

'Smart City Project Programme 18-19' Briefing Session

2017/18 Winning Teams' Experience sharing

Topic: Making a smart recycling bin

SKH Tang Shiu Kin Secondary School

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19 Dec 2018

Outstanding Smart City Award (Junior Secondary)

Theme: Smart Community

Topic: Smart Recycling Bin



Identify an environmental problem in the Wan Chai community

Overflow of recyclables from the recycle bins



Wrong sort of recyclable
in the respective bin



Analyse the problems

Problems

**Overflow of
recyclables from
the recycle bins**



**Wrong sort of
recyclable in the
respective bin**



Causes of the Problems

- **Waste collectors: Not know when the recycle bins are full**
- **Citizens: Not know where the other recycle bins are when the nearest one is full**
- **Citizens: Lack of education and public awareness; for convenience**

Causes of the Problems

- **Waste collectors:** Not know when the recycle bins are full
- **Citizens:** Not know where the other recycle bins are when the nearest one is full

- **Citizens:** Lack of education and public awareness; for convenience

Proposed Solutions

- Remind FEHD or LCSD when the recycle bins are 75% full
- Tell the citizens not to dispose of recyclable when the recycle bin is 75% full
- Provide the information about the location of the recycle bins nearby

- Give reminders to the citizens about the importance of proper sorting of recyclable

Ultimate goal of the design

- Remind FEHD or LCSD when the recycle bins are 75% full
- Tell the citizens not to dispose recyclable when the recycle bin is 75% full
- Provide the information about the location of the recycle bins nearby
- Give reminders to the citizens about the importance of proper sorting of recyclable

Application of knowledge about climate change

↓ decrease on landfill

↓ the emission of methane

↓ climate change

Plan the design

- Give reminders to the citizens about the importance of proper sorting of recyclable

- Tell the citizens not to dispose of recyclable when the recycle bin is 75% full

- Remind FEHD or LCSD when the recycle bins are 75% full

- Provide the information about the location of the recycle bins nearby

How to do?

- Use human sensor
- Use LED display

- Use ultrasound sensor
- Use the buzzer
- Change light colour

- Use ultrasound sensor
- Use Internet of Things (IoT)

- Write an app using ArcGIS online

Draft the design

External design

LED display

Everyone is responsible for environmental protection.
Please separate your waste for recycling.

