Willerby Carr Lane Primary School – Design and Technology

Topic:	Year: 4	Strand: Electrical Systems

What should I already know?
• Used construction materials e.g. wood, card, and appropriate adhesives. • Built simple series electric circuits and rectified faults that occur (Y4 Electricity science unit) • The dangers of electricity and how to use it safely. • Learnt how the components work and used simple tools required to connect these together

What will I know / be able to do by the end of the unit?	
What are alarm systems used for?	• An alarm is a warning sound or device. • They are found all around us e.g. alarm clock, smoke alarm, light controlled crossing, microwave, washer, heating systems, fire alarm.
How are alarms triggered?	• Alarms are triggered by a switch. • Types of switches are: on/ off switch, push to make switch, push to break switch, timer switch, tilt switch, rocker switch, slide switch, micro switch, timer switch, sensor switch.
How do switches work and how are circuits with a variety of different switches made?	• See electrical diagrams below. • Timer switches work by setting a time for the device to switch on or off and them counting down to this time. • Motion Sensor switches work by a sensor using light, an alarm is triggered when the light is interrupted, triggering an alarm in the minicomputer, activating the switch. • Sensor switches detect changes e.g. Some smoke alarms have tiny lights inside and if the smoke particles get in the way of the lights, the alarm is activated.
How do I create an alarm system for a particular purpose?	• Draw on their understanding of simple electrical circuits and switches to help them generate ideas about their alarm. • Join components and cut and shaped materials with some precision to help assembly. • Join the materials of their device using a range of appropriate techniques. • Use a control program to activate their alarm.

Vocabulary	
buzzers	use electric current to create their own sound. used in alarm systems.
conductor	a material which allows heat or electricity to pass through it easily.
input device	examples of input devices include a keyboard, a mouse, a microphone and a webcam.
insulator	a material that does not conduct electricity and can therefore be used as a coating to components, circuit boards and wires.
light emitting diode (led)	they are available in different colours and levels of brightness. they have replaced the filament bulb in many everyday uses.
microcontrollers	tiny integrated circuits used widely in automatically controlled devices such as engine management in cars. these can be combined with drivers to control devices such as motors. raspberry pi and bbc micro:bit computers are examples used in schools.
motion sensors	use infrared to detect changes in the environment to activate the system.
output device	devices include speakers, monitors and printers which can be told to do something.
prototype	a first version of a device or vehicle from which other forms are developed.
push to break switches	this type of switch breaks the circuit when the button is pressed. in this case, the alarm would sound when an item was lifted off the switch e.g. in a museum.
push to make switches	simple input devices which allow electrical current to flow when pushed.
raspberry pi and bbc micro:bit computers	small computers used in schools to control devices.
tilt switches	use mercury to connect two electrodes when moved.
time delay switches	lengthen the time a product operates for.

Key Design Decisions & Skills
• how to generate ideas, considering the purposes for which they are designing • how to explore, develop and communicate aspects of their design by modelling their ideas in a variety of ways • how to consider reliability when developing proposals • how electrical circuits can be used to achieve functioning results • how to control their alarm using a control box/program • Produce a labelled drawing to communicate their ideas to others. • how to evaluate their products carrying out appropriate tests - Review design intentions and suggest ways of improving it.

Tools and Resources
• press switch, toggle or rocker switch, slide switch, push-to-make switch, push-to-break switch, reed switch and magnet, tilt switch (non-mercury), micro switch • buzzer • lamp, lamp holder • LED (light emitting diode), batteries, battery holder, battery clip • wood, card, coloured paper, fabrics • adhesives • simple control interface (micro:bit)

Pictures

Examples of devices which use alarms

Smoke alarm

burglar alarm

fire alarm

microwave

Alarm clock

Timer

Cross the road warning alarm

Car seat belt alarm

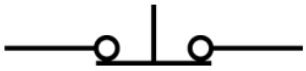
Film Links

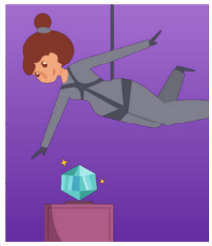
https://www.bing.com/videos/search?q=sensor+switch+how+works+for+kids&docid=608040053284013754&mid=CA0AFFD2E81DFC9A243DCA0AFFD2E81DFC9A243D&view=detail&FORM=VIRE

Symbols for switches in electrical diagrams

ON/OFF SWITCH CIRCUIT SYMBOL:

PUSH-TO-BREAK SWITCH CIRCUIT SYMBOL:





PUSH-TO-MAKE SWITCH CIRCUIT SYMBOL: