香港教育大學
The Education University of Hong Kong

Pedagogies and practices for conducting creative hands-on and minds-on STEM activities through an innovative, multi-purpose and low-cost device

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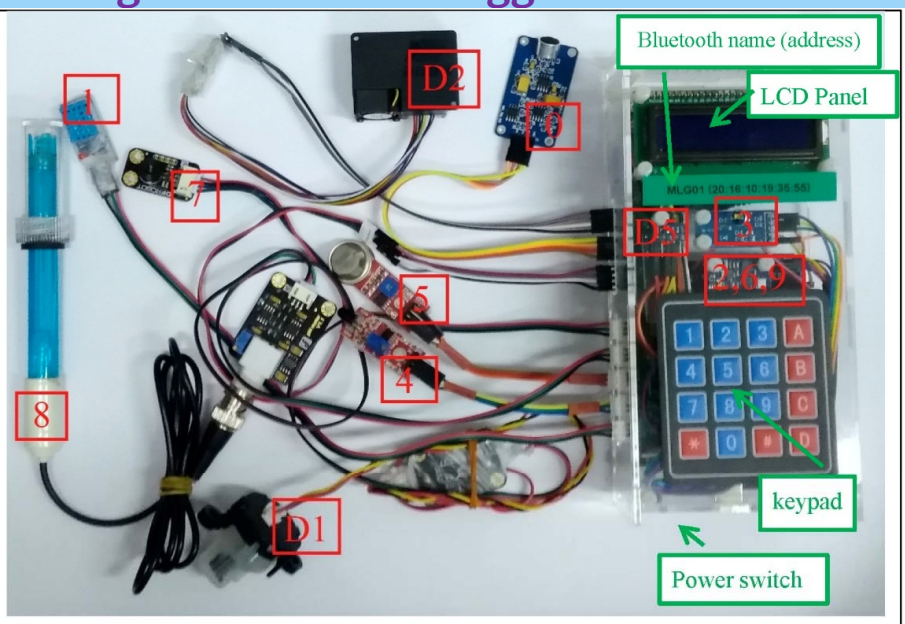
Design of the Mobile Logger

Instructions:

After powering on the mobile logger for 10s, press a suitable button in the keypad:

1 = Temp & humidity (S#1)
2 = Air pressure, altitude and temp
3 = Light intensity
4 = IR flame level (S#2)
5 = Gas level (S#3)
6 = Compass direction and magnetic field
7 = IR object surface temp (S#6)
8 = pH sensor (S#4)
9 = inclination angles of the logger (static) or 3D accel. (moving)
0 = Sound level (S#7)



* = Help
\# = Re-activate the sleeping LCD panel
A = Re-take previous measurement
B = Break the continuous measurement mode
C = Continuous measurement mode
D = Prefix for special sensors or commands
D1= Turbidity (S#5); D2= PM 2.5 sensor (S#8)
D3= CO_2 concentration (S#7);
D4= O_2 concentration (S#5); D5= UV intensity
DC = Clear LCD; DB = Reboot

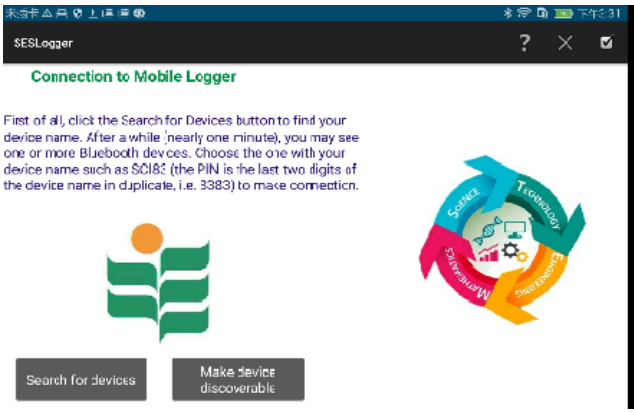
S# refers to the slot number to plug in the external sensor.