Buzzer



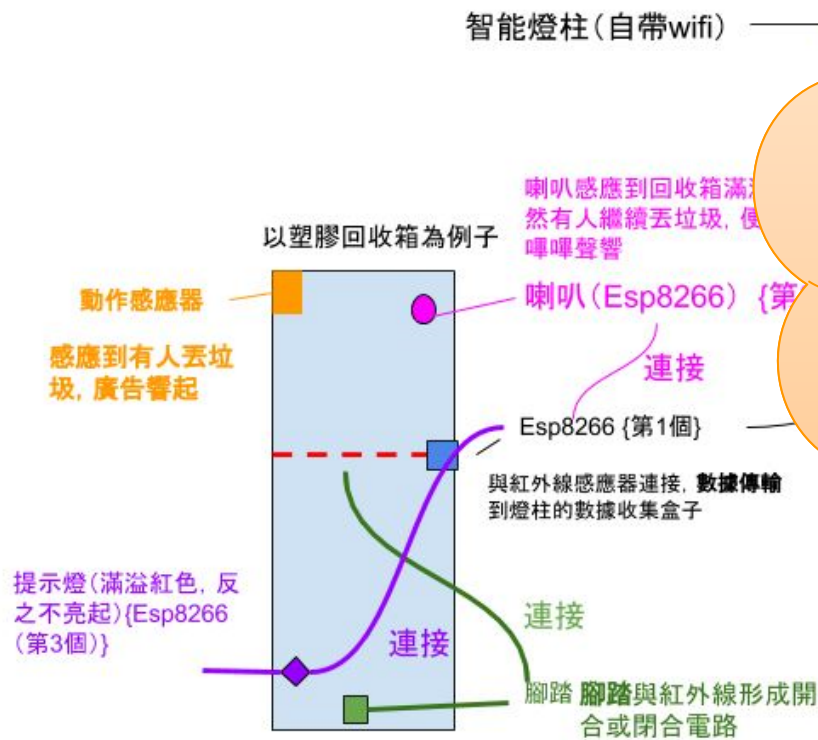
Human sensor

Electricity supply

Green light



Internal design



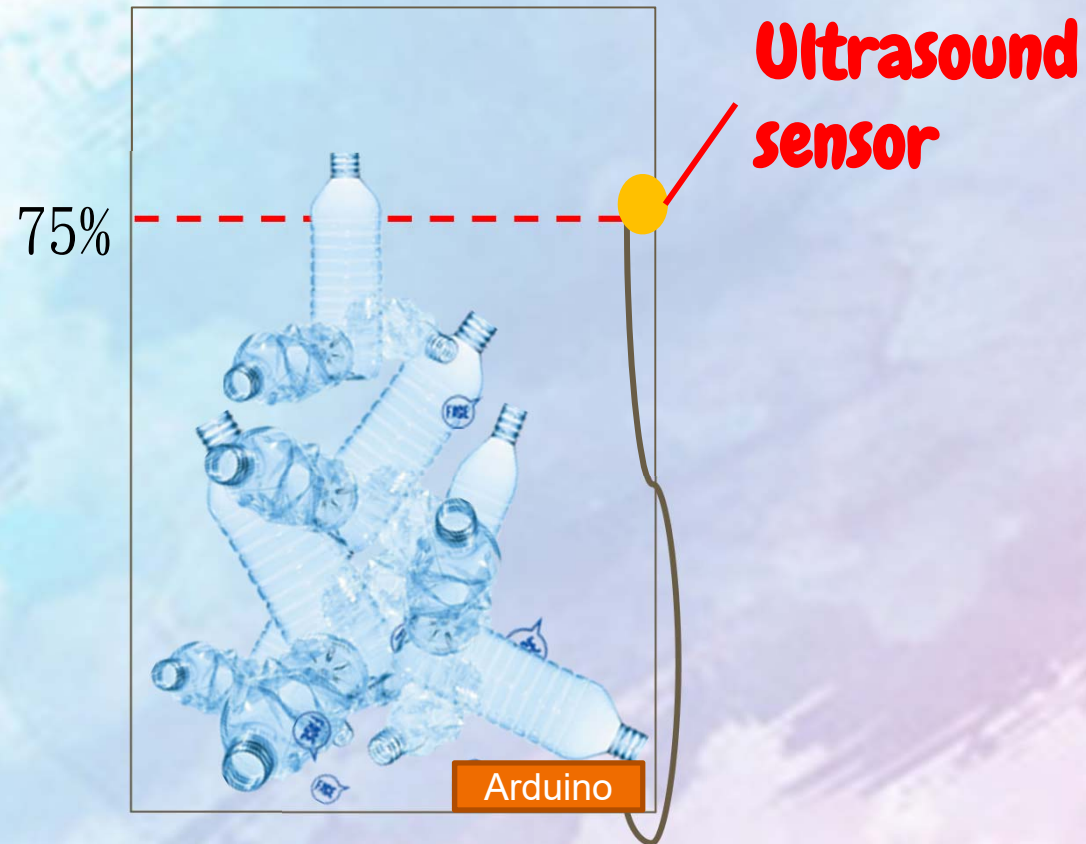
1. What items are involved?
2. What are their functions?
3. How are they connected?
4. Where does the power come from? How does the electricity flow?
5. How does the information / data flow?

