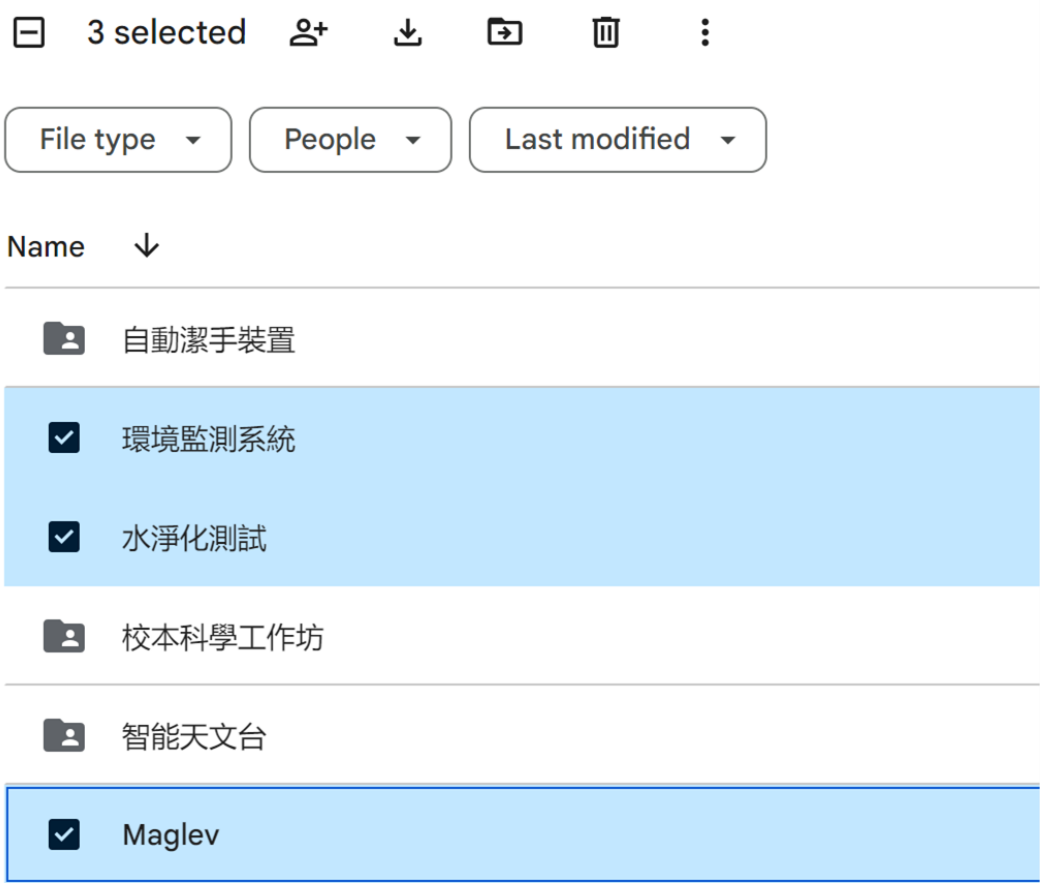
Network Coordinating School:

萬鈞伯裘書院

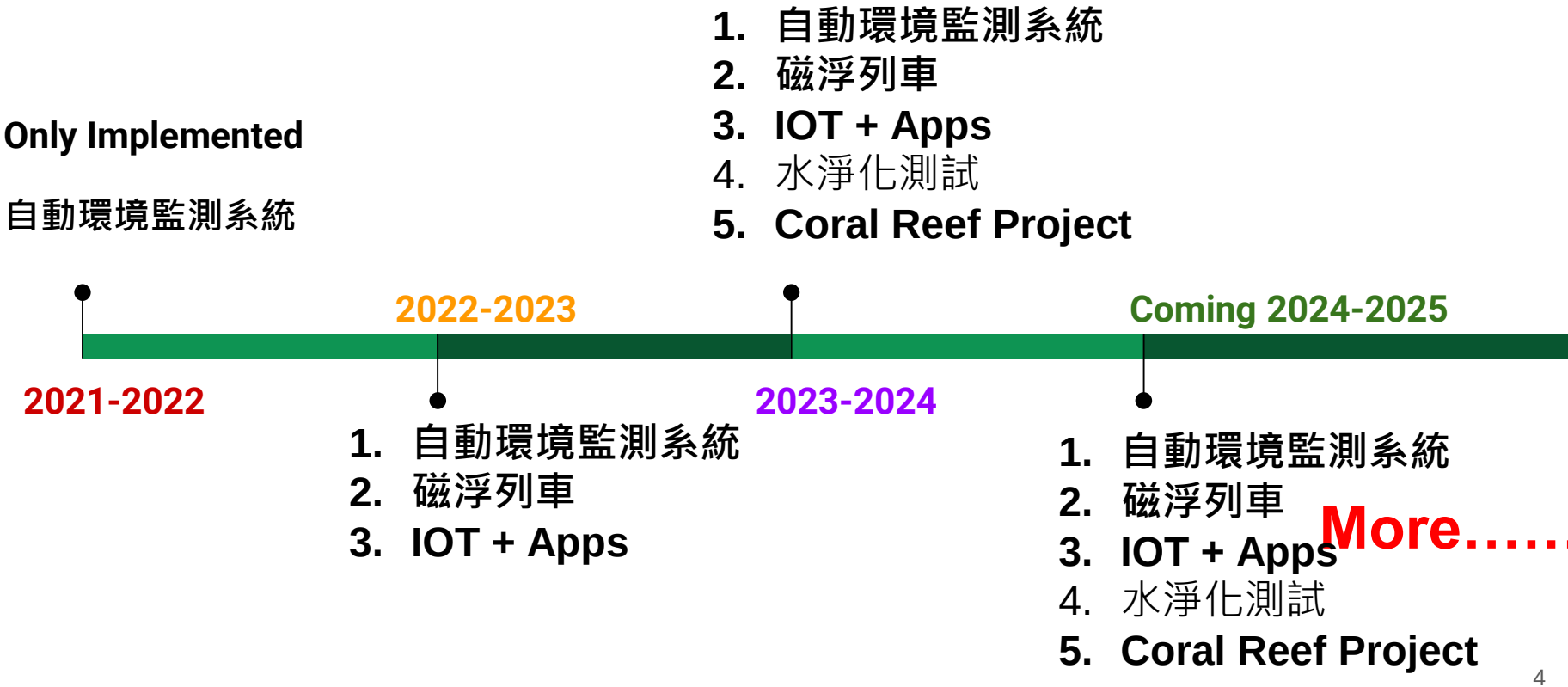
Man Kwan Pau Kau College

Great Supports by Pak Kau College

1. Teacher trainings
2. Teaching resources
3. Lesson Co-planning
4. Technical Supports
5. Many activities prepared

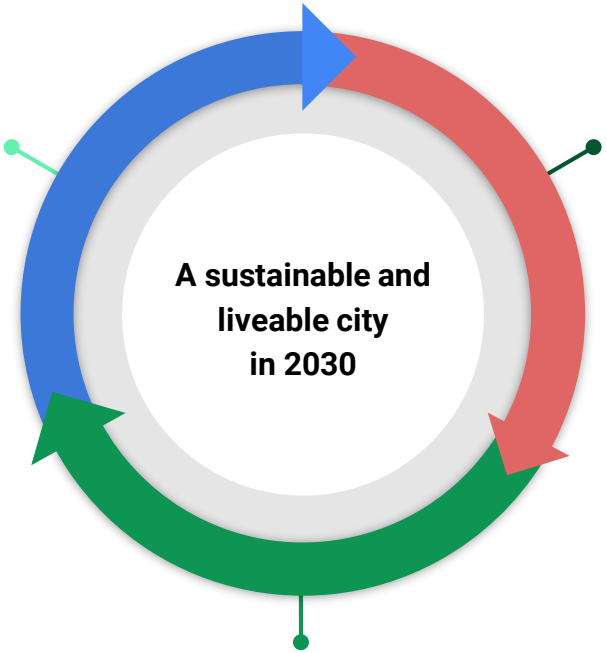


The 3rd Year to join…



Matched with our School Theme: Building a SMART Sustainable City

To what extent your proposal is an effective way to achieve your goals?



What are your major concerns towards your community?

How will you bring change(s) to the community facilities to make it more sustainable and liveable?

Smart Sustainable City

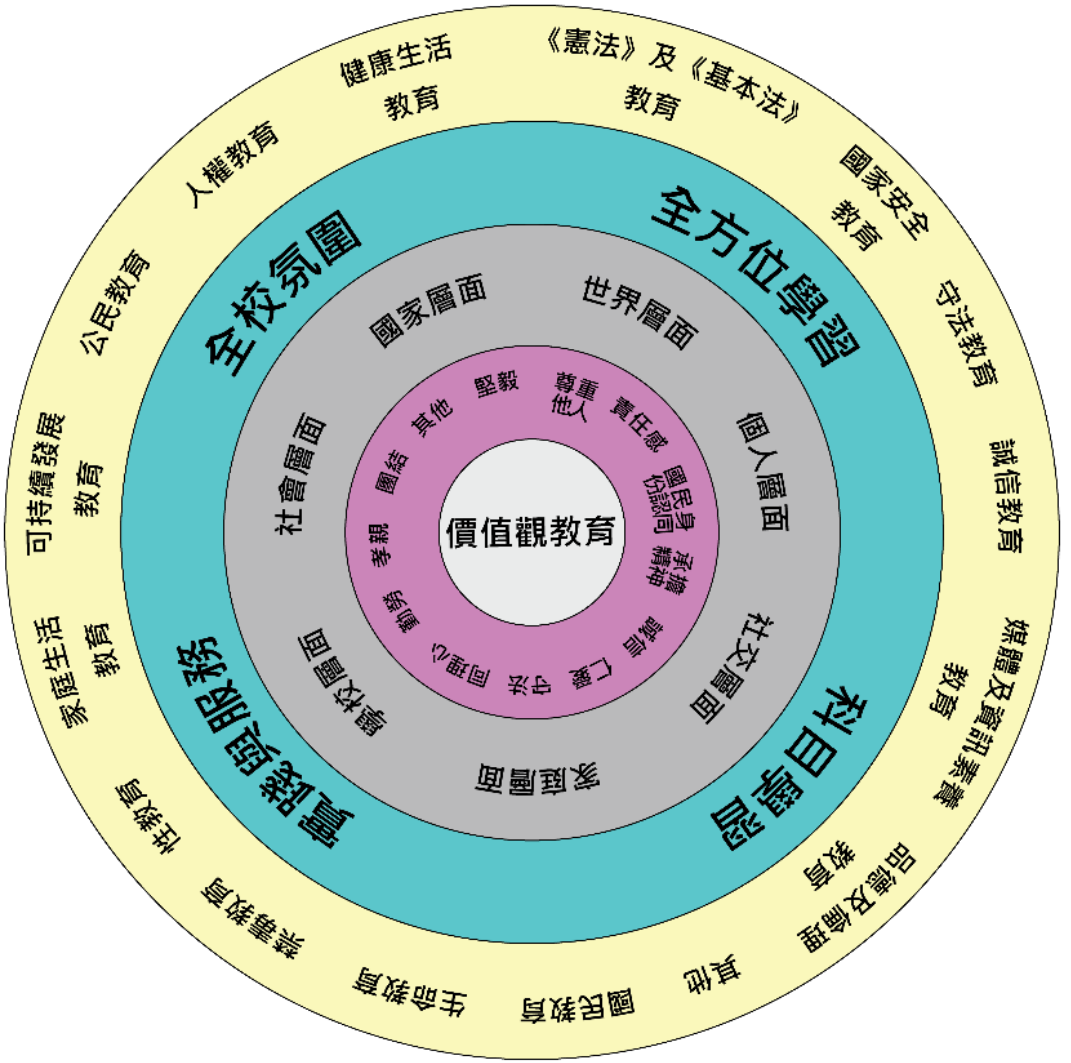
IoT Technologies

- Legality and Security
- Air Quality
- Digital Transformation
- Green Urban Areas
- Water Quality
- Energy
- Occupation
- Waste Management
- Sustainable Mobility
- Tourism and Culture

Sustainability Indicators

New Concerns: ESG

New Concerns: Value Education



New Concerns: Value Education

Schools could promote values education through nurturing in their students the twelve priority values and attitudes (PVAs): "**Perseverance**", "**Respect for Others**", "**Responsibility**", "National Identity", "**Commitment**", "Integrity", "Benevolence", "Law-abidingness", "**Empathy**", "Diligence", "Filial Piety" and "Unity", as the direction for promoting values education.

1. 自動環境監測系統 (Learning IOT using Microbit + sensors)

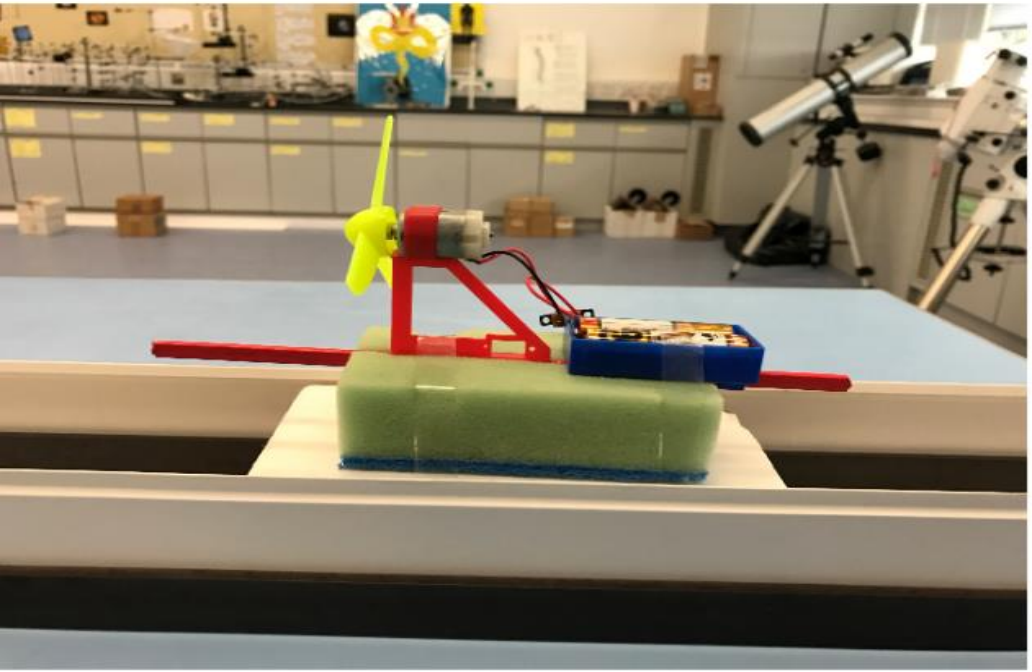
- 學生可運用 Micro:bit 微電路版，透過不同的感應器及裝置，設立環境監測系統。
- 運用物聯網，將數據上傳在雲端系統，並達至科學數據化顯示。