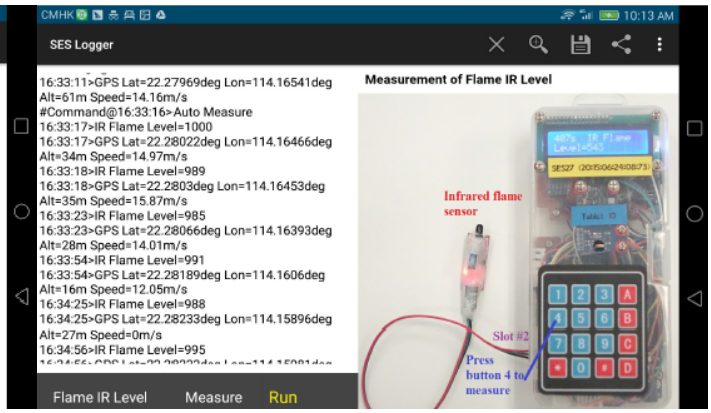
Underlying Technology and Pedagogical Features

- *built upon the open-source microcontroller platform called Arduino mega board and a number of sensors*
- *a new operating system for the mobile logger was specifically developed in which the students can simply press a keypad number to measure*
- *An Android app called SESlogger (with thousand lines of code in total) was coded for easy use of the system in which it can*
  1. *Provide a user-friendly graphical interface (with corresponding photo of sensor and connection) for students' easy and remote control of the device.*
  2. *Make use of the GPS function of the smart phone to add geographical information for the place of data collection.*
  3. *Automatically collect data for a long period time with plotting of the corresponding graph.*
  4. *Draw Google maps for a holistic view of data*

Connecting mobile logger with an android app called seslogger

1. In the Settings of an Android device, power on its Bluetooth
2. Pair the Bluetooth with your mobile logger (note its address SESXY) and input the password: XYXY
3. Launch the App called SESLogger.
4. Click the "Connect Logger" button and select the right Bluetooth of your logger.
5. Press any button in the IR keypad to send sensor readings to your Android device.
6. If it is in the Continuous mode (i.e. → key already pressed), you need to press the OK button to send the current reading to the App.
7. Download from http://has.eduhk.hk/seslogger/