Make the smart recycling bin

1. Buy a rubbish bin and other materials
2. Cut part of the exterior surface of the rubbish bin
3. Decorate the exterior surface
4. Install human sensor and record the reminder
5. Install LED display



6. Install ultrasound sensor

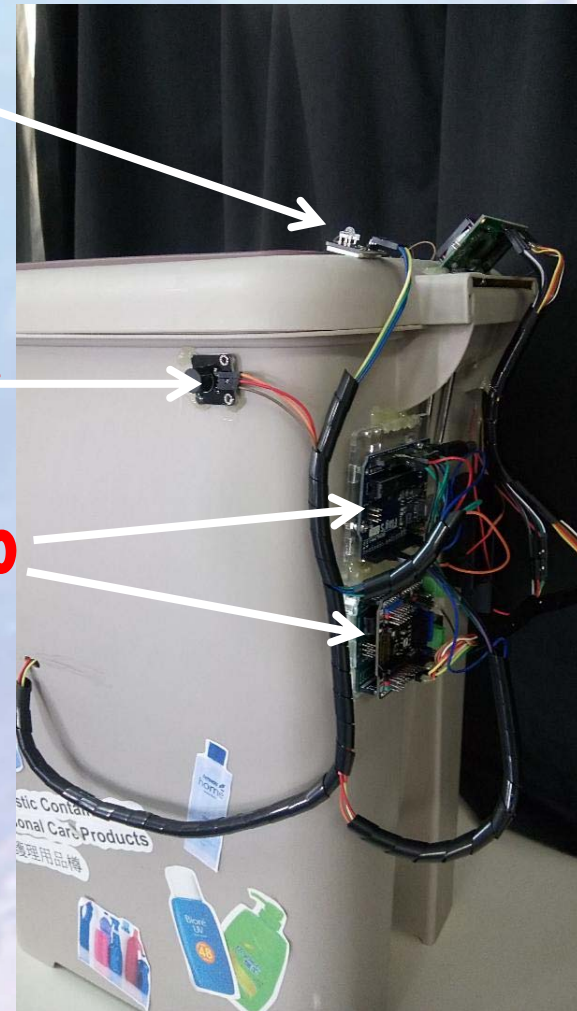


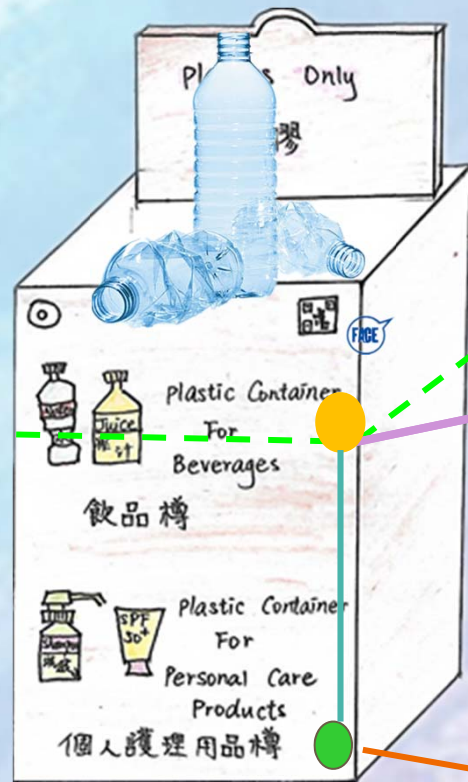
7. Install buzzer, light, & Arduino, and connect them
8. Write, try out and then refine the programme until it can work