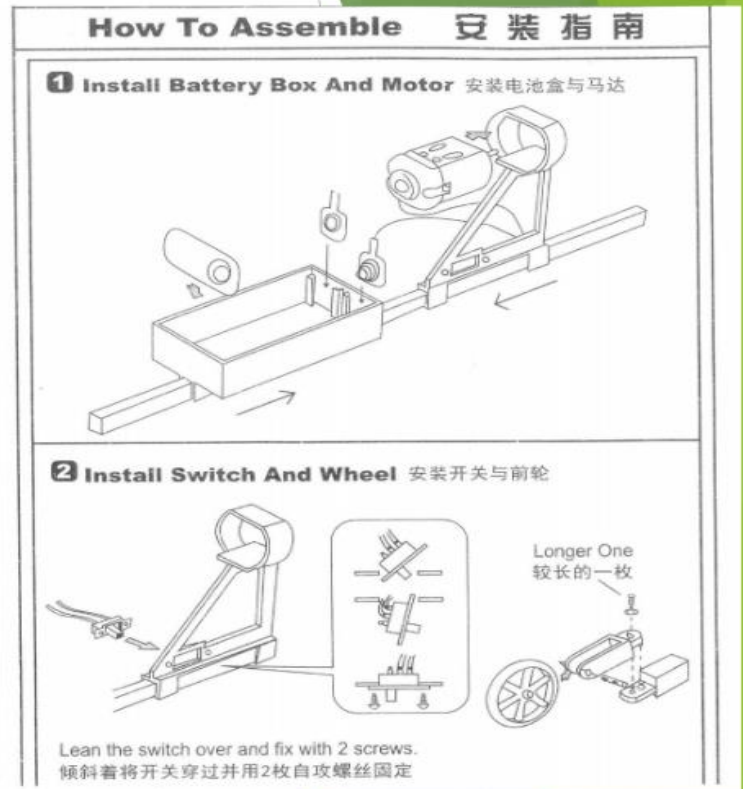
科學	科技	數學
觀察生物 電的使用	程式設計 感應器應用	雲端數據系統 統計

- 運用科學過程技能
- 發展共同解決問題能力和創造力
- 發展綜合和應用科學、科技和數學的知識與技能的能力

2. 磁浮列車

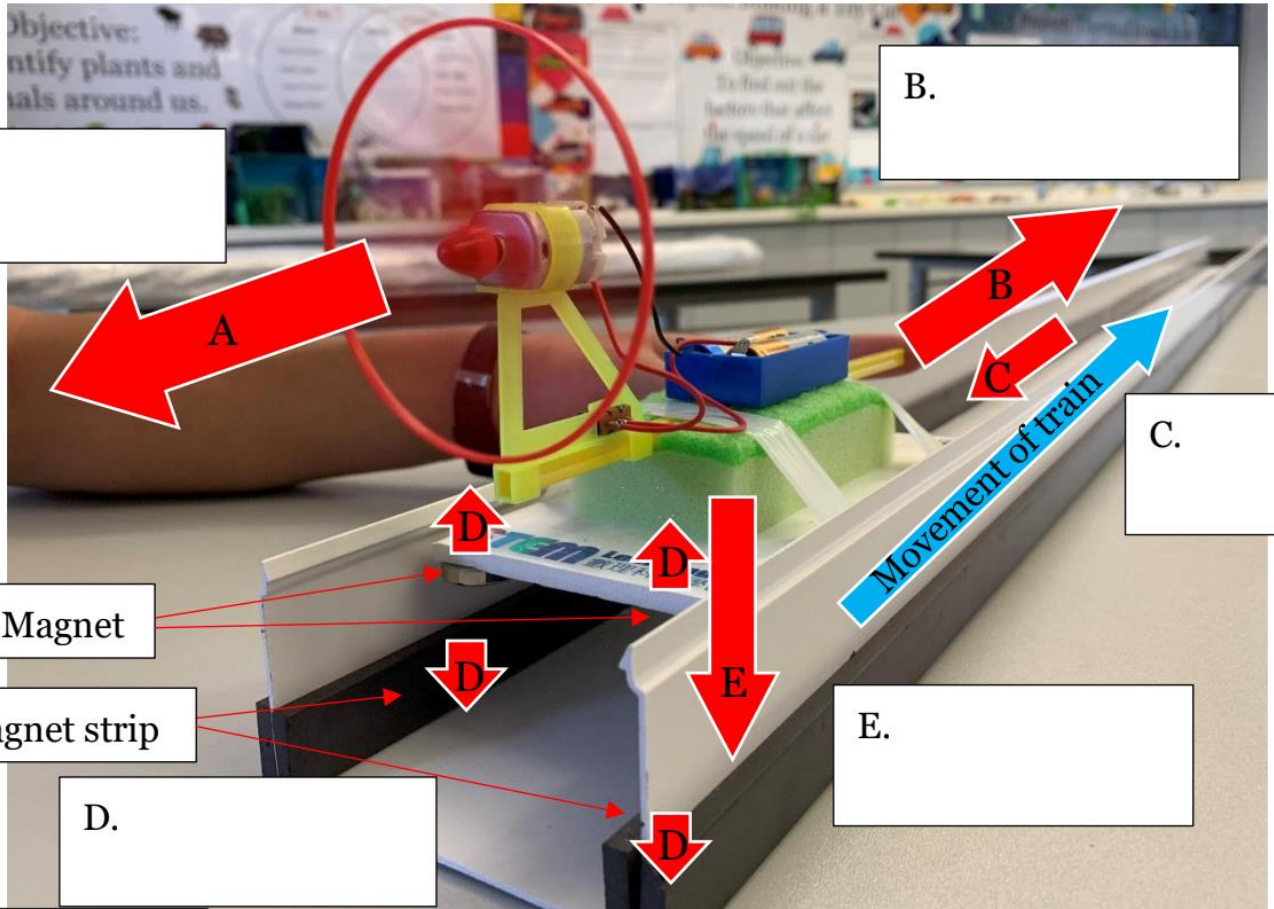
製作電舫動部分

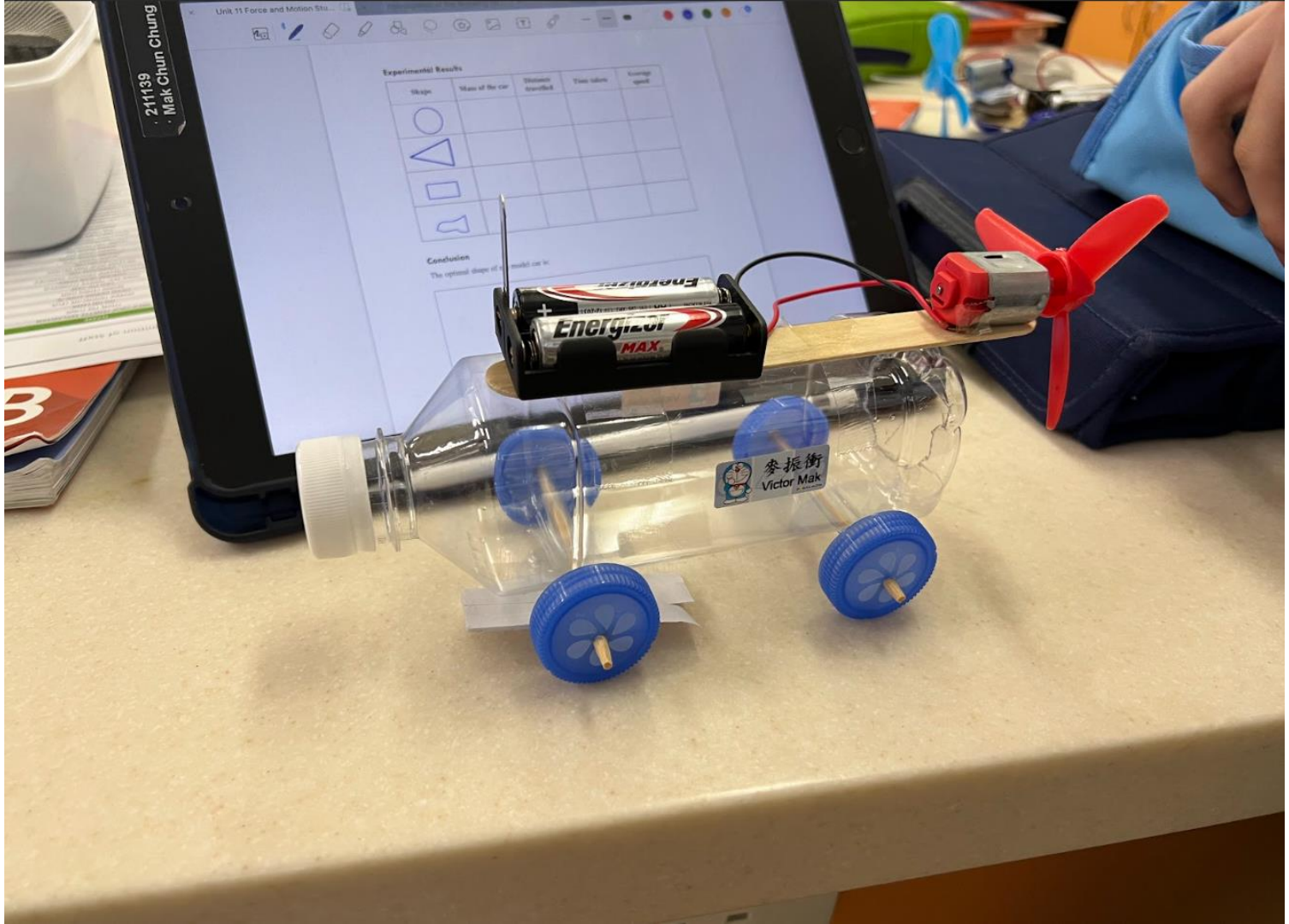




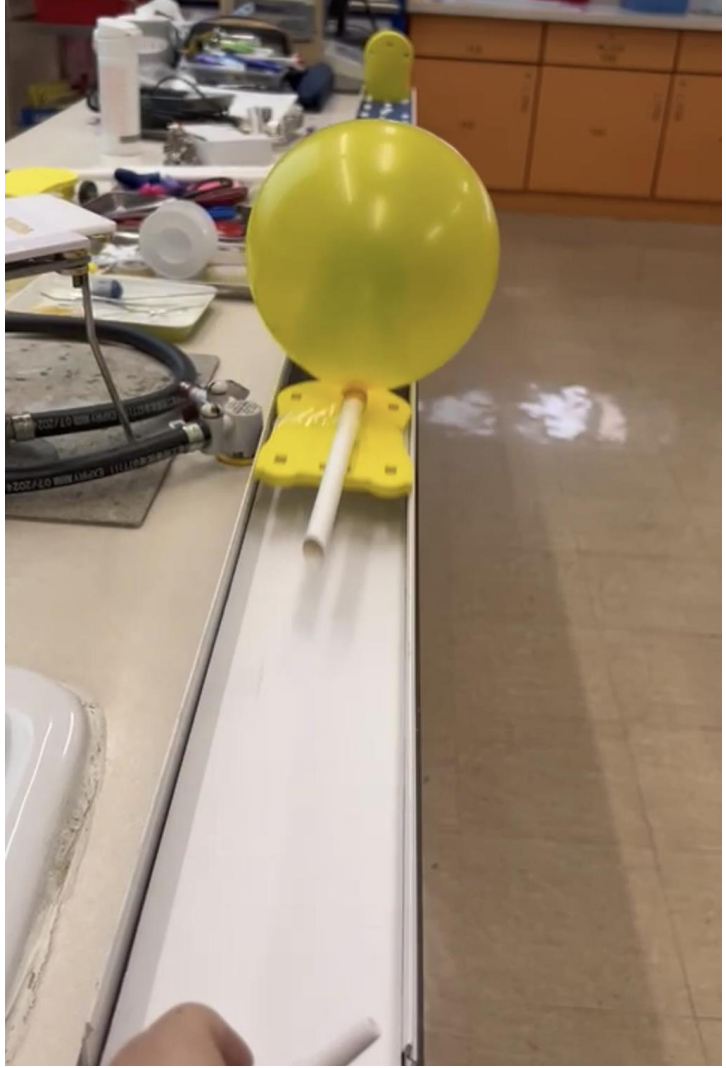
Form 2 Curriculum: Modified Maglev Activity (Force and Friction)

Applied force (Backward)	Force of gravity (Downward)	Air friction (Backward)
Reaction force (Forward)	Magnetic force (repulsion)	




211139
Mak Chun Chung
Experimental Results
Conclusion
Energizer
MAX
麥振衡
Victor Mak


Supreme
B9D
B10D
B9C
B10C
C9D
C10D



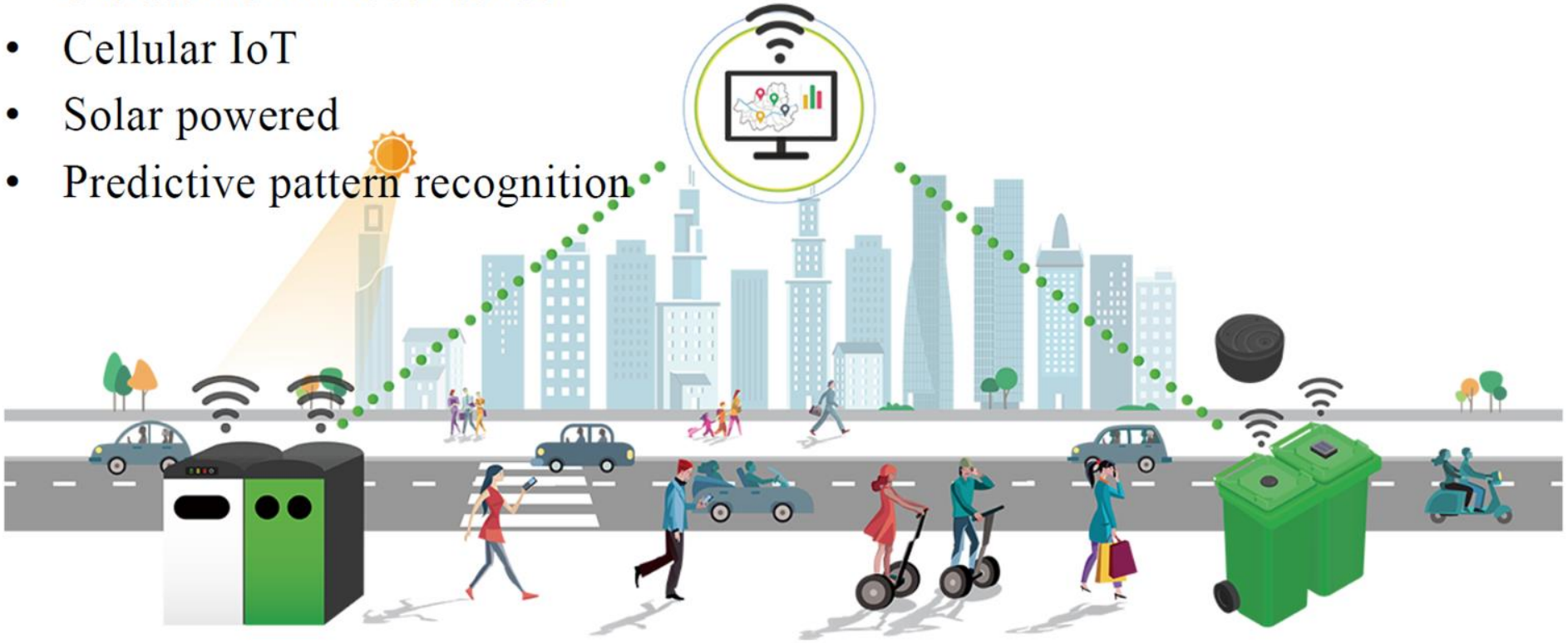
Promoted to Primary Section

Form 4 Curriculum
Importance of IOT and IOT Application Examples

- Devices + Sensors
- Apps writing
- IOT
- API
- **GIS (Data manipulation)**

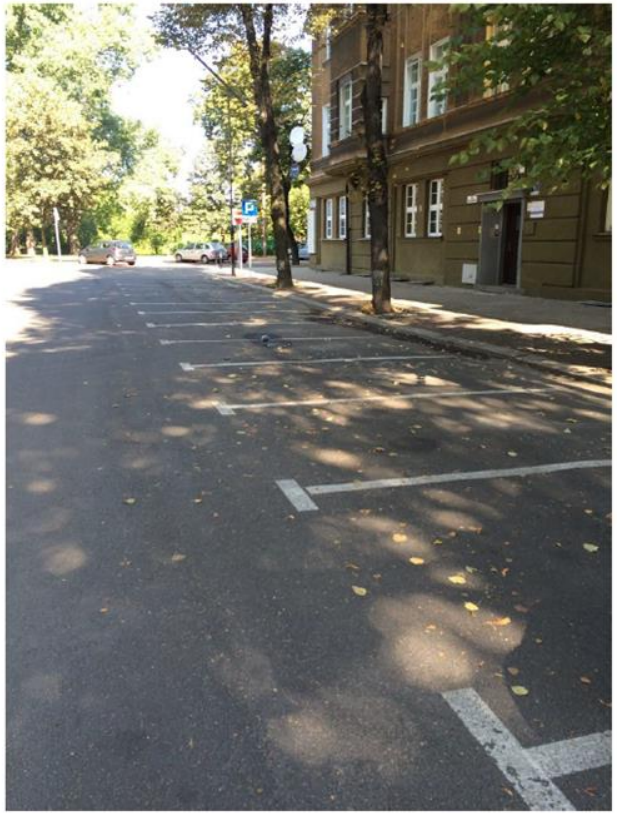
Smart Waste Management

- Ultrasonic fill-level sensor
- Cellular IoT
- Solar powered
- Predictive pattern recognition



