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STEMVIRONMENT ECO-SENSORS CHALLENGE

Sharing the amazing eco-sensor inventions from 5 Cornish schools and celebrating these future change-makers!



Awesome eco-sensors

BY SUZANNE MANSON

Over the last few months, I've had the absolute privilege to meet some future innovators, engineers and coders at 5 Cornish schools as part of the STEMvironment challenge. In the first workshop I delivered, the children learnt about awesome eco-sensors which help us see the invisible in our environment such as temperature, light, air quality and water quality. The children practised their coding skills and created two eco-sensors using bbc micro:bits. We had a lot of fun running around the playground trying to find the coldest temperature and inside the classroom to find the biggest variance in light level when the lights were switched on and off. Hopefully we inspired the children through hands-on learning and by explaining all the exciting Cornish jobs available in engineering, tech and creative-digital.

But the best bit was supporting them with coming up with their own awesome eco-sensor invention and then returning to the school with their prototype. Read on to find out more about each school's invention!



Amazing Inventions at a glance

Breage School

Improving wellbeing at school by introducing healthy plants

Marlborough School

Monitoring the water quality at Swanpool Beach

Nanstallon School

Ensuring the classroom air quality and flow is ideal for learning

Probus School

A weather station to check if the UV rays outside are strong

Treverbyn School

Keeping classroom plants healthy with a self-watering plant station

STEMvironment was made possible by:



Breage School

Following the ideation session (fancy word for the generation of lots of invention ideas!) Blue class decided they wanted more healthy green plants in their classroom to support mental wellbeing and reduce air pollution. However, they were concerned that the plants may not get watered if no one was around or they may not remember to water them. They wanted to use an eco-sensor to monitor the soil moisture and let them know when the plants needed watering. They also wanted to collect data to see if having healthy plants in the classroom contributes to better mental wellbeing.



When TECgirls returned to the school, we brought with us some exciting kit and plants:



Blue class practiced their coding again and created two self watering plant systems, a soil moisture alarm and coded a micro:bit to act as a survey counter. This counter was to measure feedback on whether the plants improved well-being. The class needed to adjust their code and the length of the tube to ensure the plant watering system was effective and learnt about product iteration in the process. We needed lots of paper towels to mop up the water once it was working!

The class loved....

All of the coding on micro:bits

I learnt things that I never knew and it was so much fun.

Making ideas for the plants

"I loved the real world problem solving for our classroom. Seeing the process and living the process of solution based engineering."

TEACHING STAFF

Marlborough School

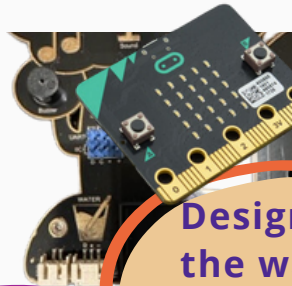
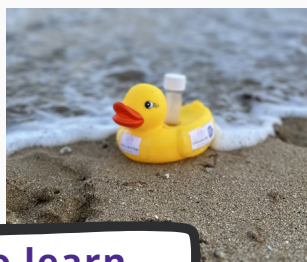
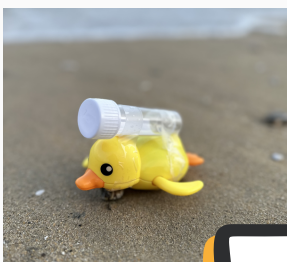


Marlborough school is situated close to Swanpool beach which unfortunately has seen an increase in sewage alerts over the past year. The year 6 class therefore wanted to further investigate the water quality at the beach. They were extremely inventive with their solution and wanted to create an eco-sensor to take and measure water samples that was shaped like a duck! They wanted to collect their data so that they could write about the sewage situation to their MP and share their project with Surfers Against Sewage. They came up with a brilliant name and logo for their product - Aquameter The original!



Testing water quality for the presence of sewage is an expensive & scientific job but TECgirls returned with all the kit that could test water quality for the amount of total dissolved solids in water as well as a lesson on how the professionals test sea water quality and what they do with the data. The children also learnt about some inspiring eco-sensor projects in nearby Devon where Artificial Intelligence is being used to predict sewage events.

And the duck-shaped water collector? There were 2 prototypes and a micro:bit controlled water-quality probe that the class learnt how to code!



The class loved....

To learn that we can do anything

Testing our eco-sensors

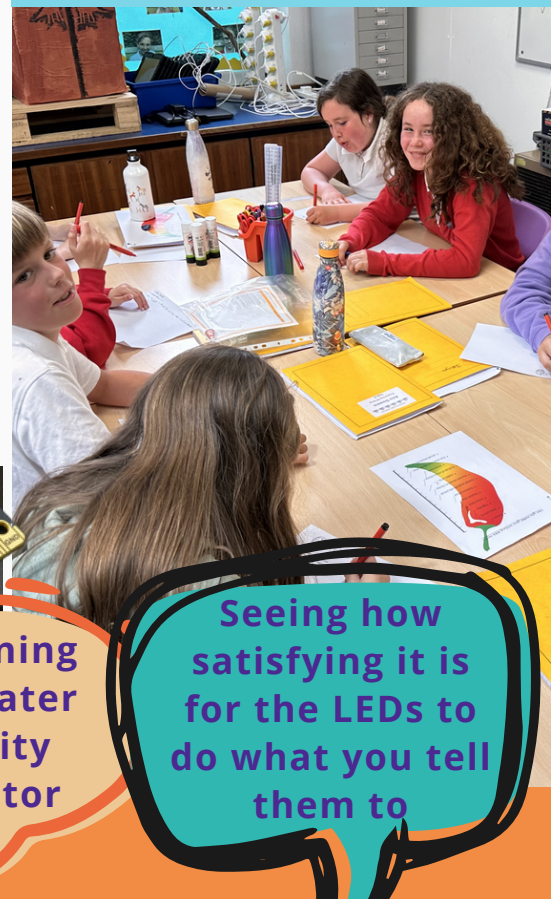
Designing the water quality monitor

Seeing how satisfying it is for the LEDs to do what you tell them to

“TECgirls was awesome. We got to use microbits and learnt how to program them. The best part was designing how we could use them.”