Light

Buzzer

Arduino



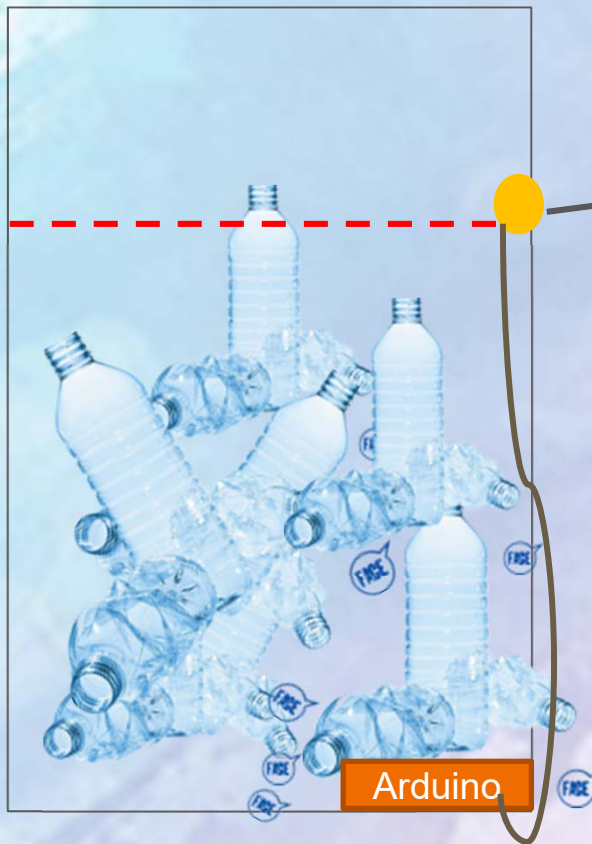


Ultrasound sensor
will not function
when the recycle
bin is open

Green light

When the recycling bin is 75% or above full

75%



The ultrasound sensor will send a message to the Arduino which is a microprocessor.

When the recycling bin is 75% or above full

The buzzer will make a buzzing sound.



The green light will turn red.