http://ecubelabs.com/integrated-waste-management/

Smart Street Parking in Poland



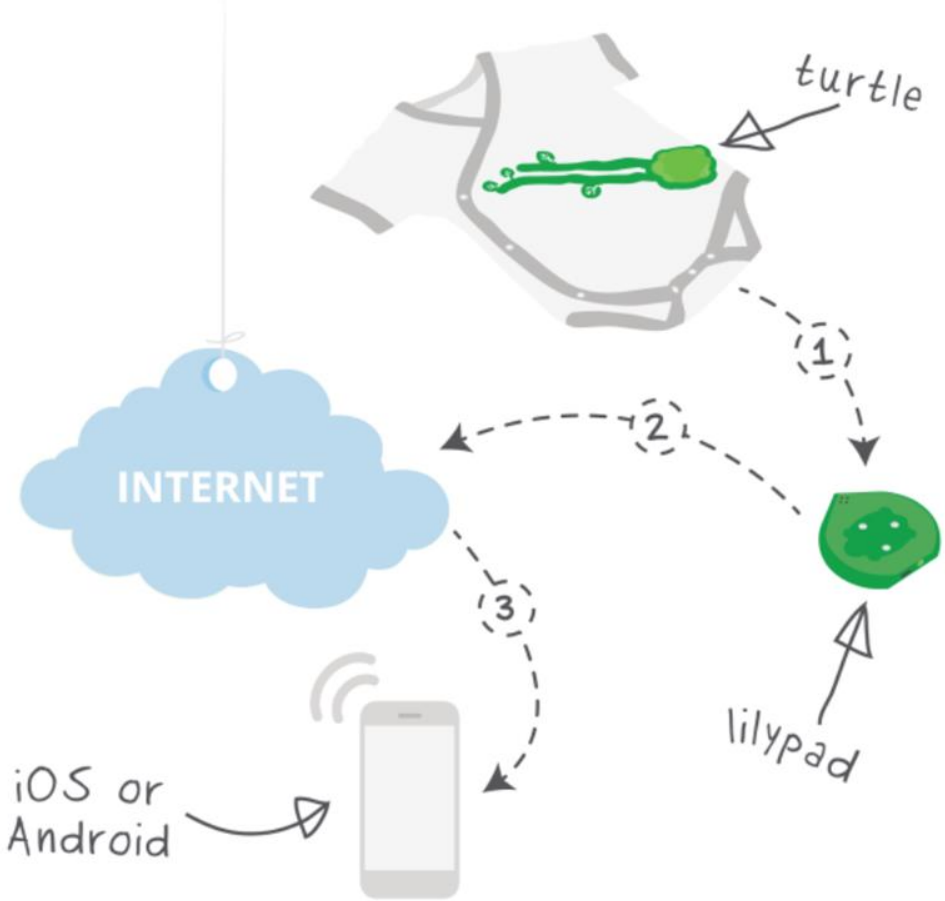
http://www.worldsensing.com/success-story/gliwice-smart-parking-solution/#

Baby Monitoring – Activity Tracking

http://mimobaby.com/

http://www.owletcare.com/smart-sock-2/

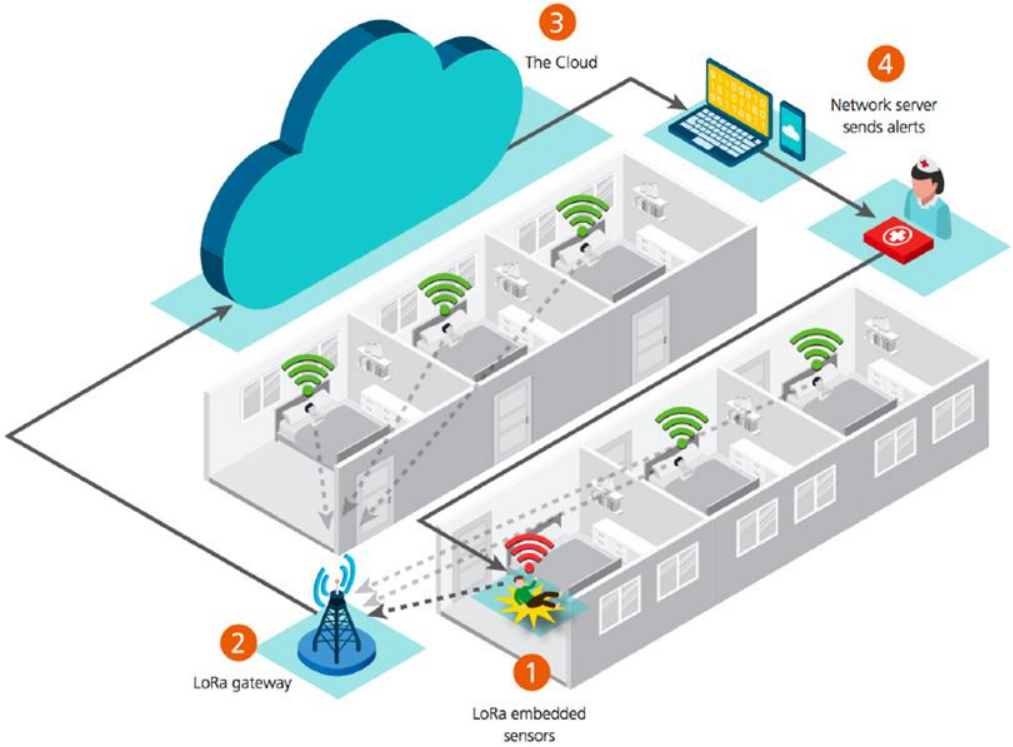
Baby Monitoring – Activity Tracking



1. The turtle sends information about the baby's breathing, body position, sleep activity, and skin temp to the Lilypad via Bluetooth LE.
2. The Lilypad streams data and live audio to the cloud via WiFi.
3. Parents receive real-time insight about their baby on their smartphone.

http://mimobaby.com/

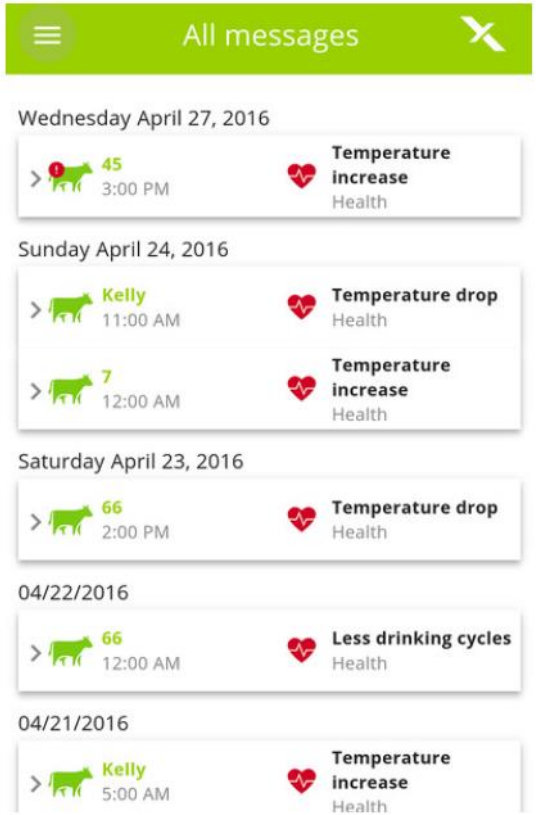
Elderly Monitoring – Fall Detection



1. Fall/movement data collected by sensors embedded with LoRa Technology
2. Data from all sensors is sent to a LoRa gateway as person moves
3. Gateway sends information to the Cloud where the data is analyzed by an application to determine what is normal and what is a fall
4. Application server sends reports and alerts on the fall and location of the person to a computer or mobile device

http://www.semtech.com/wireless-rf/internet-of-things/downloads/Semtech_Health_FallDetection_AppBrief-FINAL.pdf

Connected Livestock



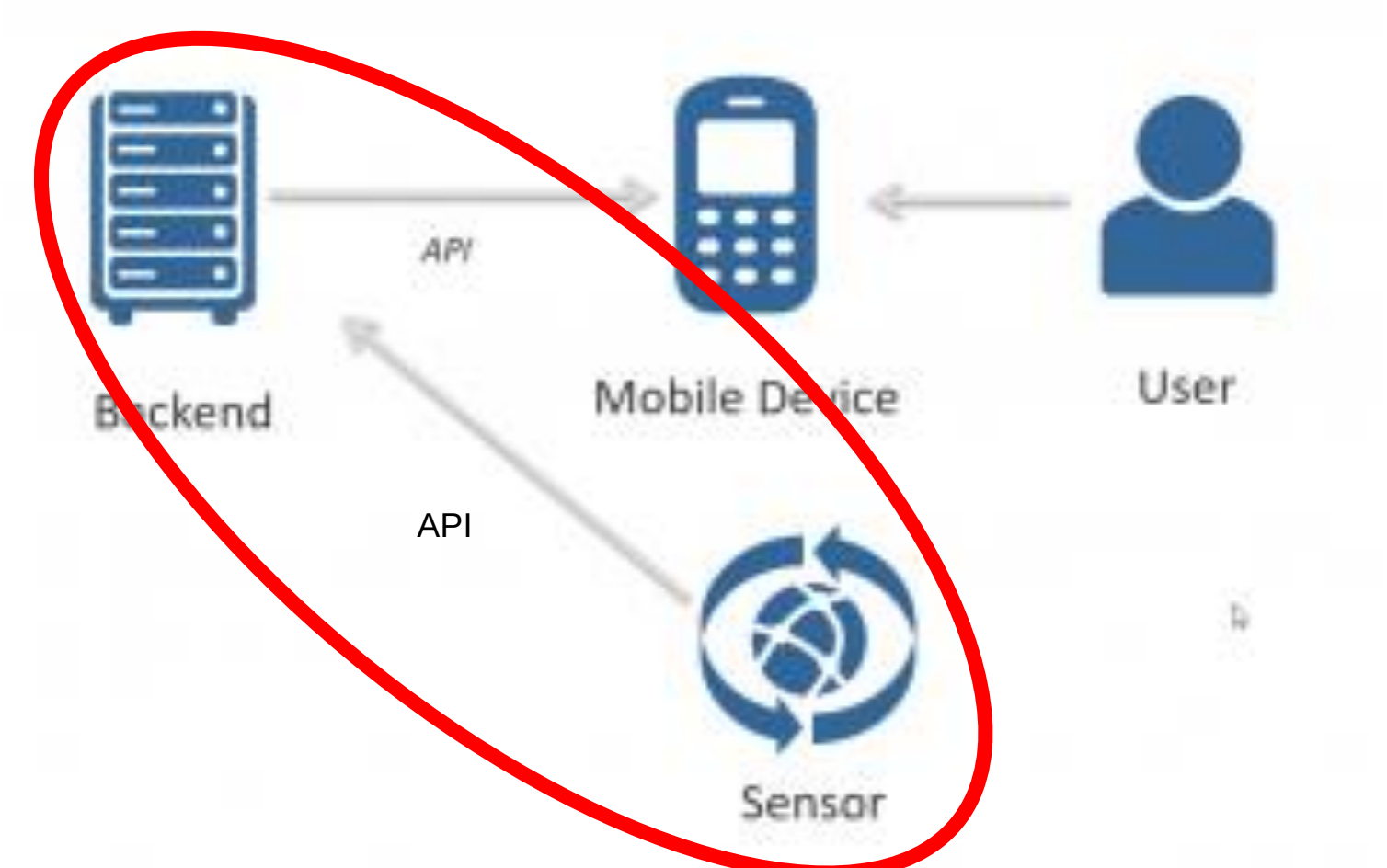
http://uk.smaxtec.com/smaxtec-system/

Conclusion

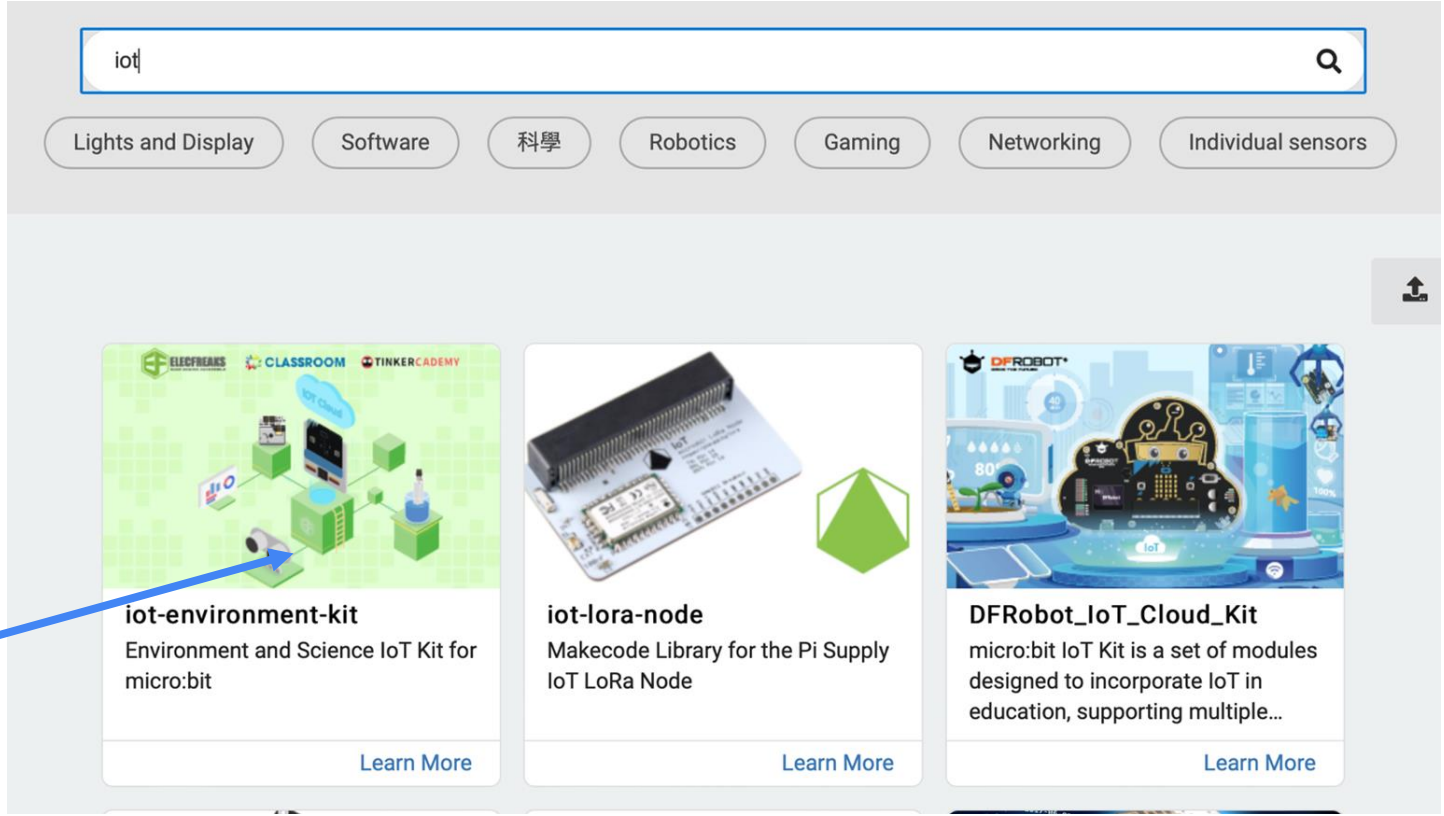
http://www.eetimes.com/author.asp?doc_id=1328602

