LITTLE BIG FUTURES

Connected future firefighting

TEACHERS' INFORMATION GUIDE

Big question: what is the Internet of Things (IoT) and how can it help firefighting in the future?

During this activity students will look at how the IOT could have a significant impact on saving lives and further enhancing what our brave firefighters can do.

Within this journey they will look at a blend of technologies and see how designers can use the design process to develop a product/system.

Your students will need to firstly have a basic understanding of the IOT (see computing resource). Then they will explore the user needs of a modern firefighter and different available technologies. These needs will be developed into a design context. Once these are completed they will be able to develop and communicate what their product/System will look like with sketched ideas using a firefighter template. Students must remember to use colour and annotate on their designs to explain their creative thinking.

When the activities are completed you can discuss with the groups how their solution compares to a future firefighter conceptual design, taking from the internet and how their design answers the 'Big Question'?

Learning outcomes

- understand and discuss what IOT is and how it can help future firefighters
- understand and explain the design needs of a future firefighter
- develop a working understanding how to use IOT devices to develop a design context and design criteria
- develop an initial design of a future firefighter with annotation to clearly explain how the IOT devices are used

Teaching resources

- work sheet 1 – a modern firefighter work mat (A3 Size) one per group
- work sheet 2 – device cards one per group
- work sheet 3 – design context and user needs, one per group
- work sheet 4 – design template (A3 Size) 3-4 per group with spares if needed
- work Sheet 5 – Future Firefighter Discussion one per group
- cutting, sticking and sketching equipment
- post it notes for annotation, if needed
- access to CISCO branded clips via STEM Learning and other video content
- access to computers or tablets for research, if needed

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Lesson activities

(1 hour duration; may be extended if appropriate)

	Activity	Resources
Activity 1 (5 mins)	Big question: what is the IOT and how can it help firefighting in the future? Organise students into smaller groups, 2-4 per group is ideal. View all linked videos to explain the Internet of Everything. See how being able to connect products can bring huge benefits to the world and especially in joining the dots to save lives. Classroom discussion about student views on the IOT.	General Introduction of "Internet of Everything" Rock Concert application of IOT Cycling accident
Activity 2 (5 mins)	Watch video to explore the context of what fire fighters are faced with in a domestic fire.	Detroit Fire Film Sacramento Fire Department (USA) extreme dangers inside a burning building
Activity 3 (15 mins)	Challenge the students to select a range of devices to add to the firefighter to further equip them to help save lives more efficiently and to reduce the risk to their own life. Ask students to cut and paste their devices in the appropriate place on the worksheet and use annotation to explain the purpose of the devices. How will they be linked together and what will be the benefit? Example of annotation: a thermal Imaging camera will help to distinguish fire intensities, but also in a smoked filled room it could pick up body heat that is not visible due to the situation. This will help direct firefighters to find people or the source of the fire. Extension task: using the two blank cards, what could students invent to help? Towards the end of this activity ask groups to present which devices they have used and to explain how the use of IOT to connect device together and solve the Big Question. Use the eight circles and write in a short sentence to describe a firefighter needs to do their job. This could include ideas from activity 3.	Glue sticks and scissors Sticky notes and pencils Work sheet 1 Work sheet 2
Activity 4 (10 mins)	Using the design context and user needs template, ask students to create a design context for fire fighters. Research devices and decide upon how mobile are they? Are they limited to any factors such as battery life? Obviously you can't change your battery or recharge when you're in the middle of fighting a fire? Are there any requirements of how these devices will be attached to the firefighter? Remember the user needs. Are they any requirements for materials/smart/modern materials for the devices?	Work sheet 3 Computers/tablets for research, if needed. Key words for structures internet research.

Activity 5 (15 mins)	Explore design ideas through sketching of how a future firefighter will look like? All students can complete at least one design per group member, then develop these designs to a final design idea.	Sticky notes Sketching materials Work Sheet 4
Activity 6 (10 mins)	Students to share their ideas with main group, opportunity for further collaboration. Introduction of Future Firefighter for discussion and compare against individual and group design idea sheets.	Post it notes for teacher to record key points Future Firefighter Sheet

Additional notes

Information for Teacher regarding optional devices

- **THERMAL IMAGING CAMERA:** a camera that that uses the Infra-Red Spectrum to pick up temperature and display as a visual form.
- **HUD (HEAD UP DISPLAY):** used in transport and aviation to allow operator to still view and have extra useful information.
- **AUGMENTED REALITY GLASSES:** glasses that link to the Internet with a small camera. It also allows the user to operate an external device using their eyes to control a user interface.
- **THERMO COLOUR PIGMENT:** a colourant that can be added to any material that reacts at different temperatures.
- **SMART PHONE:** communication device
- **EXTERNAL USB BATTERY:** can store energy to power devices.
- **MAIN CONTROL UNIT:** this could send/receive information from a central point.
- **ENVIRONMENTAL MONITOR:** monitors data such as Methane, Co2, Toxins, and Pollution etc.
- **ERGONOMIC HARNESSING:** use for devices to be attached to a firefighter.
- **BREATHING APPARATUS (BA):** allows a firefighter to have a personal air supply for a given time.
- **SAFETY LINE:** a high temperature polymer based chord that can be used for a variety of functions.
- **GPS AND MAPPING SOFTWARE:** to find the location of a specified area and can plot to any map or plan within a distance on 0.5 Meters.
- **KEVLAR:** a Light weight but extremely strong material that can be formed using a variety of resins.