“Suzanne helped us design a really cool water testing kit that we are going to use to test the water at our local school. It was awesome to use this tech and learn about coding.”

TEACHING STAFF



Nanstallon School

**Air
Intake
Researcher**

We loved working with Nanstallon School - who didn't object to the odd selfie! The Year 5's were inspired by the use of eco-sensors that can see the invisible and in particular their ability to 'sense' air quality.

Their invention was the rather brilliantly named:

**Air
Intake
Researcher** ...Or AIR for short!



Nanstallon's year 5's demonstrated that they are expert micro:bit coders as they all coded some pretty advanced air quality monitors and alarms!

We learnt that air quality for our coded solution is measured in eCO₂ (equivalent CO₂) and what the reading thresholds would be to indicate healthy air in the classroom.

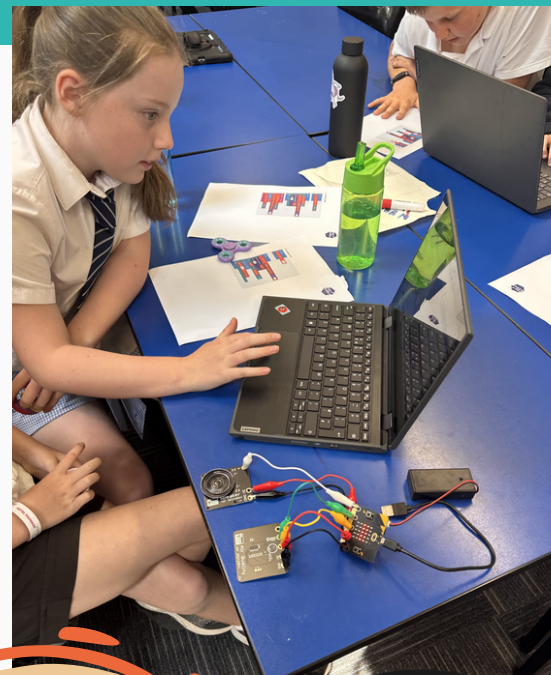
The class committed to take readings each day to see if action needs to be taken to improve area quality such as increasing ventilation and introducing more plants.

"It was a really interactive session, engaging the children constantly"

TEACHING STAFF

What would you like to do in the future?
"Probably this! I loved the coding."

PUPIL, AGE 10



I loved the coding because it was cool!

Playing with the micro:bit and designing

Creating stuff!

The class loved....

Probus School

The Year 5 class at Probus were feeling very creative for their eco-sensor workshop. They voted as a class to create a full weather station with a set of eco-sensors and in particular to detect the UV rays outside so they would know whether it was a good idea to wear sun cream and find a spot in the shade! But, they didn't invent any old eco-sensor weather station. No! They designed a fluffy, pig-shaped weather station, complete with umbrellas, clouds, lightning and sun symbols. They didn't make our job easy!



But TECgirls delivered! The Year 5 class successfully coded their weather station to read temperature, humidity and UV rays using micro:bit make code. We learnt all about how these aspects of our weather system are connected and their units of measurement.

The class are going to monitor the weather and take readings from different indoor and outdoor locations on different days and use this to find out what UV mW/cm² readings are considered low and high. They will use this to determine if hats and sun-screen are needed when playing outside!

And did it have a fluffy pig in the design? It sure did!

The best part is that the kit we left with the class is capable of lots more eco-sensor projects and we can't wait to find out what they invent next!

The class loved....

I got to create my own design!

I loved that we were able to code the micro:bits

I loved going outside and using our eco-sensor

"It was great to see the pupils challenged to find the light levels and we all loved the creative thinking exercise"

PROBUS SCHOOL



Treverbyn School

TECgirls were super-impressed with Year 4 at Treverbyn School; our youngest group on the STEMvvironment challenge. They were a very enthusiastic class and soon got to grips with coding their eco-sensors in our first workshop. They were inspired by the stories about how farmers are using agri-tech to help them run their farms and they decided that making a self-watering plant system using a soil moisture eco-sensor would be a great project for the class.



It required year-6 level coding on micro:bits, but the class were all successful at each coding part of the overall solution. Together, they produced two self-watering plant systems, a soil-moisture alarm as well as coded a micro:bit to act as a survey counter. This counter was to measure feedback on whether the plants improved well-being of people using the classroom.

Not only did they do all the coding themselves, they also successfully altered their code based on the type of plant being monitored. The fern would need more moisture than the succulent, so the code needed to reflect that.

Well done Year 4. We hope you enjoyed the workshops and we think your coding skills are amazing!

The class loved....

We got to make it!

All of it!

Watching the water come out

We got to do year 6 coding!



I loved how the children were encouraged to 'think big'. No idea was too 'out there.' Every child got to experience success of using a micro:bit.

TEACHING STAFF

"I loved that I could learn about it because I think it could help me in a future job."

PUPIL, AGE 9