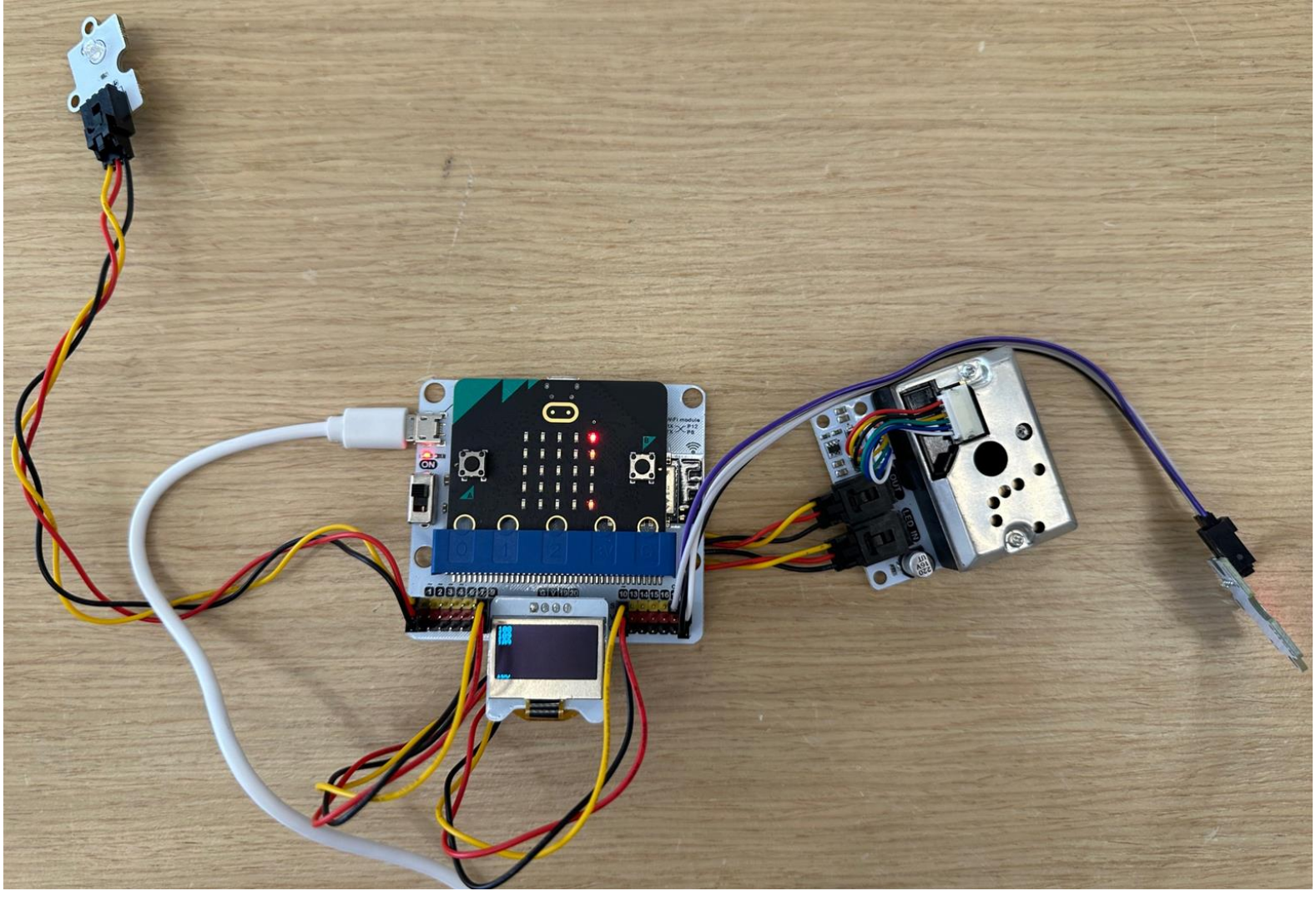
Session 2: Hands-on IOT knowledge

Lesson 1: Sensors → Thingspeak (Database)



New IOT kit


iot
Lights and Display
Software
科學
Robotics
Gaming
Networking
Individual sensors
ELECFREAKS
CLASSROOM
TINKERCADEMY
iot-environment-kit
Environment and Science IoT Kit for micro:bit
Learn More
iot-lora-node
Makecode Library for the Pi Supply IoT LoRa Node
Learn More
DFROBOT
DFRobot_IoT_Cloud_Kit
micro:bit IoT Kit is a set of modules designed to incorporate IoT in education, supporting multiple...
Learn More



TEMP and HUMID

Channel ID: **1570251**
Author: mwa0000024719121
Access: Private

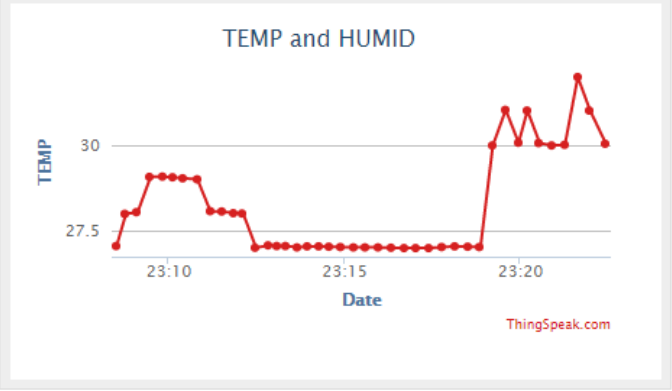
Private View | Public View | Channel Settings | Sharing | API Keys | Data Import / Export

Add Visualizations | Add Widgets | Export recent data | MATLAB Analysis | MATLAB Visualization

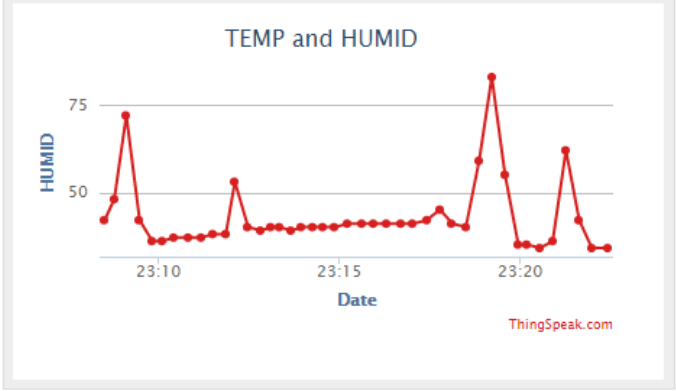
Channel Stats

Created: about 10 hours ago
Last entry: about 9 hours ago
Entries: 42

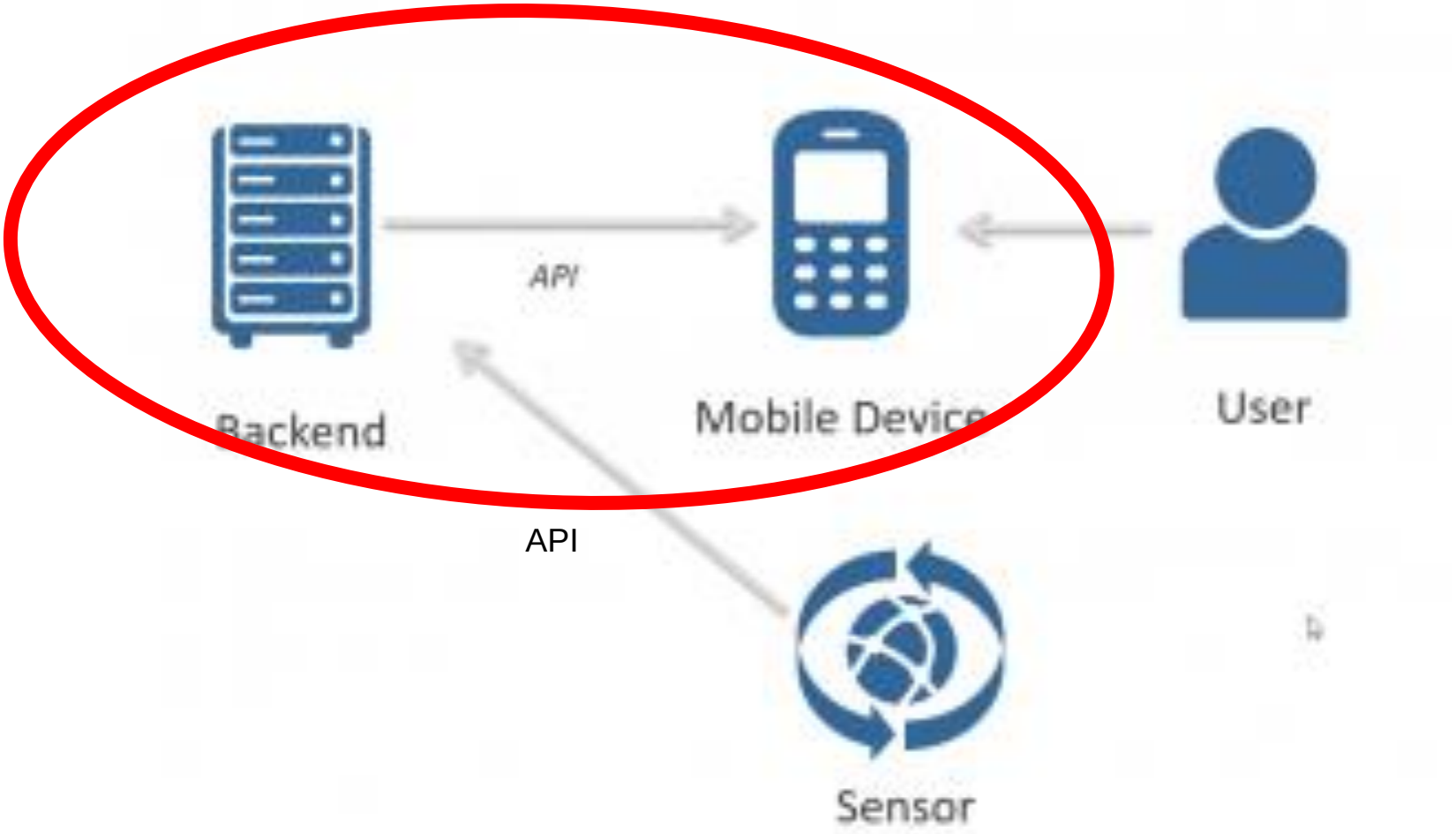
Field 1 Chart



Field 2 Chart



Lesson 2: Database → Mobile Apps



Advanced Apps Development with IoT and API

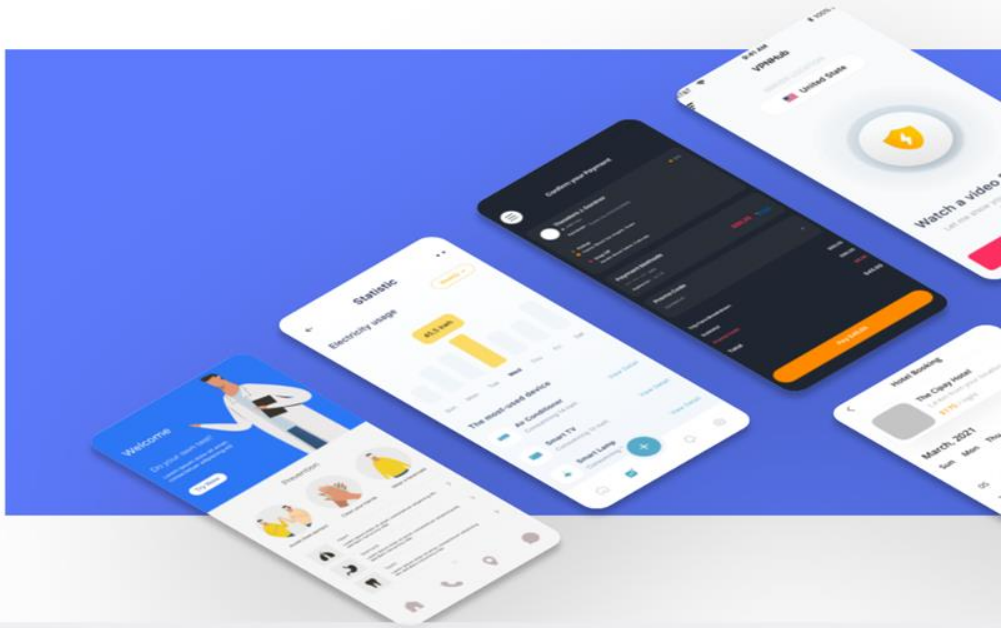
thunkable

Solutions Community Docs Blog Pricing Log In Sign Up

Create Your Own Native Apps With No-Code

Join the millions of creators turning their ideas into apps with Thunkable

START TODAY



4B IOT

Channel ID: **1582477**
Author: mwa0000024719121
Access: Public

Import

Upload a CSV file to import data into this channel.

File Choose File No file chosen

Time Zone (GMT+00:00) UTC

Upload

Export

Download all of this Channel's feeds in CSV format.

Time Zone (GMT+00:00) UTC

Help

Import

The correct format for data import is provided in this CSV Import Template File. Use the field names *field1*, *field2*, and so on, instead of custom field names.

