Science From Scratch

Scratch MIT 2016, 3rd - 6th August 2016

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Technology Volunteers

Outreach workshops designed to encourage young people have a deeper understanding of:

- modern hi-tech products
- relationship between hardware and software
- sensing the world around us

Encourage Creators rather than Consumers

www.warwick.ac.uk/techvolunteers
www.warwick.ac.uk/scratchresources

@TechVolunteers
What? Run workshops encouraging creators
Why? To encourage a deeper understanding of how things work.
Where: benefits teachers & children, happens in their class
Where? Schools, local communities & libraries
Who? Students and children work collaboratively
Who?  Led by students at Warwick
New: Coventry Coderdojo
What? Understand links
Why? Making interfaces is fun!

Box IT! (bop it!)  Dancemat
What? Water Bottle joystick
What? Touchpad made from a CD case
Sensing Our World
worksheets to build sensors
and sample applications

- Tilt Sensor
- Variable Value Sensor
- Bottle Top Drums
- Buttons & Potentiometers
Tiltometer

Box It 2.0

Dance Mat

Button Box

Light Meter & Lenses

Colour Sensor

Plant Moisture

Random Numbers
Using Sensors with Scratch

• Sensors return value

• Keep reading values from sensor (loop)

• Calibration of sensors
ExperiSense + Arduino

Display

External Inputs

External Inputs/Outputs

Dial

Button

Light Sensor
ExperiSense Extension

**Diagram Content:**
- `read dial`
- `normal resistance on A (kΩ)`
- `set EXT1 to 100 %`
- `normal read from A`
- `show 1 on first display`
- `when clicked`
- `forever`
- `show score on first display`
- `when A > 50 %`
- `plot data sensitive resistance on A (kΩ)`
Science from Scratch

Our Worksheets:

- Rotation Speed Sensor
- Wind Turbine
- Experimenting with Resistance:
  - Electrochemistry – measuring conductance through liquids
  - Thermistor – influence of temperature on conductance
Today’s Challenge:

Use a sensor or create an application that explores an aspect of science that interests you.

To Use:

1) Download Arduino Standard Firmata to board (already done)

2) Install the Scratch Extensions Browser Plugin (download for other browsers) – http://bit.ly/1Pup3Bx

3) Go onto ExperiSense Extension on ScratchX (use Firefox/IE (Windows) or Safari (Mac)) – http://bit.ly/2aTpVZo
Now let's make something!

@TechVolunteers
Thanks to all the Technology Volunteers students in 2015-16.

Project leaders:
Caspar Collins, Martin Luk, William Choi, Matt Earl, Kieran Hall, Stephen Pithouse
What? Phil’s pico-powered glove!
What?  Tilt-o-meter
### Local Informal Network and Wider Contacts

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<th>Professional Bodies</th>
<th>Local Education Authorities</th>
<th>Local Schools</th>
<th>Local Universities</th>
<th>Others</th>
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What? Bottle top drum kit
what?

whole class + in school

mini community of learners

software on school computers

broaden teachers’ experience
Why Sensors?

- **Fun:** enhance gaming experience
- **Useful:** sensors in smart phones
- **Potential:** Internet of Things
Scratch sprites can respond to events in the real world

- **Sound**, change how the sprite looks when there is a loud sound.
- **Light**, hide when it's dark (or light)
- **Others**, use the *slider* and *button* to control a character in a video game.