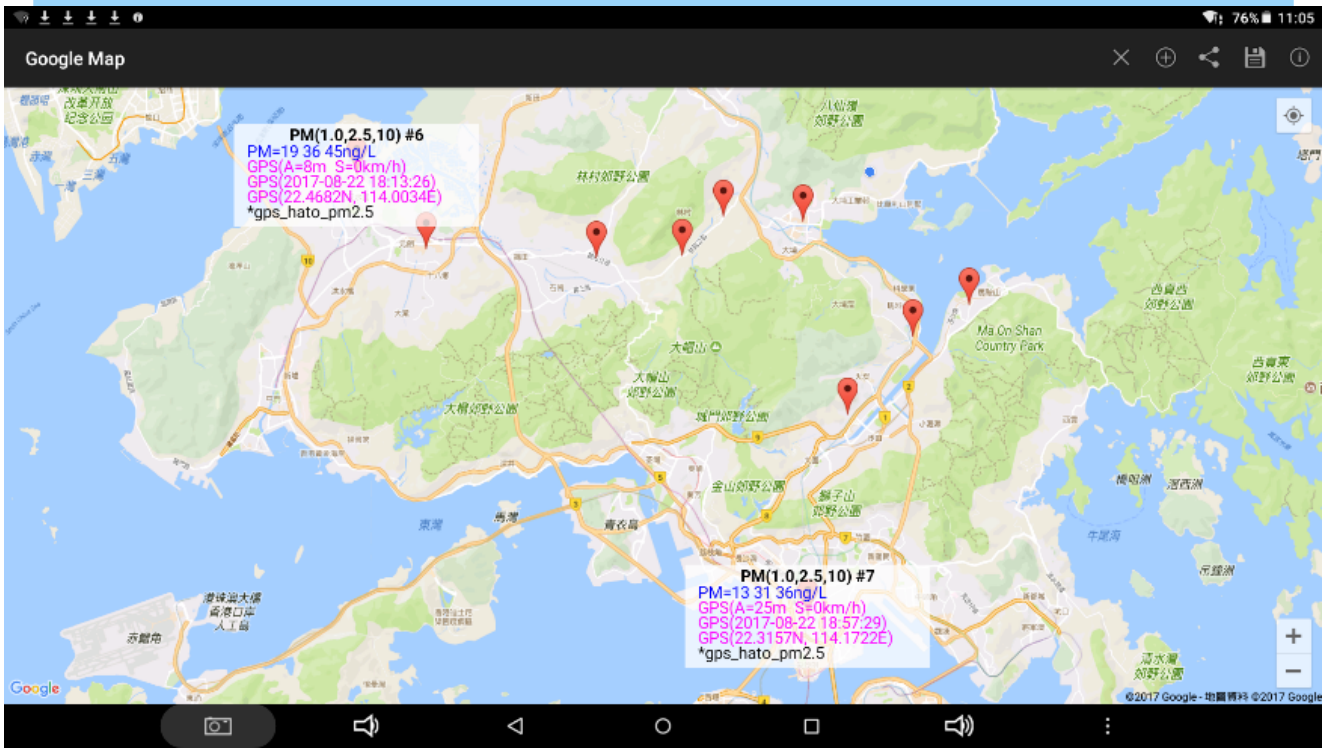




Gold Medal + Special Inventor Award in 2017 International Invention Innovation Competition in Canada

Silver Medal in 2018 International Exhibition of Inventions of Geneva

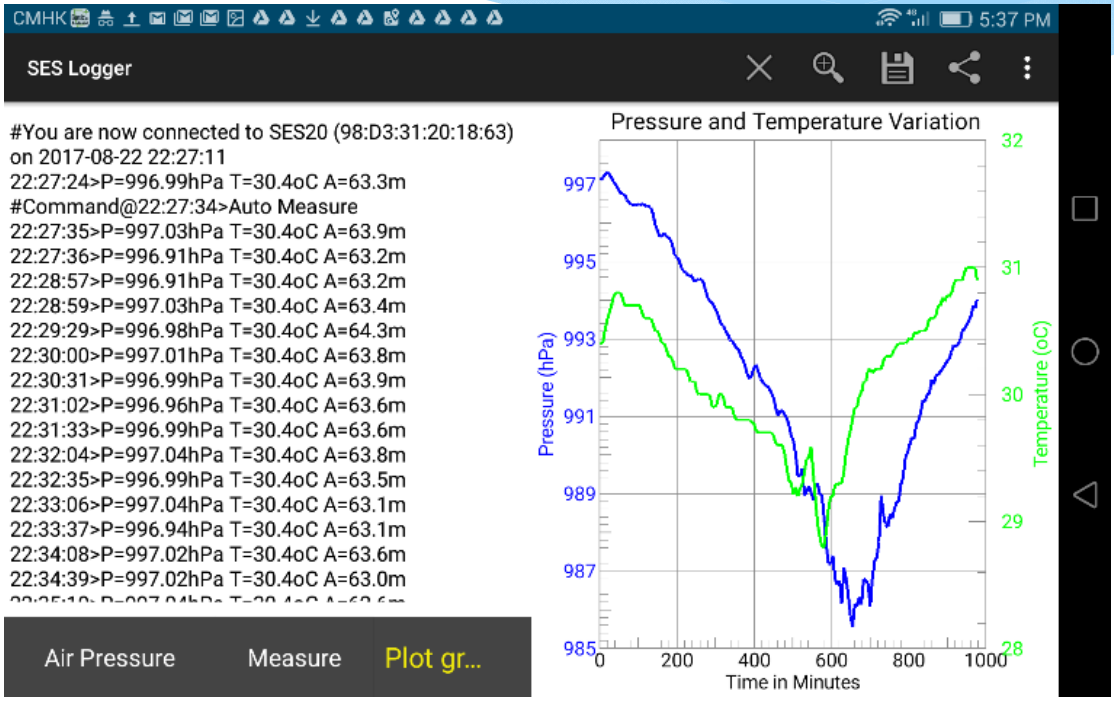
Collaborative learning through instant sharing of data to construct a Google map for holistic analysis