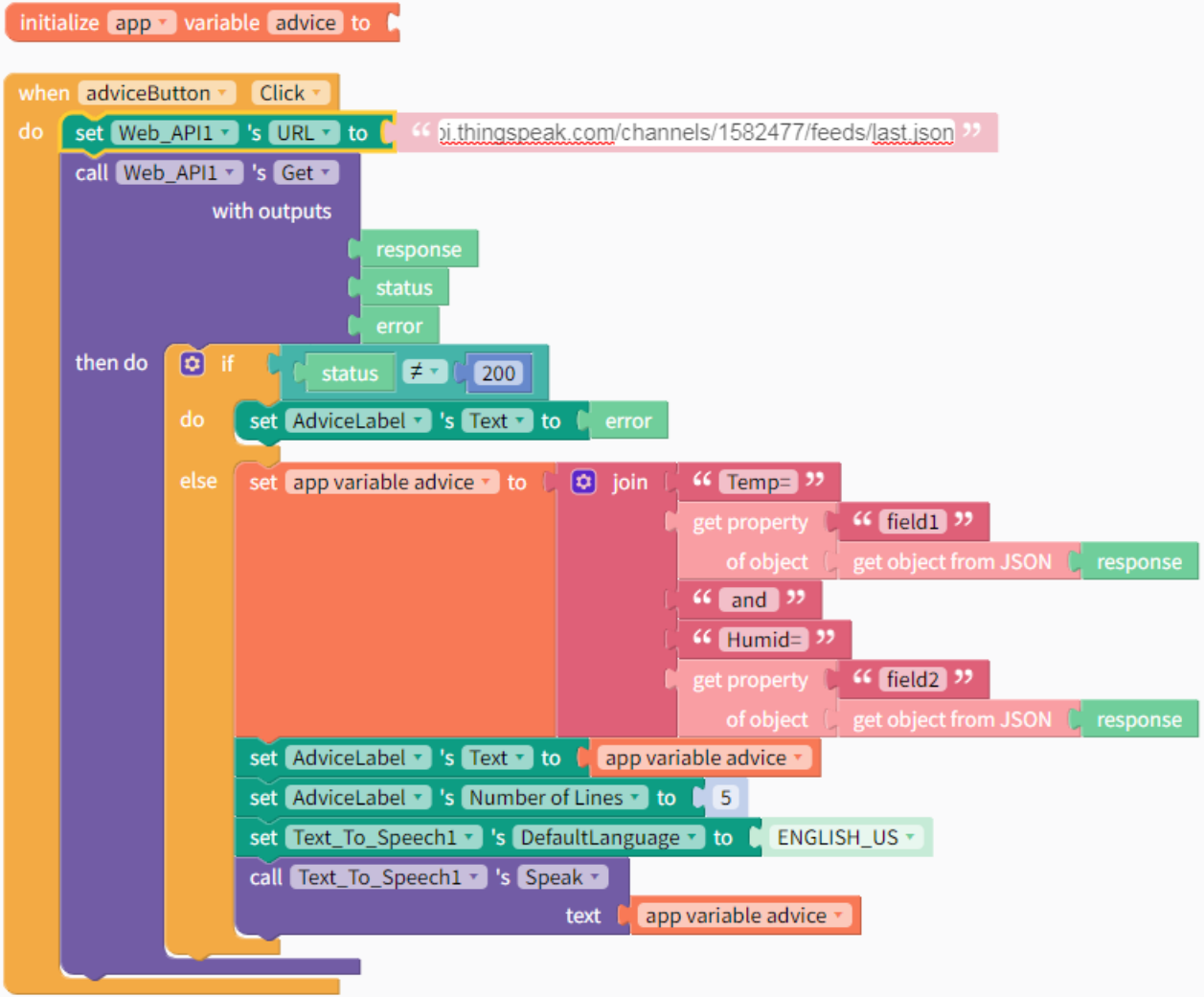
CSV Import Format

```
created_at,field1,field3,field4,field8,elevation
2019-01-01T10:11:12-05:00,11,33,44,88,10
```

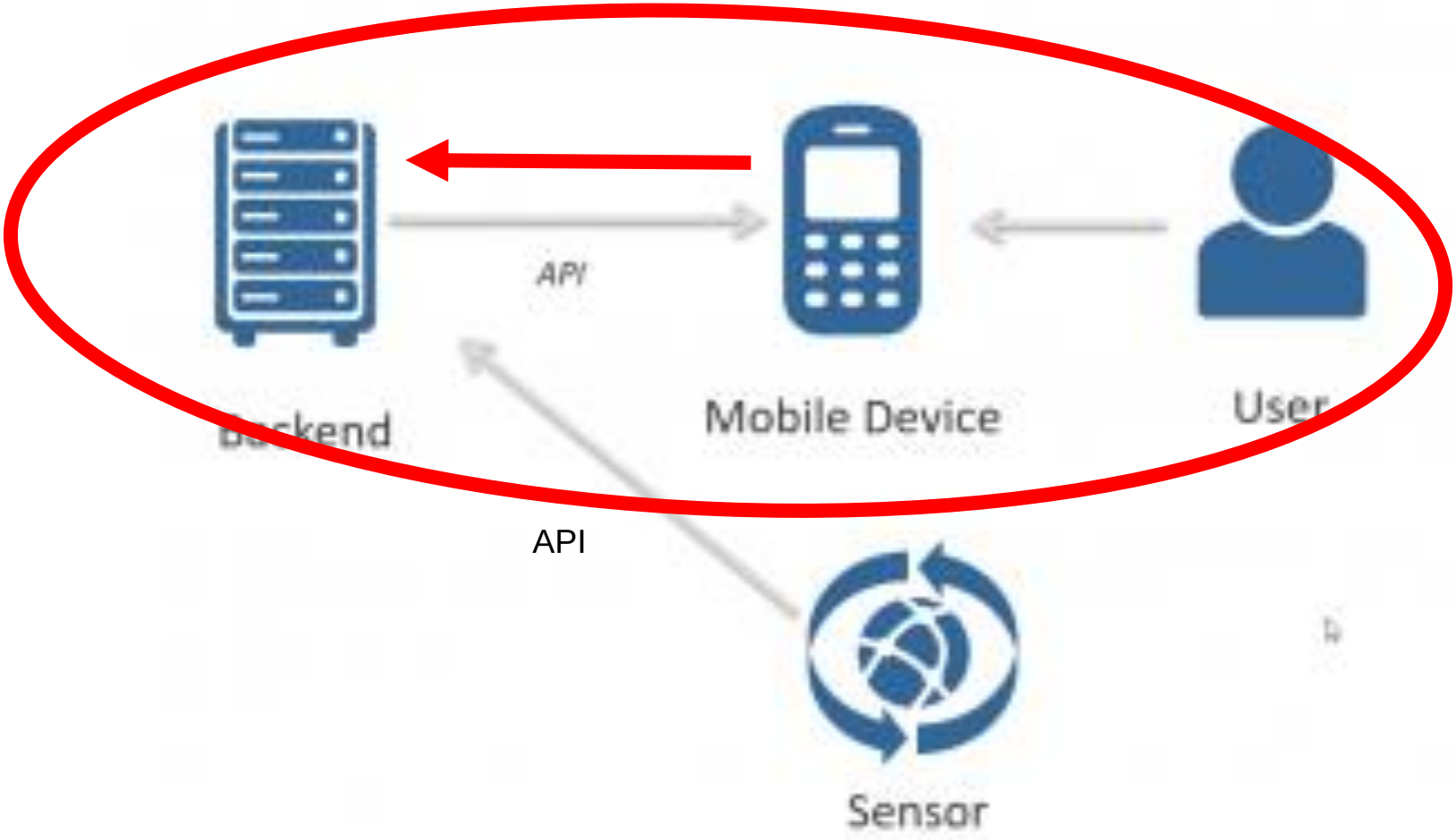
Other Import and Export Options

You can also use MATLAB, the REST API, or the MQTT API to import and export channel data.

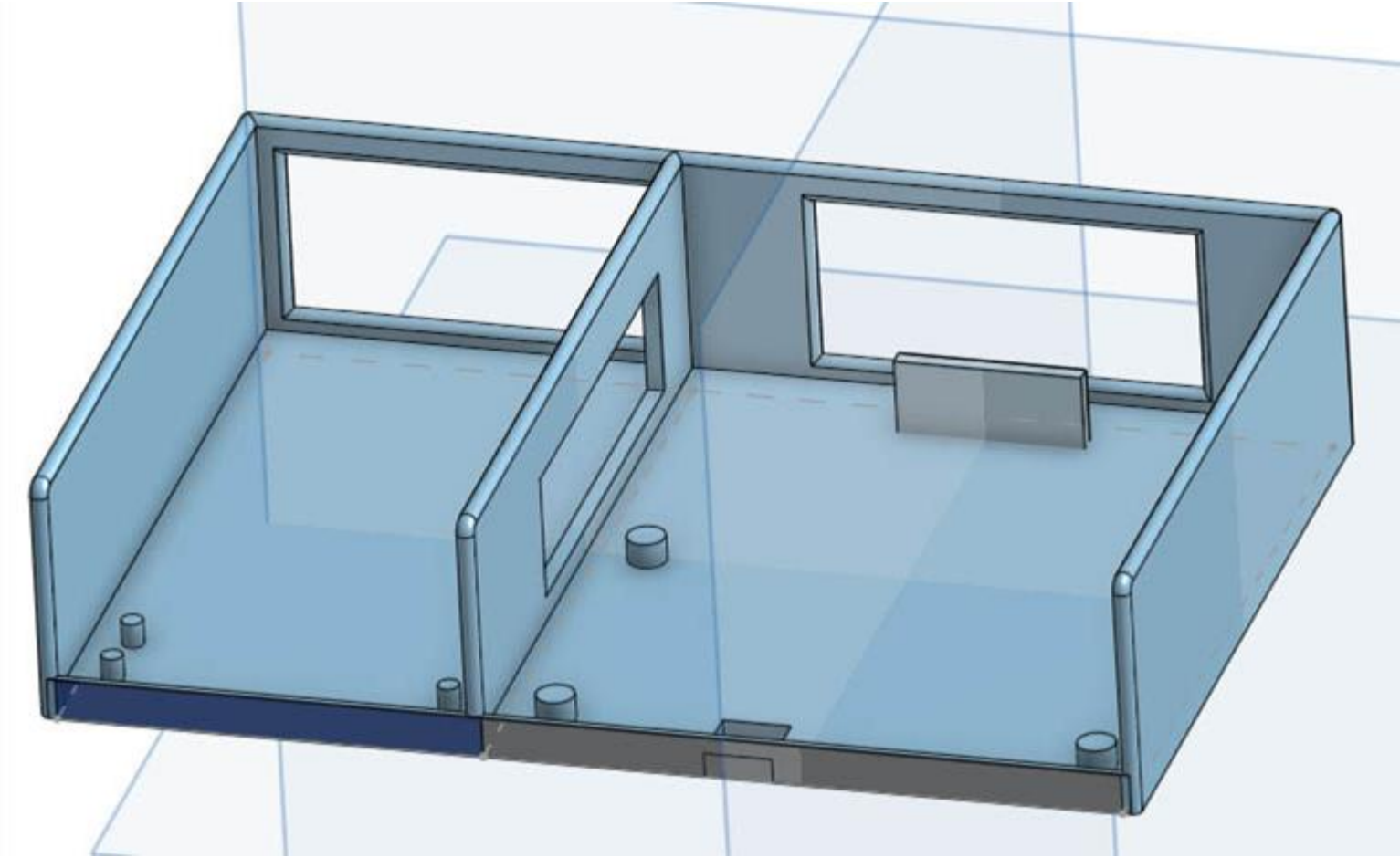
Read Data
Write Data

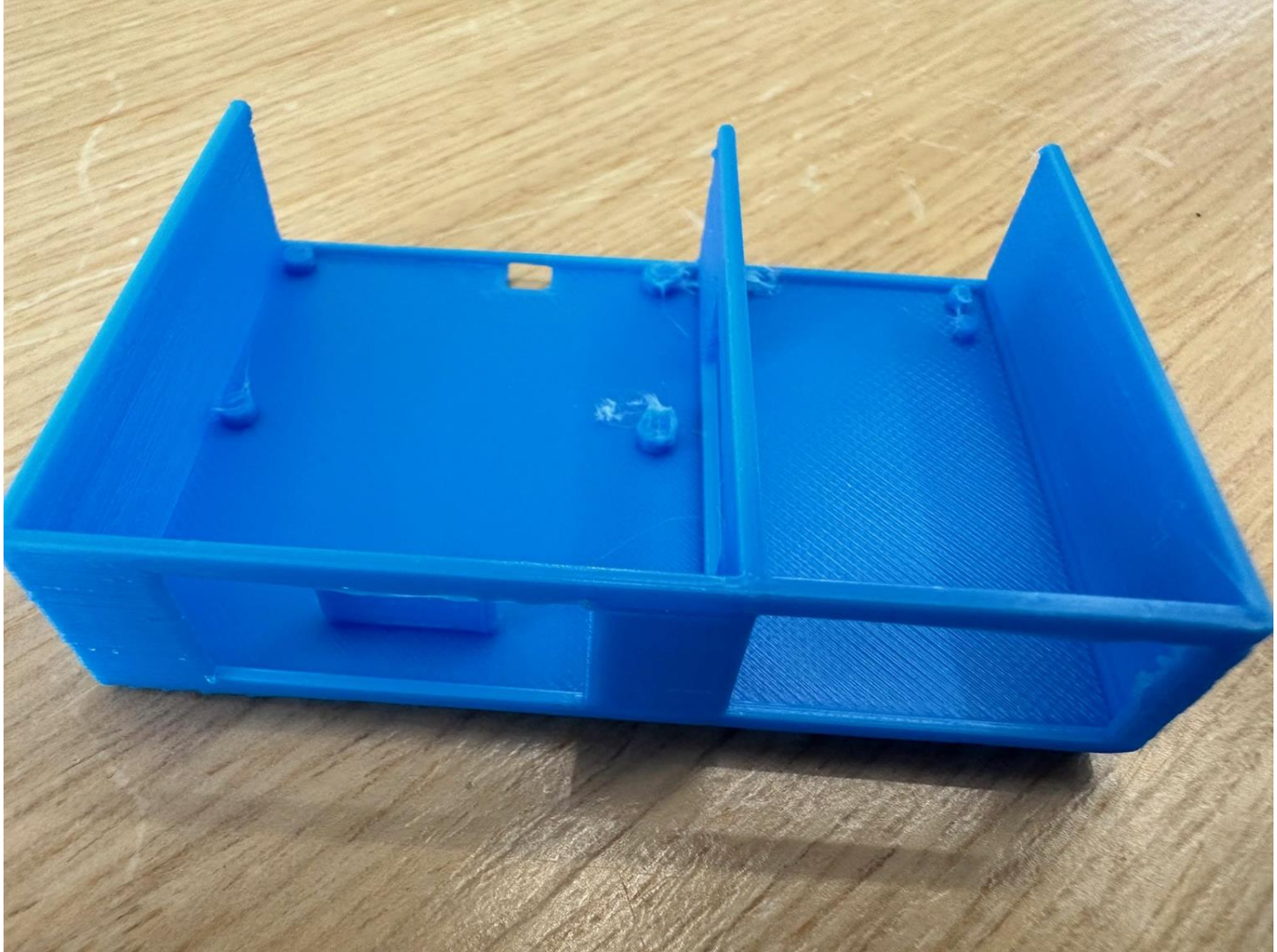

initialize app variable advice to
when adviceButton Click
do set Web_API1 's URL to "pi.thingspeak.com/channels/1582477/feeds/last.json"
call Web_API1 's Get
with outputs
response
status
error
then do if status ≠ 200
do set AdviceLabel 's Text to error
else set app variable advice to join "Temp="
get property "field1"
of object get object from JSON response
"and"
"Humid="
get property "field2"
of object get object from JSON response
set AdviceLabel 's Text to app variable advice
set AdviceLabel 's Number of Lines to 5
set Text_To_Speech1 's DefaultLanguage to ENGLISH_US
call Text_To_Speech1 's Speak
text app variable advice

Lesson 3: Mobile Apps → Database (Firebase/Airtable)



3D printing elements added..





