Environmental Protection Administration
Executive Yuan, R.O.C. (TAIWAN)
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Strategy for Deploying Environmental Quality Sensors as Environmental Internet of Things in Taiwan

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Abstract

The issues of fine particle matter and water pollution raise the awareness of the public on environmental quality recently. The conventional deployment of environmental quality monitoring stations is insufficient to support the varied demands arranging from the high-solution industrial pollution monitoring to local environment or community protection. Since the technological barrier and the price of environmental sensors have reduced, the implementation of environmental Internet of Things (EIOT) becomes possible now. TEPA (Environmental Protection Administration in Taiwan) now devises a 4-year strategy for deploying the environmental quality sensors including the deployment schedule, the verification center development, the data center, and the information application for the law enforcement. A preliminary allocation analysis is presented to simulate the sensor deployment in three monitoring density levels. A real case is also demonstrated herein to showcase how TEPA applies the EIOT to identify the pollution source that violated the regulation and was punished afterwards.

Preliminary allocation analysis and a real case

Background

High-priced Monitoring Stations

Satisfy the demand for EIOT

Insufficient Time and Space resolution

Improve the scale of air quality prediction

Difficult for Local Environmental Management

Implement smart environmental law enforcement

To improve

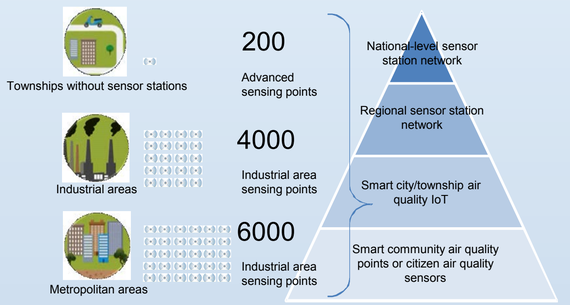
Detailed Information

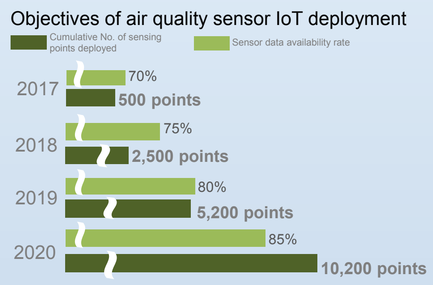
Local Forecast

Emergency Response

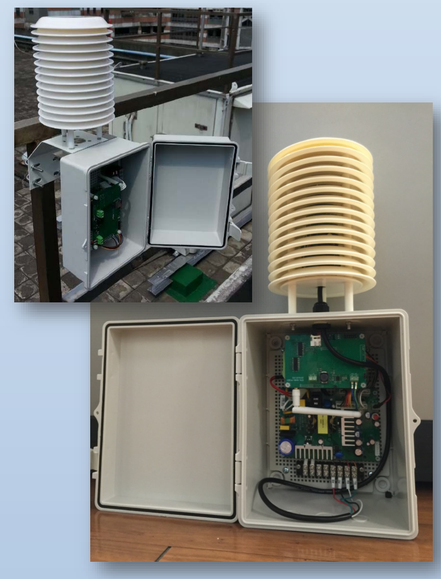
Management of Env. Issues

- **Develop Air Quality Sensing IoT**
  - Deploy 10,200 sets of air quality IoT sensors for major Industrial area, metro area and lacking of sensors towns in Taiwan
  - Establish smart data analysis and application system

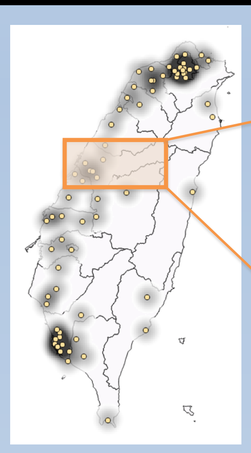


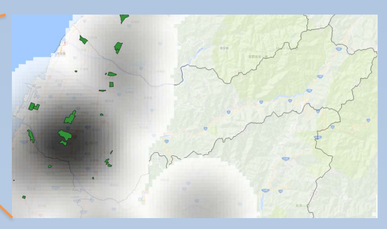


- **Length: 180 mm; width: 265 mm; height: 460 mm**
- **Capable of measuring temperature, humidity, O_3, CO, PM2.5, noise, and VOC**
- **Components:**
  1. **Main module**: Equipped with a power supply module, backup battery, control board, radio transmitter module, memory card, and terminal panel.
  2. **Radiation shield**: Equipped with a sensor board and various types of sensor components.
  3. **Mounting**: A U-shaped ring or stainless steel tube bundle is used to secure the sensor to the utility pole.
  4. **Power requirement**: 110/220V AC, 1A.



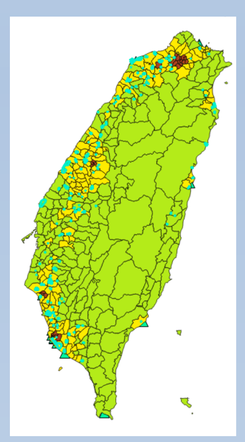
Allocation analysis





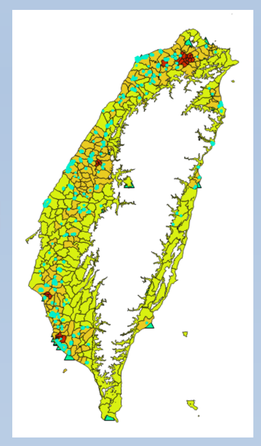
EIOT can fill the areas the conventional monitoring stations cannot cover

76 conventional monitors and their monitoring area (15km)

