STEAM for Good

Smart Cities

Activity pack

STEAM for good

Smart Cities

‘The Internet of Things (sometimes shortened to IoT) is all about connecting everyday objects to the internet, whether this be your smart fridge to order milk for you when you run out, to wearable devices such as Fitbit or Apple watch that monitors your steps and heart rate.

The Internet of Things uses sensors to detect a change in an environment or situation and then acts upon that to alert or trigger a response to the change. An example of this is using a temperature sensor to monitor a room, if the temperature of the room gets too cold the sensor will prompt a heater to warm the room up. An application of where maintaining a specific temperature is important, is in catering where food must be kept cold in the fridge; if some chicken nuggets were accidentally kept at a wrong temperature and then served to you there is a heightened chance you would get food poisoning, yucky…

IoT technology has potential to be used pretty much everywhere; at home, in hospitals, even on the moon. One of the areas IoT is used today is in Smart Cities.

A Smart City is a city that is using IoT technology and has implemented intelligent connected objects and machines all around the city that transmit data using wireless technology like Wi-Fi or Bluetooth. The data these sensors collect are received by IoT applications that are able to make sense of the data by analysing it in real-time. An example of this is:

- Connected traffic lights receive data from sensors and cars adjusting light cadence and timing to respond to real-time traffic, reducing road congestion.
- Connected cars can communicate with parking meters and electric vehicle (EV) charging docks and direct drivers to the nearest available spot.
- Smart rubbish bins automatically send data to waste management companies and schedule pick-up as needed versus on a pre-planned schedule.

Kit list

- Books
- Balloon
- Blue tack
- Tape
- Pin

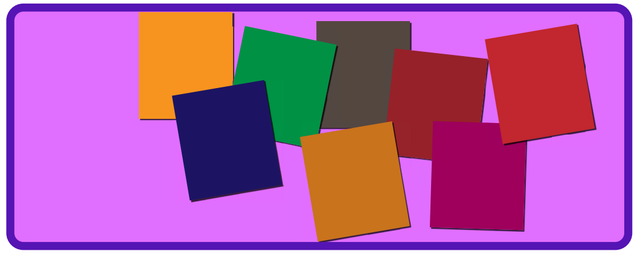
Safety note

Be careful when handling the pin, don’t prick yourself on the pointy end. Ask for help by an adult when securing the pin if needed.

Alternatively think about what else could be used to make a loud clattering noise.

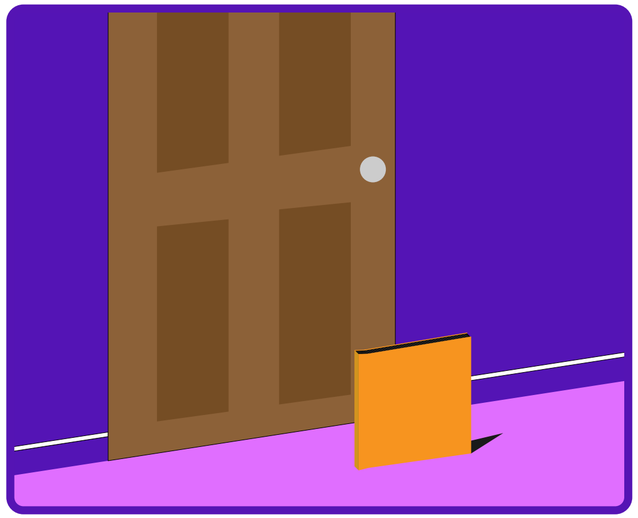
1

Gather some books, the more you have the larger your domino chain will be



2

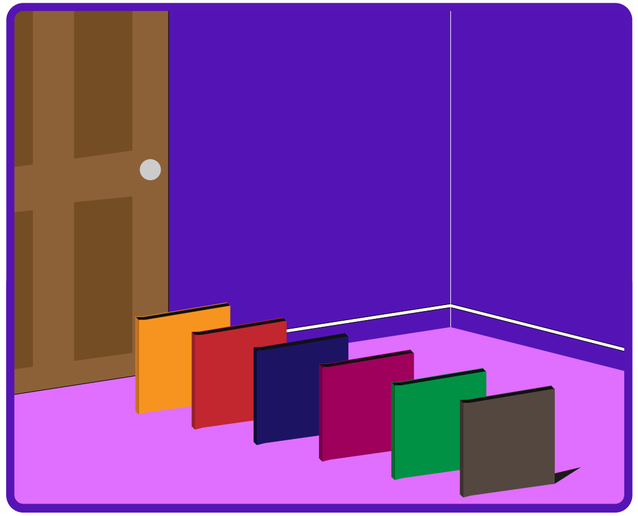
Place the first domino block in place – this should be near enough to the door you are protecting so that when it opens it will knock over this domino



3

Place your other domino materials one after the other, carefully, make sure that they are close enough to push each other over when they fall.