Session 3:
Data Manipulation (GIS)

Learning GIS

CSDI

Common Spatial Data Infrastructure Portal

Search Dataset e.g. School...

FRAMEWORK SPATIAL DATA

- Address
- Administrative Area
- Building
- Coordinates Reference System

Overlay Layers

1. **Choose input layer**

3D_Pedestrian_Network_...

2. **Choose overlay layer**

Buffer_of_Lamp_Post_Ge...

3. **Choose overlay method**

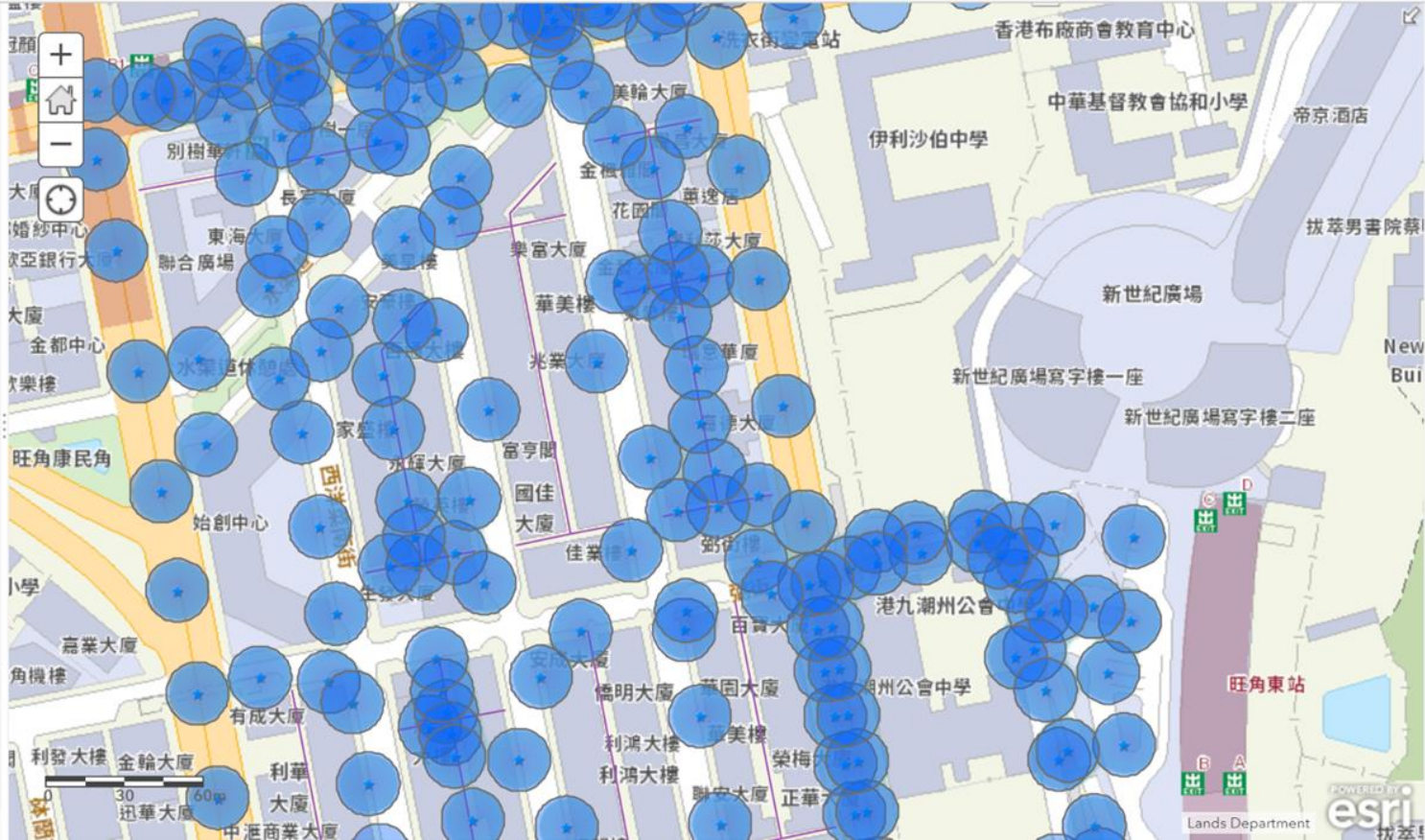
Intersect Union Erase

Output: Points

4. **Result layer name**

Intersect of 3D_Pedestrian_Netw

Save result in geolab_s1621



storymaps.arcgis.com/stories/83c999b4568a45faa6b146acf64807a7/edit

Update

Adjust map appearance

Search by location

Map layers

Erase_3D_Pedestrian_Network_GeoLab_with_Buffer_of_Lamp_Post_GeoLab_copy_s1621

Buffer_of_Lamp_Post_GeoLab___copy_s1621

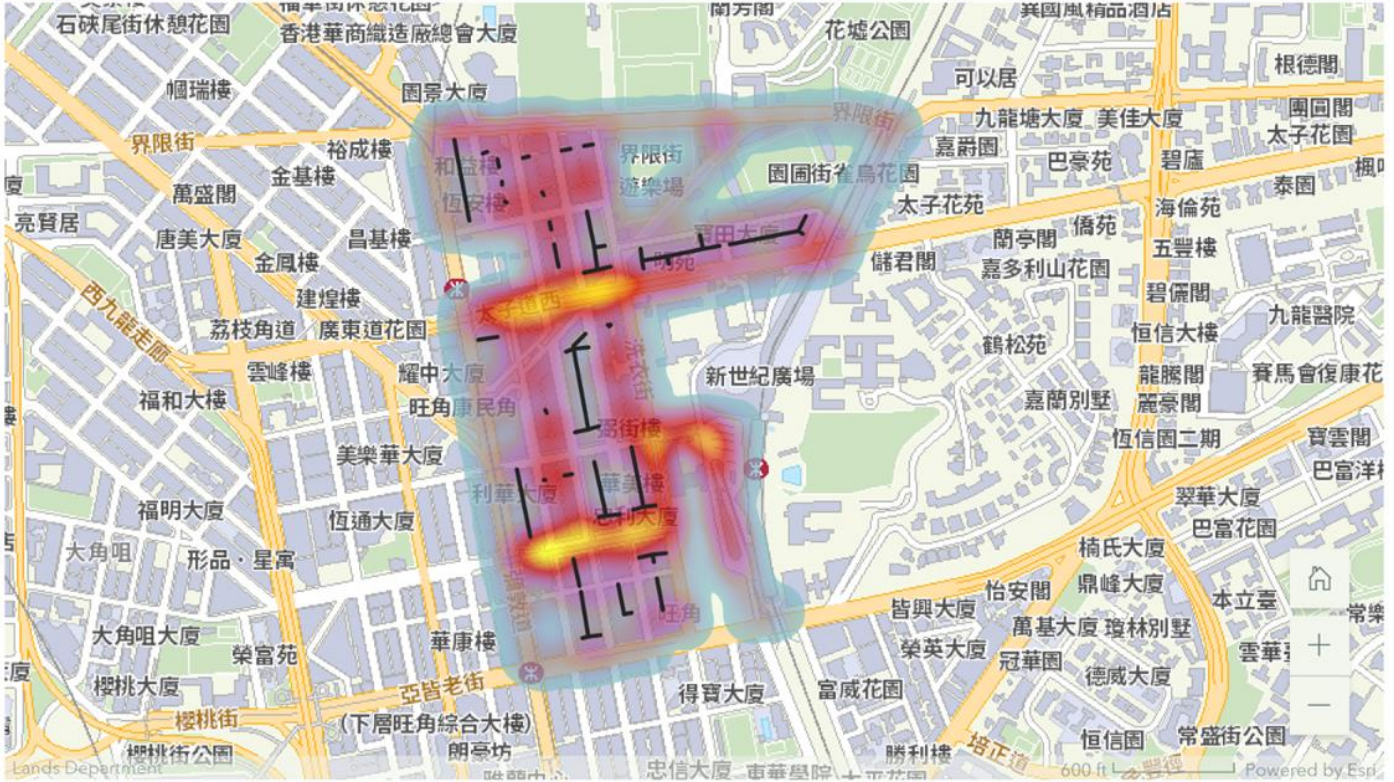
Lamp_Post_GeoLab - copy

3D_Pedestrian_Network_GeoLab

Lamp_Post_GeoLab

Modifications made here will only affect the appearance of this map in this story. To edit the underlying map, click the button below.

Edit in ArcGIS



Cancel

Place map

Smart Sustainable City

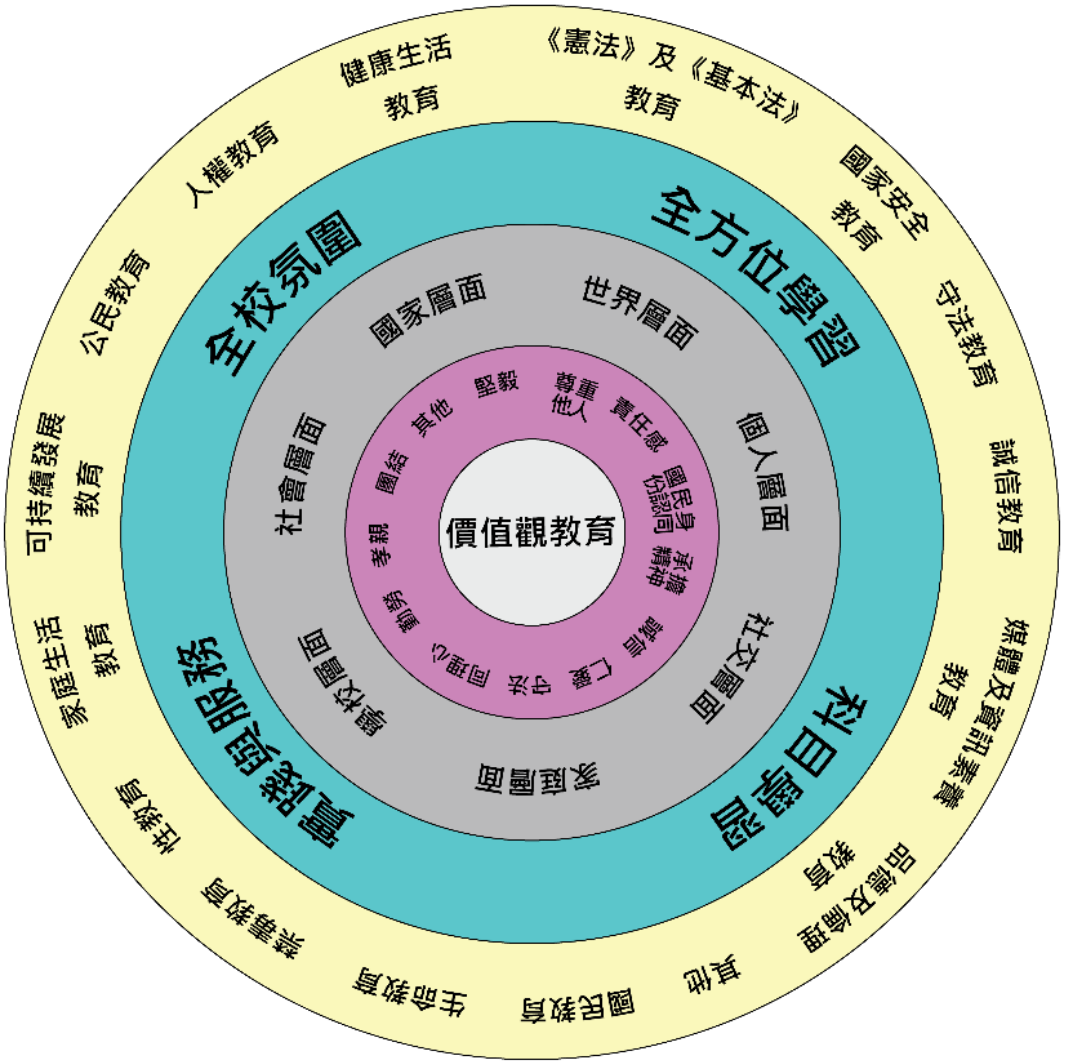
IoT Technologies

- Legality and Security
- Air Quality
- Digital Transformation
- Green Urban Areas
- Water Quality
- Energy
- Occupation
- Waste Management
- Sustainable Mobility
- Tourism and Culture

Sustainability Indicators

New Concerns: ESG

New Concerns: Value Education



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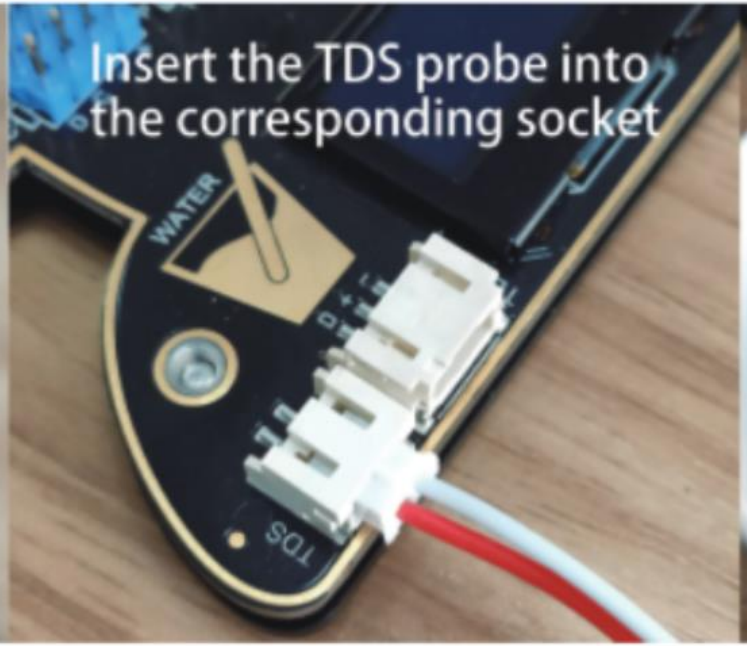
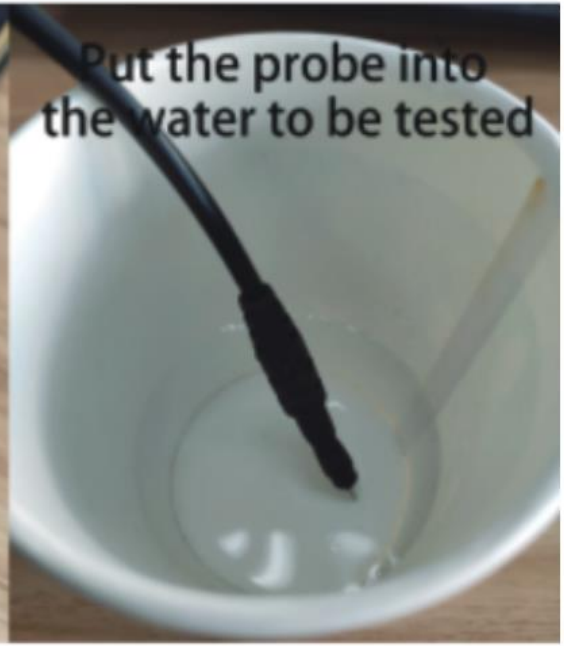
Students’ Innovative Projects and achievements