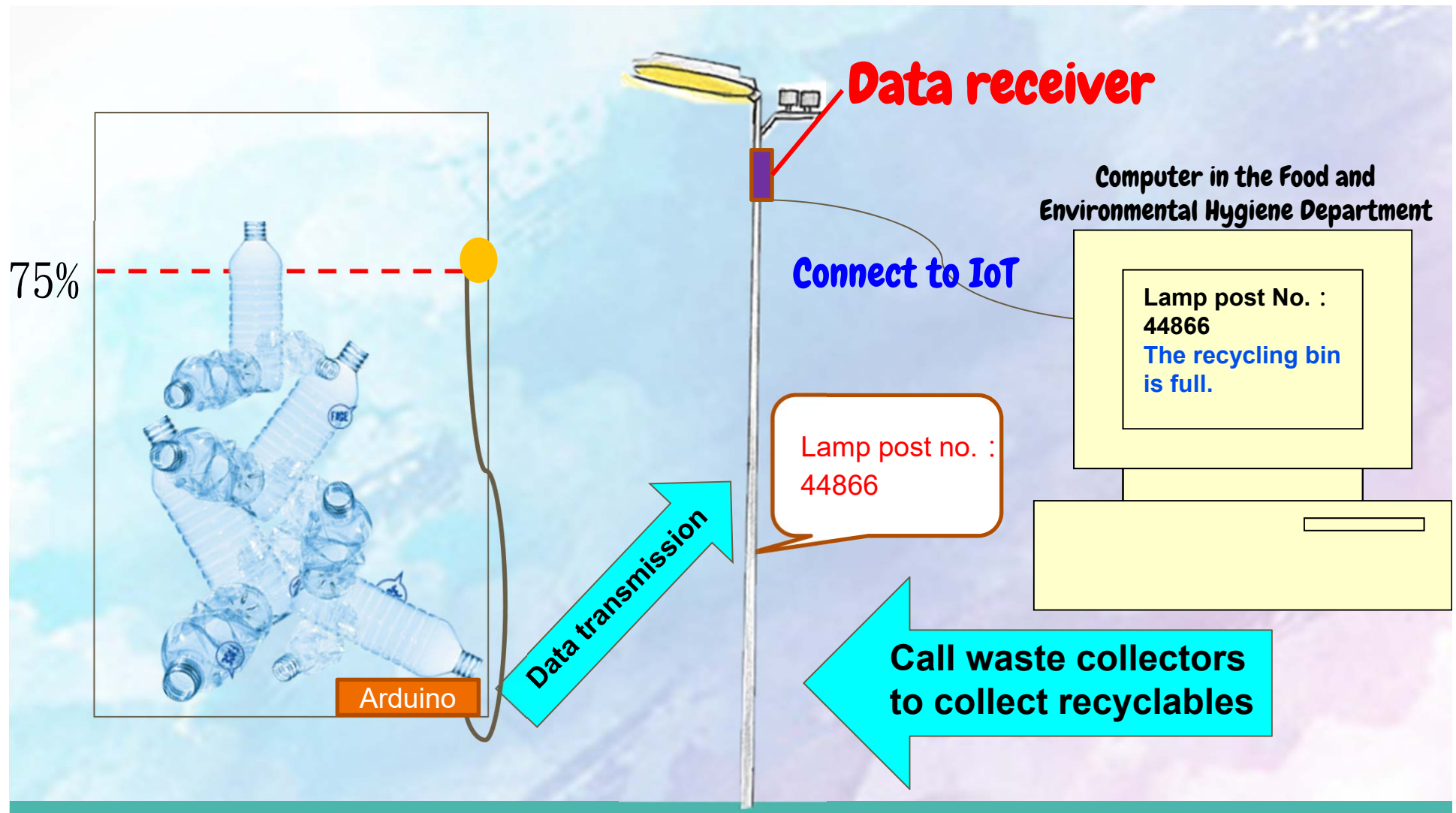


When the recycling bin is 75% or above full



Data receiver

The Arduino will send the message to the lamp post.



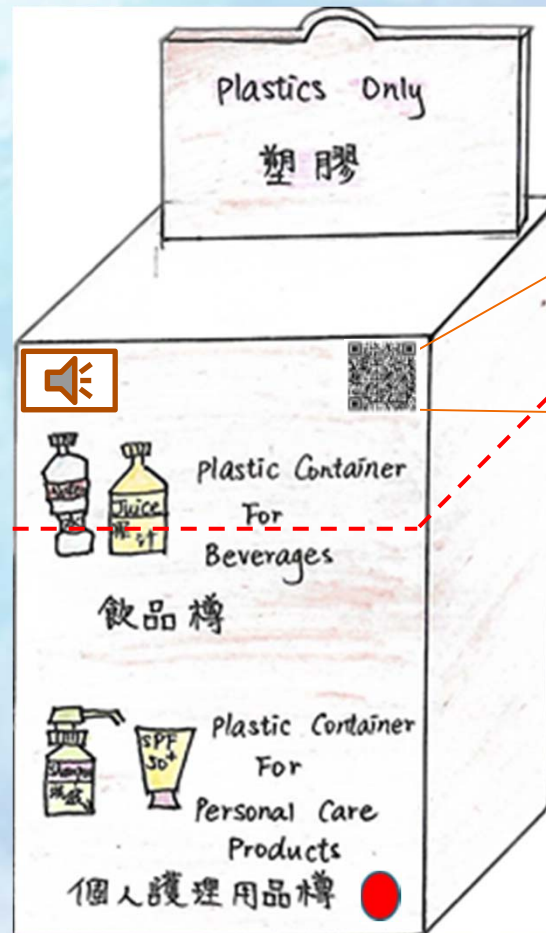
9. Write an app using ArcGIS online

Home ▾ Recycling points in Wan Chai



- Get the message from the Arduino in each recycle bin in Wan Chai
- Reflect whether each recycle bin is 75% full on the map
- Find the location of plastic recycling points which are not full
- Locate the nearest plastic recycling points with route

10. Generate the QR code and paste it on the recycle bin





Navigation



方向
大王東街
Summary of Nearest Features (Walking Time)



00:01
小时 分钟
0.07英里

1. 从起 香港灣仔大王東街发
下午 12:32 GMT+0800
2. 向东北前行 大王東街 Tai Wong St 行駛 莊士敦道
0.04 mi · 1 分钟
3. 右轉進 莊士敦道 Johnston Rd
0.03 mi
4. 到达左側終 大家樂
0.07 mi · 1 分钟
下午 12:34 GMT+0800

提供的方向仅供规划之用，受 Esri 使用条款的限制。可能存在动态路况，导致您的方向与实际方向有所偏差，您必须将实际交通标志和法律限制考虑在内。您将自行承担所有的使用风险。

Apply the knowledge and skills for design work



Knowledge
and skills
from STEM
education

Knowledge
and skills
from IT in
education

- **Energy input and output**
- **Make the model**
- **Design an app using ArcGIS online**

- **Programming**
- **IoT**
- **GIS**

Students' reflection

1. Learning more knowledge from STEM education

2. Good time management

3. Teamwork spirit and good communication skills