Direct comparison of the authentic data in a Google map for the air pollutant concentrations collected in various places of HK when the typhoon Hato was approaching on 22 August 2017

Long-time automatic collection of data and graph plotting

Real-time graph for the variation of air pressure when the tropical cyclone called Hato was approaching and departing from Hong Kong over a period of 16 hours (22-23 August 2017).

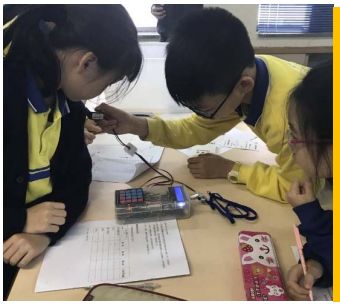


Use for training teachers and students in STEM education at EdUHK and schools

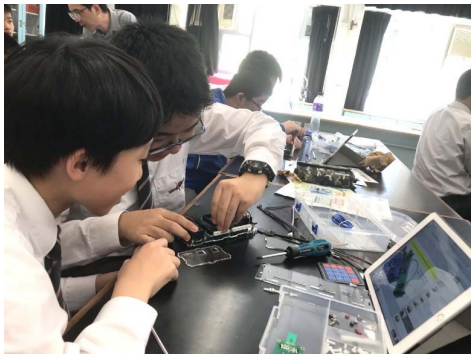
U students conducted investigations

Training workshop for primary General Studies teachers

Students assembled the devices by themselves in STEM workshops



Primary school students carried out scientific investigations within and outside the classroom

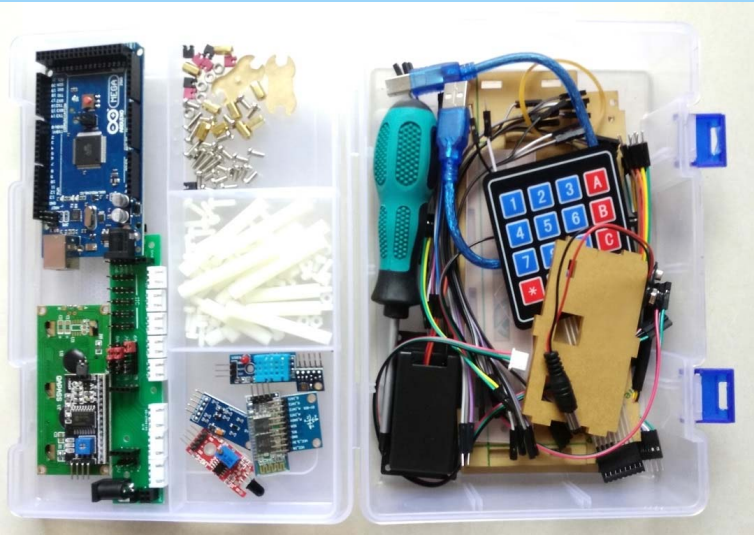


Selected activities of the STEM Olympiad 2016

Use of the mobile logger and related app in Hong Kong STEM Olympiad 2016 competition as participated by 600 secondary school students and over 100 school teachers.

https://www.eduhk.hk/stemo/

Assembling Mobile Logger by Yourself



Updated information (including the operating system and app as free for download) is available at:

http://has.eduhk.hk/seslogger/

Welcome to send feedback or comments by email to yyyeung@eduhk.hk