IoT, Big Data and AI: Innovating STEM Teaching Through Strengthening Teacher Professionalisation

Technical Training Session #5:
"Hands on Interactive Session on the Use of ScienceScope's IoT Devices"

Wednesday, 3 November 2021 | 13:30 – 16:00 (CEST)

Join Us at the Technical Training Session:
https://zoom.us/j/437007825?pwd=K2I2QU1FdWFkN3YzWEFwNzMrUjBFUT09
Password: classnet

Introduction

This session is about using the knowledge learnt from the previous 2 sessions. The aim of this session is to help guide you through the creation of lesson materials for the Exploratory. We will split the team into 2 groups where each group will take what they have learnt and create a new learning resource.

An example template has been provided which can be used if you wish.

About the Speakers & Facilitators

Dr David CRELLIN
CEO & Founder
ScienceScope Ltd

David was educated at the University of Bristol and the University of Cambridge. He has over 30 years of expertise in the EdTech sector, ranging from consultancy, research to entrepreneurship. David holds directorships in EdTech businesses in the UK, South Africa and Singapore. As the founder of ScienceScope, he collaborated with BBC on a nationwide and award winning micro:bit project.

Mr Josh WRIGHT
Software Engineer
ScienceScope Ltd

Josh is currently a Software Engineer at the ScienceScope Limited. He graduated from the University of Bath with BSc Honours in Computing in 2016. He is responsible for the overseeing of the design, implementation, and development of ScienceScope's IoT sensor system (IoT @ School) built on the Microsoft Azure platform. He is also responsible for conducting research in different sensing solutions and how new sensors can be integrated in the ScienceScope system during the product development phase. It includes the design and testing prototypes which could then become a finalised product. Joshua is also specialised in using 3D design software and 3D printers to rapidly prototype the designs and ideas while maintaining the lower cost of development.

Recommended Reading List

https://www.influxdata.com/what-is-time-series-data/

https://www.gartner.com/en/information-technology/glossary/iot-platforms

https://searchcloudcomputing.techtarget.com/definition/Windows-Azure

https://www.telenorconnexion.com/iot-insights/what-is-iot-guide/

https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/research/library-and-archive/library/publications/factsheets/factsheet_14-microclimates.pdf

Template

Comparing the Temperatures Measured by Different sensors Within a Room

Intentions

Develop a strategy for analysing complex graphs by breaking the task down into simple steps Plan effective data collection by considering the positioning of sensors

Preparation

Sensors should be placed in a room, at different heights above the ground. Data needs to be collected for at least five days before the lesson.

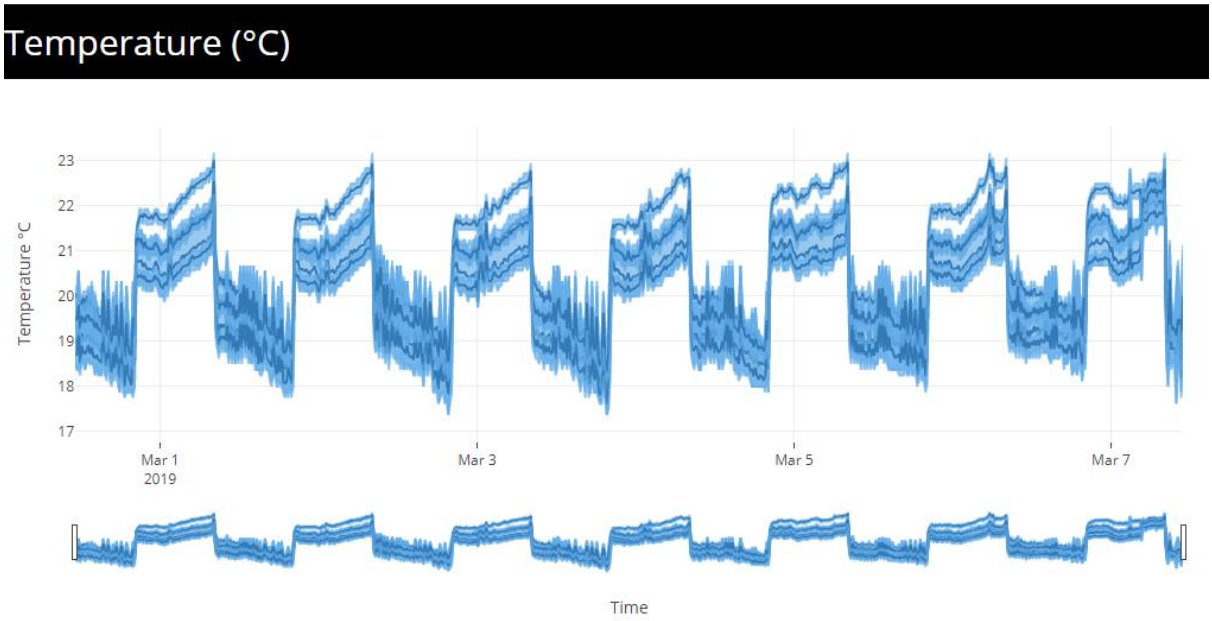
Collecting the data set

Data can be collected from the IoT@School Exploratory which can be found at the following URL https://exploratory.sciencescope.uk/exploratory/. There are a wide range of devices collecting data from location around the world that can be utilized for this investigation. Always select similar devices and sensors for comparison to ensure the results are as clear as possible.

Example data can be found at the following URL link;

https://exploratory.sciencescope.uk/graphing/?deviceID=MB102908&startTime=2019-02-28T11:05:30&endTime=2019-03-07T11:05:30&attempt=0&interval=15

This data selection includes a total of 5 temperature sensors placed at different heights and locations within a classroom in Singapore.



Learning activities

The following scientific analysis activities with pupils would be useful:

1. Pupils describe the pattern of temperature change over a 24 hour period, looking at the data from just one sensor, to ensure that pupils know how to use the graphs to identify patterns and trends.
2. Pupils then explain the patterns detected, within the 24 hour period of the graph from the same sensor.
3. Increase the complexity of the task by comparing the pattern shown by each of the temperature sensors over the same 24 hour period. Pupils should be able to suggest reasons for the differences between the sensor readings if you explain where the sensors were located.
4. Then analyse the pattern over other days in the data collection period to find out if the same patterns existed on each day.
5. Explain the Stats tab on the data set, particularly the values for ‘mean’, 'minimum’ and ‘maximum’. Use this data plus data from the graph to report any significant differences in temperature over the period of data collection.

Taking it further

This detailed analysis of a small amount of data should then allow pupils to plan a further investigation in which data is collected for several weeks in different locations. I suggest setting up data collection either to compare the temperature in different parts of the school (compare two classrooms or a classroom and a corridor) or to compare inside the classroom with outside the classroom. It will not need temperature sensors to be placed at different heights, now that pupils understand how position can influence the data collected, but they do need to use this information when planning where to place the sensors.