

The background of the slide is a vibrant red with abstract, overlapping shapes that create a sense of depth and movement. A green and yellow object, possibly a pen or stylus, is visible in the upper right corner, pointing towards the center. The text is white and centered on the red background.

*Stop Touch*  
- The must have  
device to help  
prevent you  
touching your  
face

Jamie Holroyde

A red abstract graphic consisting of several overlapping, curved, ribbon-like shapes that create a sense of depth and movement, located in the bottom-left corner of the slide.

## *Stop Touch* - WHAT IS IT?

*Stop Touch* is a small, compact and affordable way to remind you not to touch (especially scratch) your face. Making use of the Arduino Nano, a Bluetooth adapter, a buzzer, a pair of gloves, a headband and a few sensors, the device can help prevent the spread of many viruses and bacteria (like coronavirus). This device will remain useful in the future as health and safety become even more of a concern.

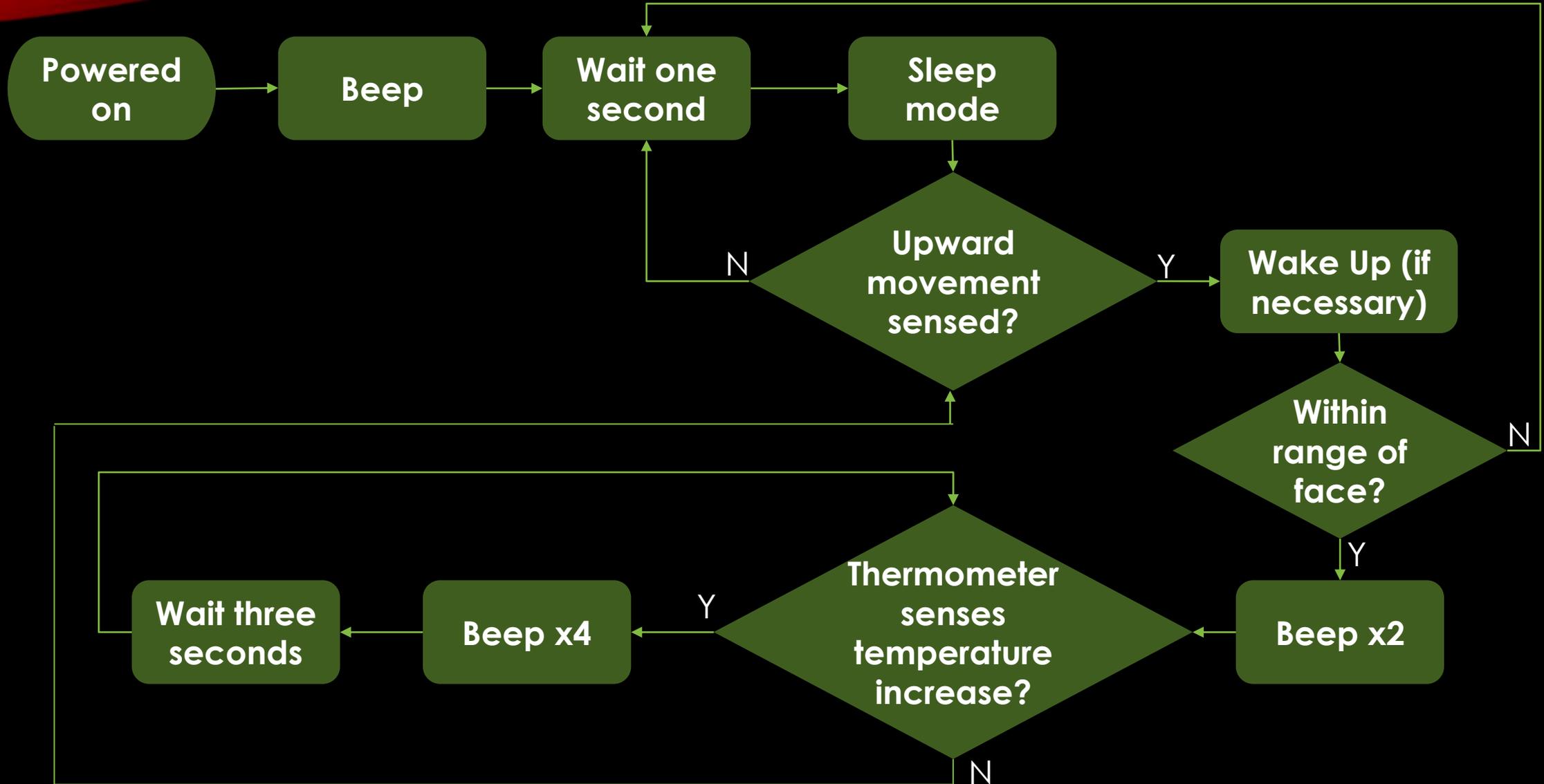
# HOW DOES *Stop Touch* WORK? (PART ONE)

*Stop Touch* contains two levels of “security” to help meet your sanitary needs.

The first level of “security” acts as a preventative to discourage you from touching your face using proximity. Making use of an infrared beacon attached to the headband and two infrared reflectors, one on each glove, the device can detect when your hand is near your face. When this happens, the buzzer produces two small beeps to attract your attention and give you time to realise that you are about to touch your face.

*Stop Touch*'s second level of “security” minimises the time you are touching your face by alerting you to when you are touching your face. If your fingers are near your face and the thermometers on the gloves sense a temperature increase, the device will assume you are touching your face. When this happens the buzzer will continuously produce four short, higher pitched beeps every three seconds until the thermometer senses a temperature drop (which indicates you've stopped touching your face).