3. 水淨化測試

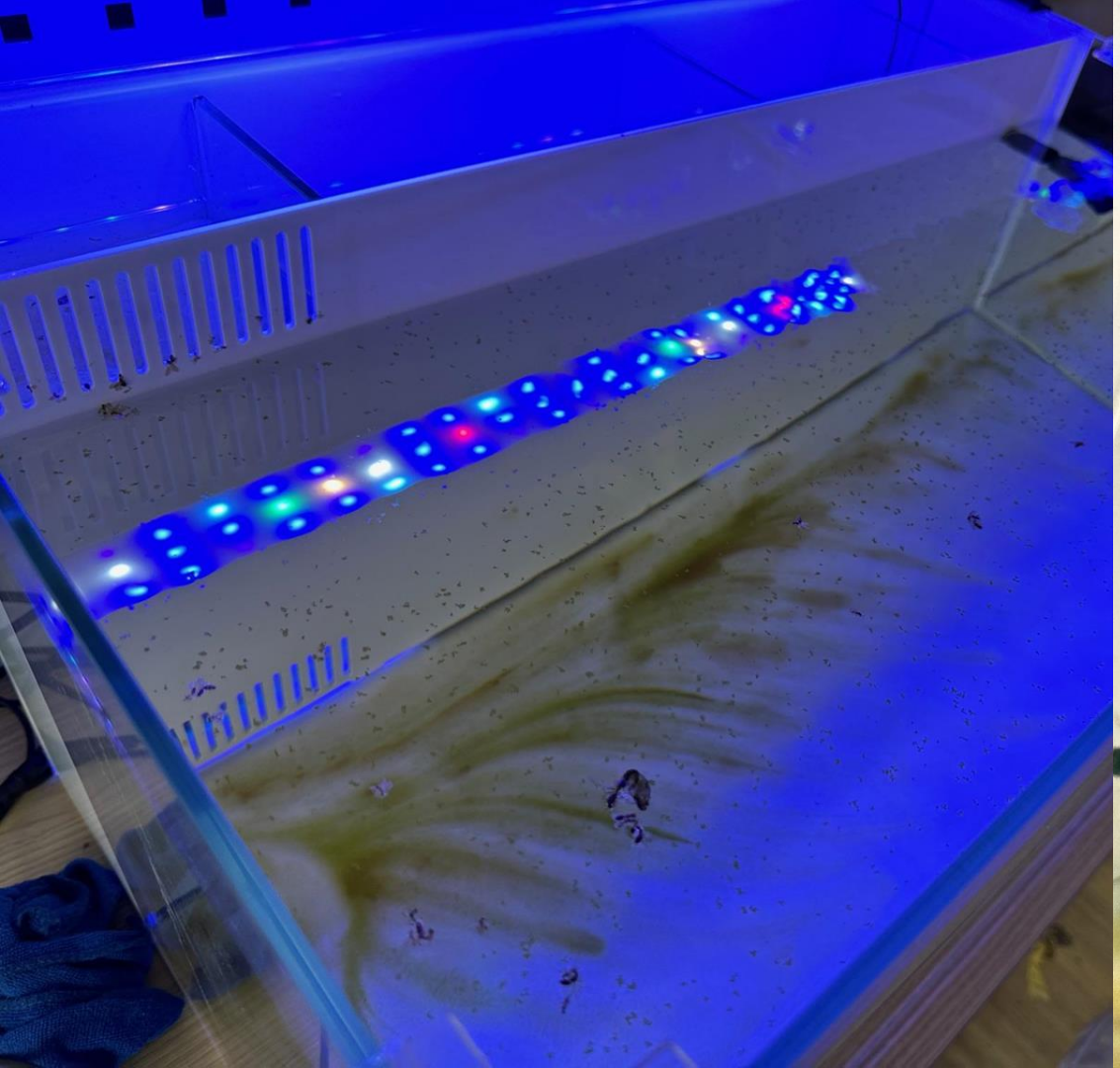
Remote Laboratory: Coral reef

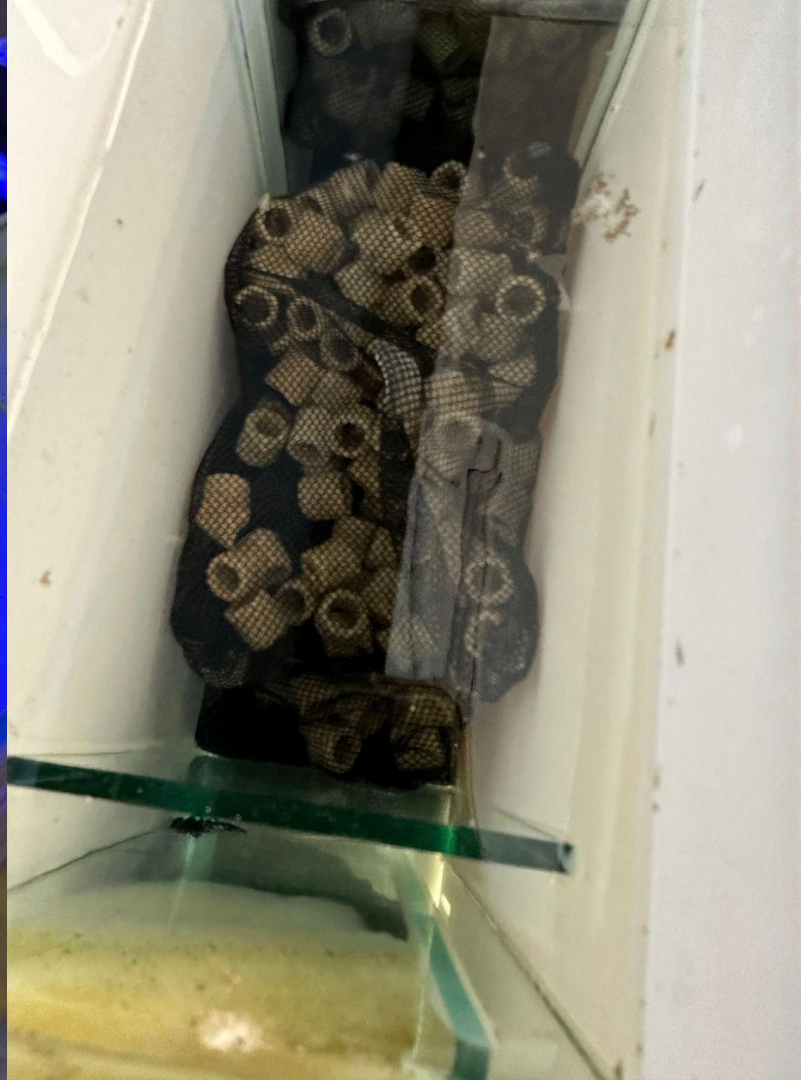
將 TDS 探頭插入 TDS 插座。將探頭放在不同的水資源上，輕輕搖晃，將它連接io:bit 或iot booster

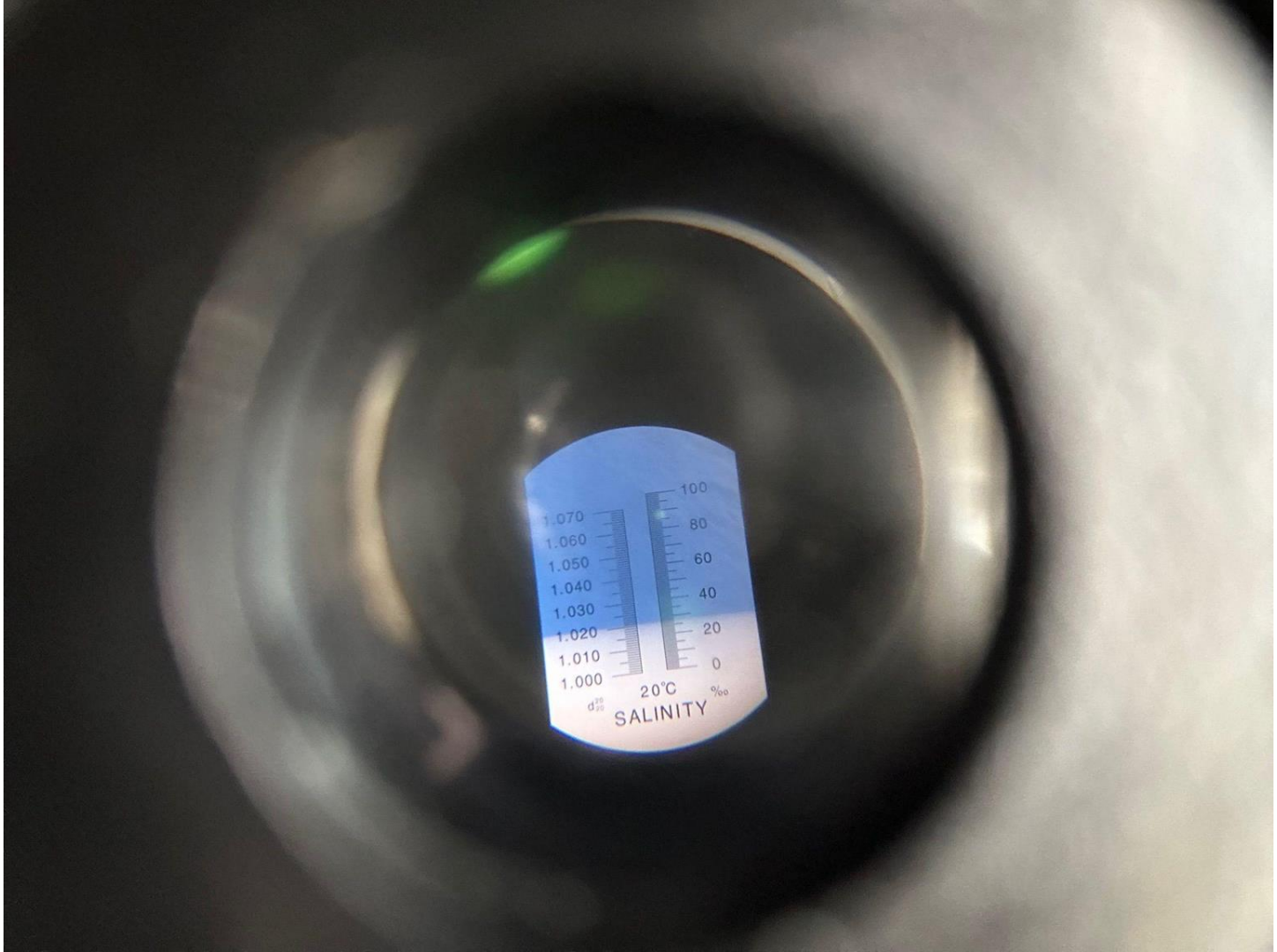




懸浮在水中的顆粒會降低水的透明度。清澈的水對於保持池塘健康非常重要。清澈的水使光線可以到達池塘植物。污染可能對魚類和其他池塘動物有害。直接排放污水帶來的有害影響。人類及禽畜排泄物、清潔劑及肥料能助長水中藻類的繁殖。於短時間內大量繁殖的藻類會消耗水中的氧氣，導致魚類及水中生物因窒息而死亡。



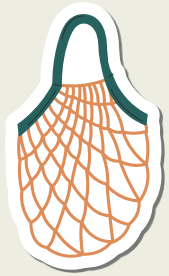



1.070
1.060
1.050
1.040
1.030
1.020
1.010
1.000
100
80
60
40
20
0
20°C
‰
SALINITY


249

EcoQuest App

The all-in-one go green tool for building a better place for the future, powered by AI



The EcoQuest Go Green Loop

Learn

Learn from our gamified platform

1

Plan

2

Plan your daily purchases and recycle routine with AI

Action

Try recycling after learning and planning

3

Evaluate

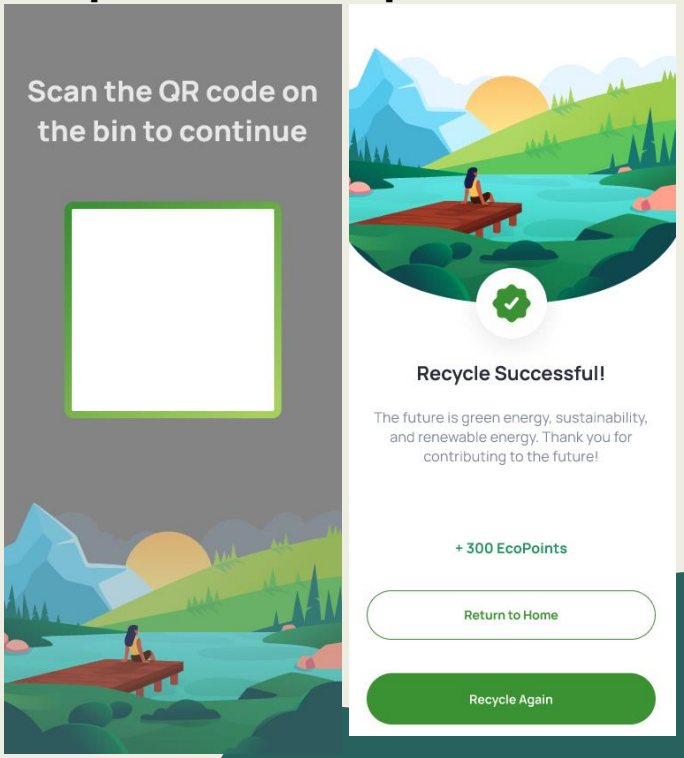
4

Get rewards from your efforts, and evaluate your contribution

03: SmartBIN - another alternative

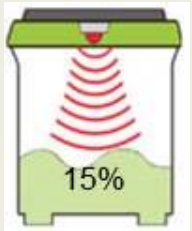
Waste **automatic sorting** by AI recognition

Real-time data management on cloud, and **update reward points** for users



Compression of recyclable

Fill level monitoring



The EcoQuest Go Green Loop

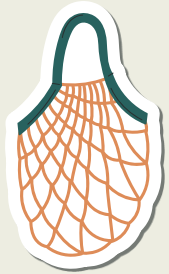
01 Raise Awareness

02 Encourage Action

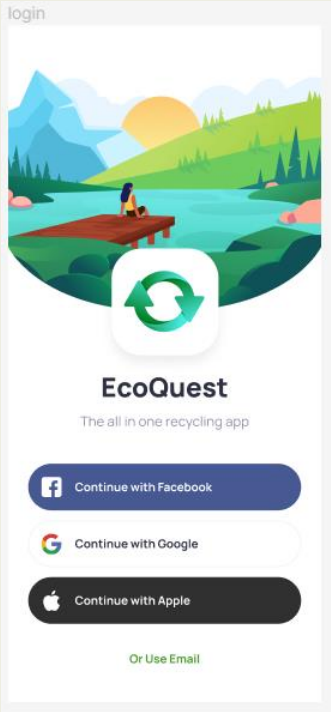
03 Incentivize and Evaluate

App Design

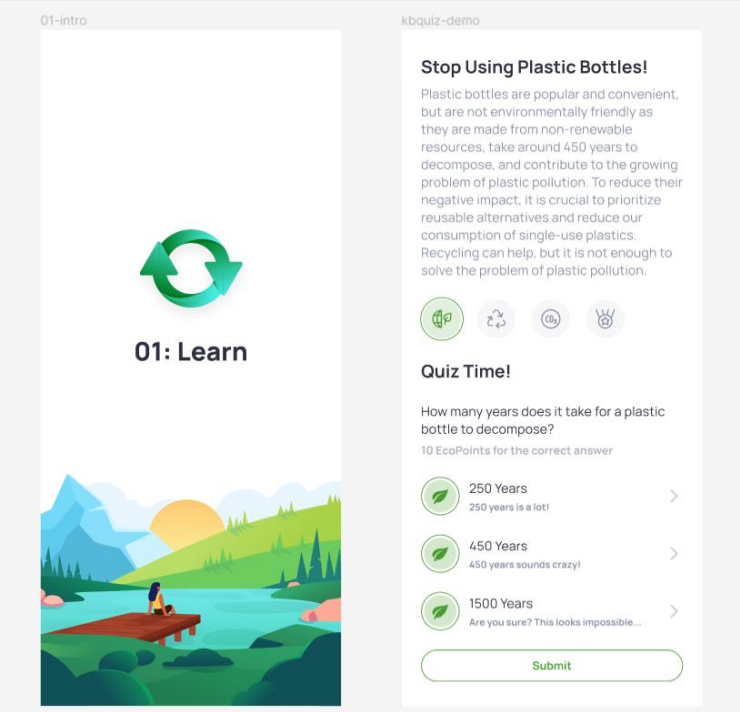
This design is set to be user-friendly and match modern UI design standards.



