Fighting fires with the Internet of Things

DESIGN AND TECHNOLOGY (TEACHER NOTES)

This resource will give students a greater understanding of how to design a product that uses IoT technology.

Students will research the context of firefighting, develop, model and prototype a product that incorporates the Internet of Things (IOT) and evaluate the success of their product, reflecting on how they have worked either individually or as a team.

Delivery guidance:

We recommended that before undertaking this award, students complete the Little Big Futures, Design and technology connected future firefighter resource.

Overview of project:

Design a piece of equipment that can be used by a firefighter to demonstrate how the Internet of Things can make their lives safer and their work more efficient (eg saving time, materials, money).

Materials you need to run this project:

- access to internet
- sketching equipment
- camera to record ideas (optional)
- modelling materials (i.e. cardboard, paper, masking tape etc.)
- programmable board (i.e. micro:bit, crumble, IoT explorer kit etc.)
- contact with a fire station visit or professional firefighter (not necessity but beneficial)

	Activity	Guidance for delivery
Activity 1 **(60 mins)**	**Research**	
	Establish groups (if necessary) and assign roles within group. Introduce the project and discuss the steps required to complete the student CREST Discover Award passport. Ask students to complete research into design context. - what types of tasks do firefighters do? - what environments do they work in? (I.e. underground, at heights, in buildings, near water). - what types of equipment do they currently use? (see 1 hour resource for ideas) - what problems are there which the IoT could potentially help with?	**Primary research:** Interview a Firefighter (teacher to invite into school) or visit a Fire Station. Students could develop a list of questions to ask a Firefighter about their equipment and work. As an extension, the students could explain to the firefighter what the Internet of Things is and ask how it might enhance their work. **Secondary research:** Use the internet to look at pictures / videos of firefighters at work. Discuss with students the equipment that they see and the environments that they are working in. Students can also research products available to buy (eg helmet, harness, breathing equipment.)
Activity 2 **(75 mins)**	**Design**	
	Students to decide on which piece of equipment they would like to improve or create. Students will need to model / draw their ideas and record them for their final presentation. Modelling materials can be chosen depending on what is available and the expertise of students. Use of Computer Aided Design is also acceptable, although this may increase the time needed to complete their design ideas.	If you have contact with a firefighter, students could present their ideas and ask for feedback from their target user.
Activity 3 **(75 mins)**	**Prototype**	
	Students will need to prototype how the Internet of Things part of their idea will work. Using the technology that you have at school, consider what they can use to simulate IoT within their product? For example: - PIC Microcontroller (eg Picaxe, Genie) - Micro:bit - Crumble - Arduino - Raspberry Pi	Consider asking your computing department to support this part of the project.

Activity 4 (60 mins)	Present	
	Students to present their product and their thoughts about the project. Ensure that all documentation, including images, are arranged within the student Discovery passport for submission.	Presentation can be to class and teacher. Consider inviting an external visitor (firefighter, STEM Ambassador, Governor) to act as another assessor for the award and another source of feedback for the students.
Activity 5 (30 mins)	Evaluate	
	Students to evaluate their idea, reflecting on their experiences during the project as well as their thoughts on the product itself. Evaluations to be recorded for the CREST Discovery Awards passport.	If you have contact with a firefighter, students could ask for feedback.