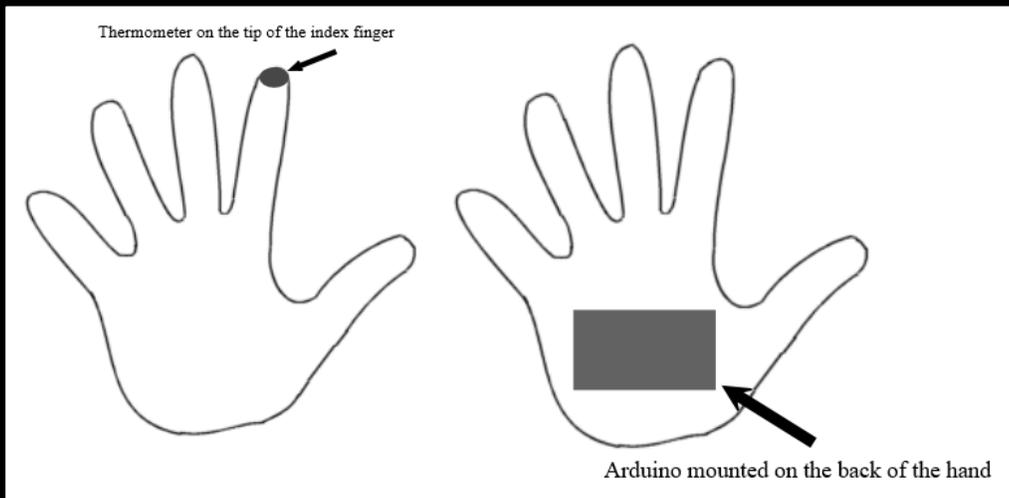
# HOW DOES IT WORK (PART TWO)



# AESTHETICS

The gloves and headband that accompany the device are customisable. With a variety of colours, materials and designs, they are able to suit personal preference. Colours include: red, yellow, orange, blue, white, black and see-through. The materials can either be recycled plastic or acrylic wool.

## Portability



*Stop Touch* is very portable. The temperature sensor, the Arduino and the proximity beacon are contained within the gloves, whilst the proximity sensor is mounted on the head band. All the components are enclosed in a waterproof casing allowing for use inside or outside the house, rain or shine.



# THE SCIENCE BEHIND THE PROXIMITY SENSOR (PART ONE)

## Infrared sensors

Infrared sensors detect infrared light . One of the properties of the Infrared LEDs is that not only do they emit light when they receive an electric current, *they also produce an electric current when they receive light of a specific wave length.*

A pair of Infrared LEDs can be used to measure distance. One of the LEDs is set to output light and the other is set to transmit a signal when it receives light. The light from the light-emitting LED is then received at the light-receiving LED.

Using the formula:

$$\text{Distance} = \text{Speed} \times \text{Time}$$

the distance is able to be calculated. All that is needed is the speed of light ( $3 \times 10^8$ )ms<sup>-1</sup> and the time it takes for the infrared light to hit the light-receiving LED (this has to be timed by the Arduino).



# THE SCIENCE BEHIND THE PROXIMITY SENSOR (PART TWO)

## Infrared sensors

There is a small margin for error. The sun also emits Infrared light which can cause the Infrared LED to react. Infrared waves vary in wavelength from  $1\mu\text{m}$  to  $1\text{mm}$ . The sun emits mainly Infrared waves of wavelength  $1\mu\text{m}$  to  $10\mu\text{m}$ . This means if an Infrared sensor and beacon have longer wave lengths, there will be minimal interference from the sun (the recommended Infrared beacon works on a wavelength of approximately  $940\mu\text{m}$ ).

## Alternative solution

Another answer would be to use an ultrasonic sensor, however these, paired with the beacon, are generally more expensive. These would work without interference from the sun as they use sound rather than light and as sound can't travel through a vacuum, the sun could not interfere.

# DEVICES NEEDED



RVFM 5V Miniature  
Electronic Buzzer

## Input

- an infrared transmitter and receiver (for example the Kingbright L-7113F3BT paired with the Vishay TSAL6200)
- two temperature sensors (like the TMP36GT9Z temperature sensor)

## Output

- one buzzer (possibly the RVFM 5V Miniature Electronic Buzzer)

As well as the Bluetooth adapter  
and the Arduino Nano



The TMP36GT9Z  
temperature sensor

# BATTERY POWER

*Stop Touch* can either be run on small, disposable batteries (like the AG1) or as an eco-friendly alternative miniature rechargeable batteries (for example the CTL1616F rechargeable battery). To conserve power, there is an inbuilt sleep mode.

When the sleep mode is active, the whole device, except the Nano, is shut down. When the Nano's inbuilt accelerometer and gyroscope detect an upwards movement, everything switches on again to perform its normal function.

# COSTING

Using the suggested devices throughout the presentation:

- CTL1616F Rechargeable battery - £10.07
- RVFM 5V Miniature Electronic Buzzer - £1.39
- TMP36GT9Z Temperature Sensor - £1.39 (x2)
- HC05 HC-05 Bluetooth Serial Module - £6.45 (x2)
- Arduino Nano - £16.15

A cheaper, more affordable model (using Infrared) could use:

- Vishay TSAL6200 5mm 940nm IR Transmitter Diode - £0.39
- Kingbright L-7113F3BT 5mm Blue Lens Infrared Diode - £0.19

The more expensive model (using ultrasonic) could use:

- Hc-sr04 ultrasonic sensor - £4.14
- Prowave 400St160 Ultrasonic Transmitter (beacon) - £7.09

Total cost (simple model) - £43.80

Total cost (advanced model) - £54.45

\* Indicative costs. Costs could be reduced by buying the items in bulk and by using the optional disposable batteries