**Night sensor**

**Introduction**

In this activity, students develop their understanding around road safety for children at night and explore potential solutions before planning, creating and testing a Night sensor using the BBC micro:bit.

**Time:** 60 minutes+

**Learning objectives**

* To understand the problem of road safety for children
* To explore ways technology can help children stay safe at night
* To plan, create and test a ‘Night sensor’ using the BBC micro:bit to remind children to ‘Be Safe: Be Seen!

**Materials needed:** lesson slides, large sheets of paper, MakeCode editor, micro:bits, Night sensor basic and Night sensor start-stop programs.

**Introduction: Night safety for children (5 minutes)**

* In groups or pairs, invite students to consider and share the main problems around road safety for children (**slide 2).**
* You could ask them to focus on particularly vulnerable children if you wish (e.g. children with visual or hearing impairments).

**How can technology help? (10 minutes)**

* Introduce the idea that technology could help with the problems identified (**slide 3).**
* Give groups large sheets of paper and ask them to brainstorm potential ideas – encourage them to think creatively.
* Invite groups to present their (best) ideas back to the class.

**Using the BBC micro:bit to help (10 minutes)**

* Give each group a micro:bit and ask them to consider how it could be used to help (**slide 4).** Depending on your class’ experience with micro:bit you may need to provide an introduction or a micro:bit running the ‘Night sensor’ program for them to explore.
* Invite groups to share their ideas.
* Introduce the ‘Night sensor’ and discuss how it could be used, why it might be helpful for children and especially those with hearing or visual impairments **(slide 5).**

**Algorithm for a Night sensor (10 mins+)**

* Depending on your students’ experience, you may need to introduce them to iteration, selection and variables before asking them in pairs or individually to write a pseudocode algorithm for the Night sensor program **(slide 6).**
* Invite students to test and debug their algorithm with someone else/another pair.
* Examples are given on **slide 7.**

**Programming a Night sensor (15 mins+)**

* Ask students to work in pairs or individually to write their Night sensor programs **(slide 8).**
* You may need to talk students through the MakeCode editor and using iteration, selection and variables, depending on their experience. Simple and more complex examples are given as example files and on **slide 9.**
* If working in pairs, encourage students to use paired programming and test and debug regularly.
* Once completed, ask students to download their code to a micro:bit and test out their program, debugging if necessary until they have a working version.
* Encourage them to show each other and spot any differences in their programs.

**Review (10 mins)**

* Ask students to share any problems they encountered and how they overcame them **(slide 10).**
* As a class share students’ learning from the project, highlighting aspects important for your students (e.g. terminology, programming skills, common issues etc.).

**Extension ideas**

* Students could design and create their own innovation using the micro:bit to help children stay safe at night, developing their initial ideas, or developing new ones.

**Differentiation**

**Support:**

* Students can create the basic Night sensor, with additional support in writing their algorithm or programming as required.

**Stretch & challenge:**

* Students could add additional features to their Night sensor, or create a sensor using the Python editor.

**Opportunities for assessment**

* Informal observation of students’ understanding of writing algorithms and using iteration, selection and variables.
* More formal assessment of students’ programs and final Night sensors if wished.