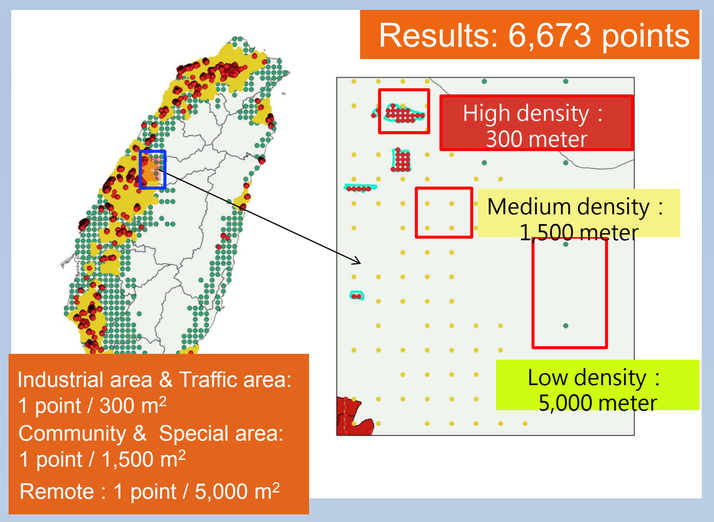


Population density

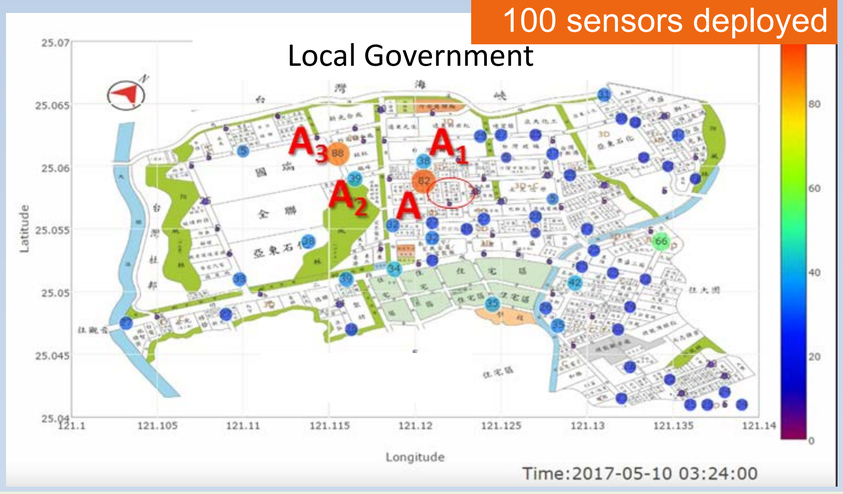
500m-up areas

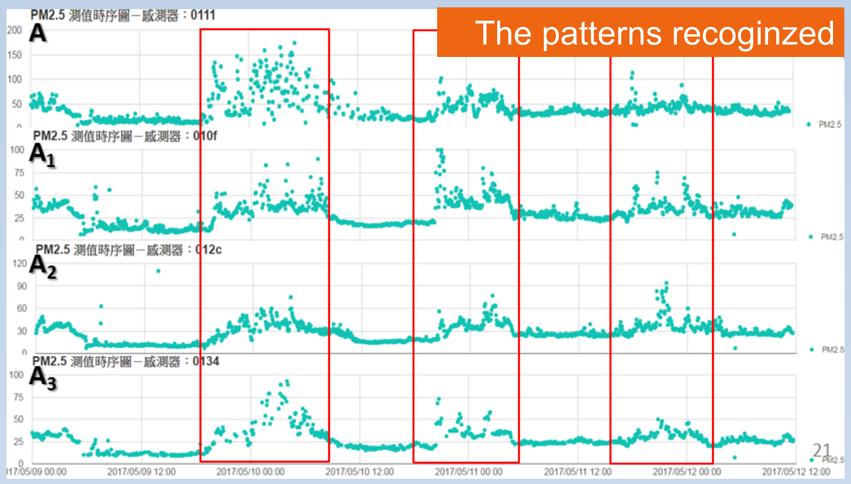


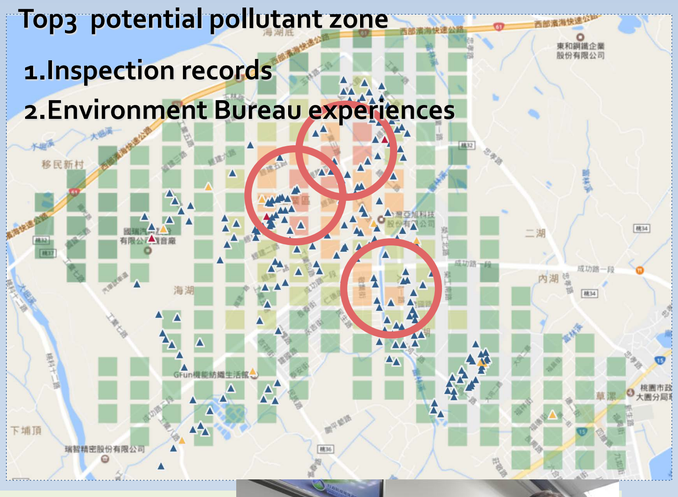
Final map for analysis



Case: Identify the polluting hotspots and the suspects







Conclusion

- In the preliminary allocation analysis, the deploying estimation of air sensors, including the locations and the amount, can be the base of the TEPA's EIOT strategy. When higher resolution of deployment is necessary, the deploying amount and the relevant cost can be evaluated quickly by modifying the analysis process.
- The case in local government cooperation showcases how to integrate the data analysis and the law enforcement to track down the illegal company. This case proves the integration of EIOT and the public sector can improve the inspection effectiveness.

Data Source : Chinatimes (2017.08.07)