Main Page and Learning Page



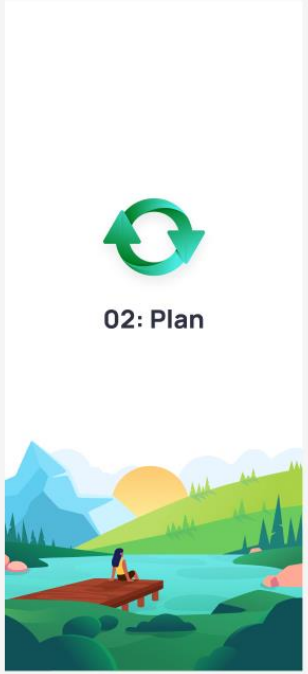
Sign In



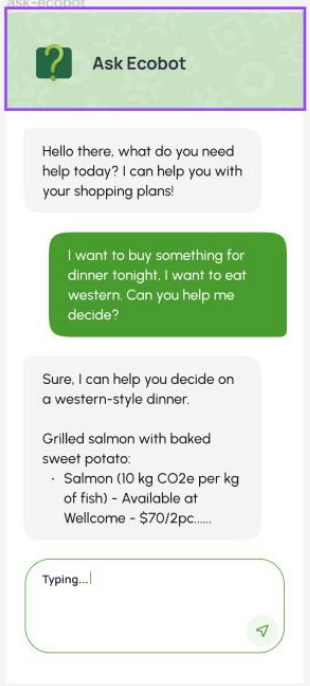
Knowledge Base

02 : Plan (Ask EcoBot/Map/Shop Info)

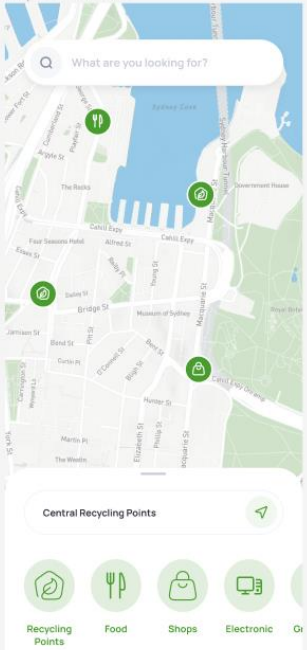
02-intro



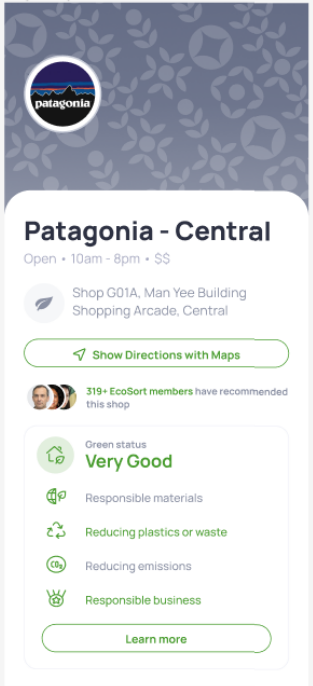
ask-ecobot



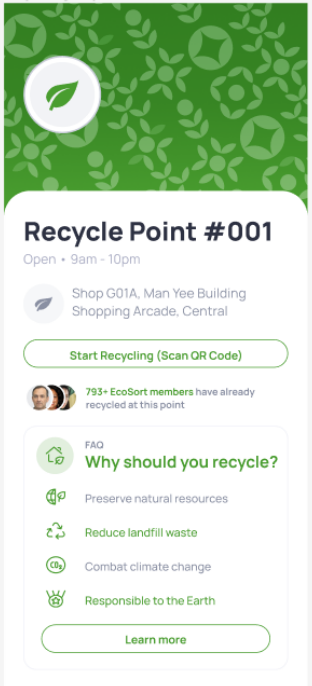
map-find-location



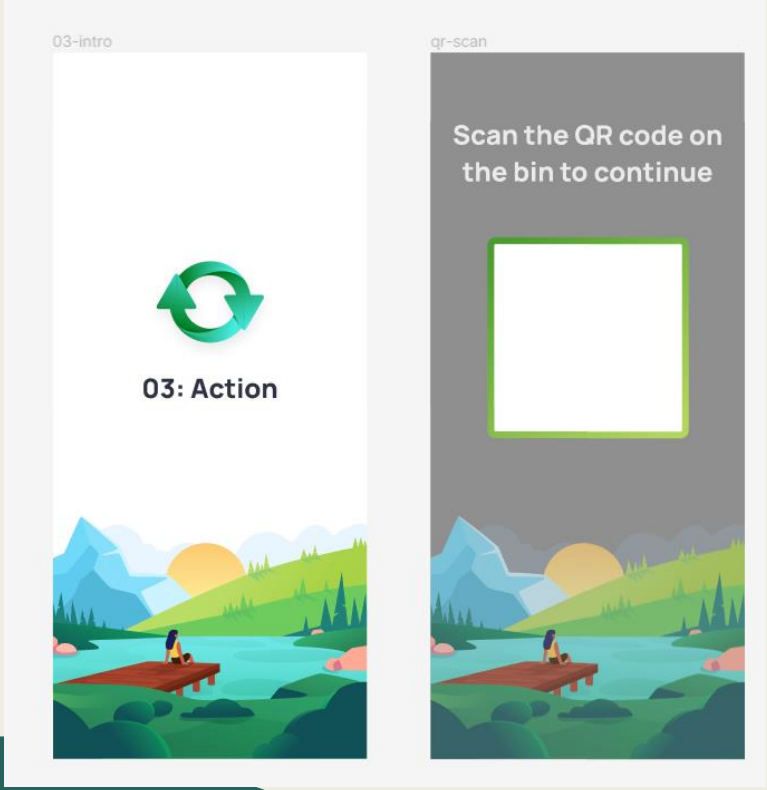
map-shop-details

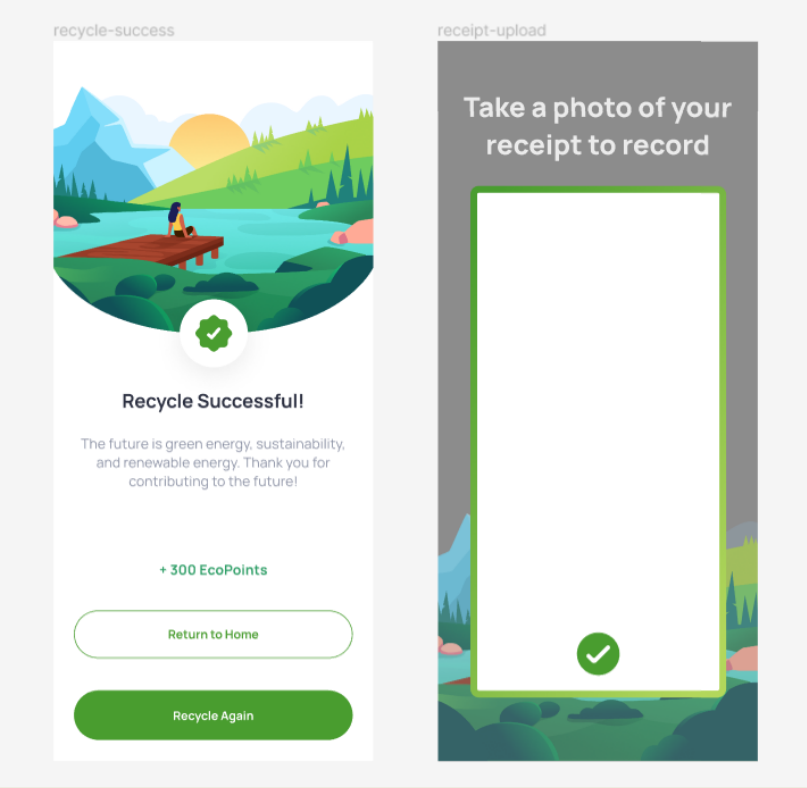


map-recyclepoint-details

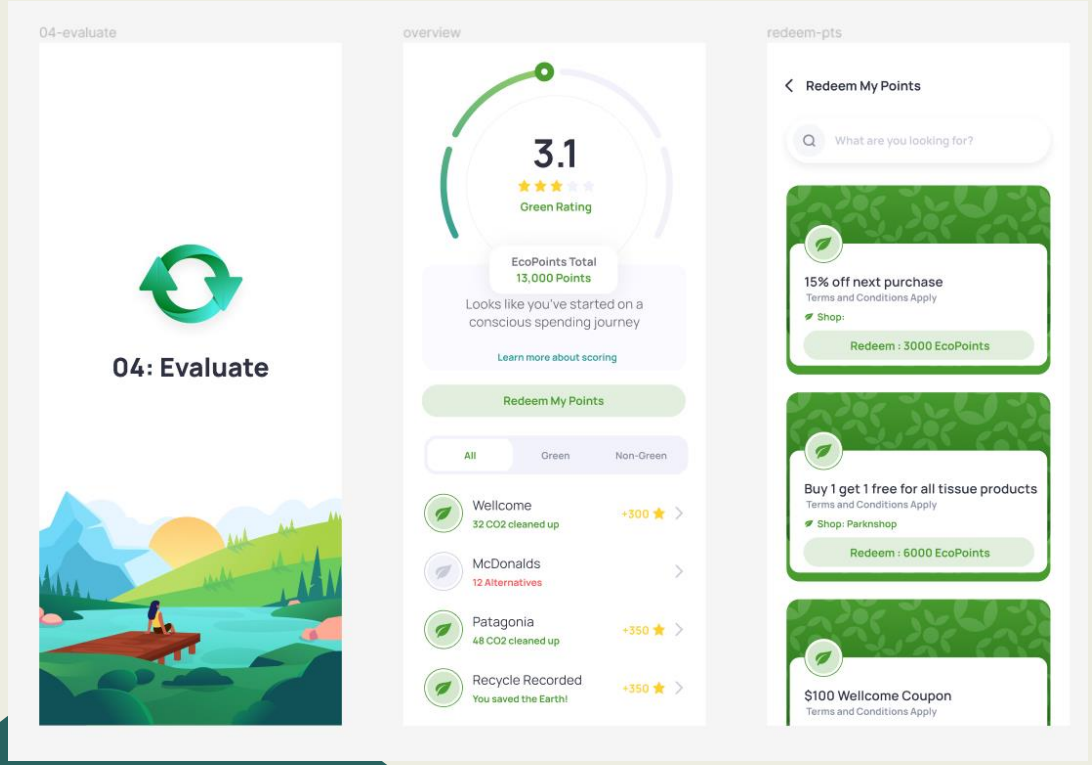


03 : Action


03-intro
03: Action
qr-scan
Scan the QR code on the bin to continue


recycle-success
Recycle Successful!
The future is green energy, sustainability, and renewable energy. Thank you for contributing to the future!
+ 300 EcoPoints
Return to Home
Recycle Again
receipt-upload
Take a photo of your receipt to record

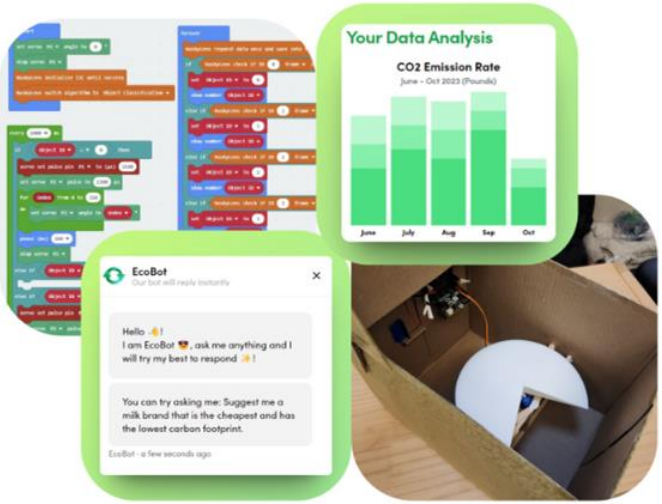
04 : Analytics / Leaderboard / Redeem



Hong Kong School Project

St. Paul's College

Green Knights



Building a better future for our next generation - a smart bin and green app that collects big data for insights and analysis and promotes green lifestyle with help of AI

SPC Steam Team
steam@spc.edu.hk
Mr. P.Y. Chan

Hong Kong School Project

St. Paul's College 聖保羅書院

Est. 1851

CASEE

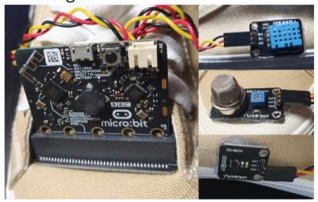
(The Canary, Alert System for Enclosed Environments)

What is CASEE?

CASEE is a IoT system of hardware that senses the environment, exchanges the data and alerts users of potential hazards.

The basic form of CASEE:

- **Sensor Shoe +** with temperature, humidity and gas sensors to alert users of nearby danger

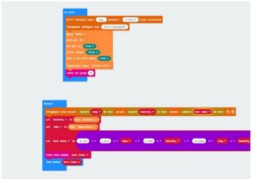


Why CASEE?

Many accidents happen in Hong Kong are related to **Occupational Health and Safety (OSH)**. CASEE wants to prevent this by **warning** workers, and more users of danger ahead.

How is CASEE made?

CASEE is made with **micro:bits**, **coded** and connected to various **sensors** such as temperature, humidity and gas sensors.....
More modules can be added according to need, so it has a **high flexibility**!



SMALL IS CASEE... UNLIMITED ARE THE POSSIBILITIES!

SCAN FOR MORE!

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5G nuMultiMedia LTD
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Teaching &
Learning Tech
South Hall
THE WORLD'S MOST EFFECTIVE
5G SOLUTION FOR DRONES
DUAL NETWORK
5G Real-time AI3D Modelling
AI Robot Dog: GO2
AOPA
The largest and most influential aviation community in the world.

Thank you