When you get to your final domino block, decide on what you’re going to use as your noise. It should be loud enough to alert you if someone is intruding



Smart Museums

Most cities have at least one if not many Museums – these may contain precious artefacts that are thousands of years old and extremely valuable. In order to protect these artefacts, whether this be the Mona Lisa, a woolly mammoth tusk or ancient Aztec golden Ingots, museums must make sure they have security in place to make sure no artefacts go missing.

The museum must also make sure that the environment of artefacts is just right so that they can ensure the artefact doesn't degrade or become damaged over time.

One of the ways you can monitor the environment around a painting like the Mona Lisa for example is by using humidity and temperature sensors. Both of these properties are very important, if it is too hot then a painting may shrink or even expand the artwork and if the humidity is too high it can cause mildew and mould to grow which can destroy ancient art pieces, which would be devastating.

Monitoring security in a museum can be aided by using IoT sensors for example, they could have CCTV monitoring their exhibitions, or an alarm that is triggered if it detects the noise of a glass cabinet breaking. Another way to detect intruders is to use a Passive Infrared Sensor (PIR) which can detect human bodies because of the infrared heat all living bodies emit.

This PIR sensor can then trigger light beacons to flash inside the museum notifying the intruders that they have been caught and also alerting the security guards that there has been a break in! Depending on the equipment and resources you have available, you can follow the guides below to create your very own IoT security defences...

More things to explore

If you would like to learn more about IoT then have a look at the following Adastral Park STEAM Videos made by our very own Researchers:

Help drivers move through Red and Blue Towns safely by using decomposition to program their traffic lights:
tinyurl.com/nn3r2s2k

Intro to connected Devices or the Internet of Things:
tinyurl.com/y3u2bmay

Smart Home Video:
tinyurl.com/pbzhzam6

Have a go activities

Create an Intruder Alarm
tinyurl.com/kuuu5js7

Collecting data from sensors is great but we need to be able to make sense of it. Here is some sample Museum data (tinyurl.com/hwu2yv23), can you create a Smart Museum Dashboard?
tinyurl.com/4muk6k8f

You may also find this video useful
tinyurl.com/35k4fx2e

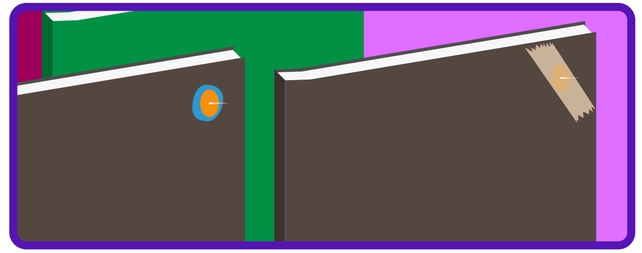
Using a Micro:Bit or the Micro:Bit emulator
Burglar Alarm
tinyurl.com/z9m32mth

Thermometer Sensor
tinyurl.com/h38xn2pv

Can you design a smart classroom, school, home, playground or shop?

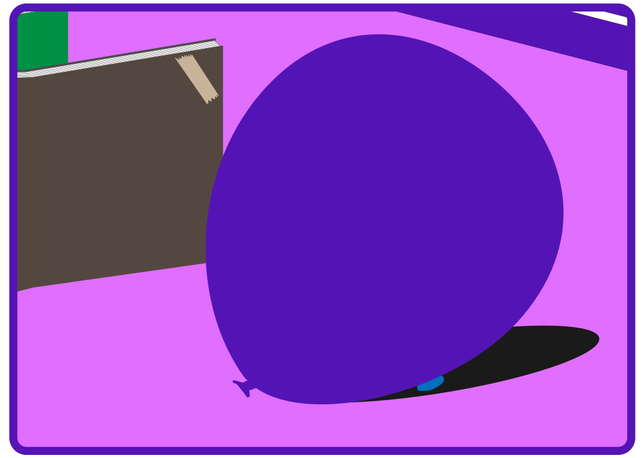
4

If using a balloon and pin, use some blue tack or tape to stick the non-pointy end of the pin to the back of the final domino piece



5

Blow up balloon and place in position when it will be popable by the pin – you may need to secure the balloon, perhaps with more blue tack or tape



6

Wait for someone to enter your room and watch your Domino Alarm system take off!