Web Site Case Study

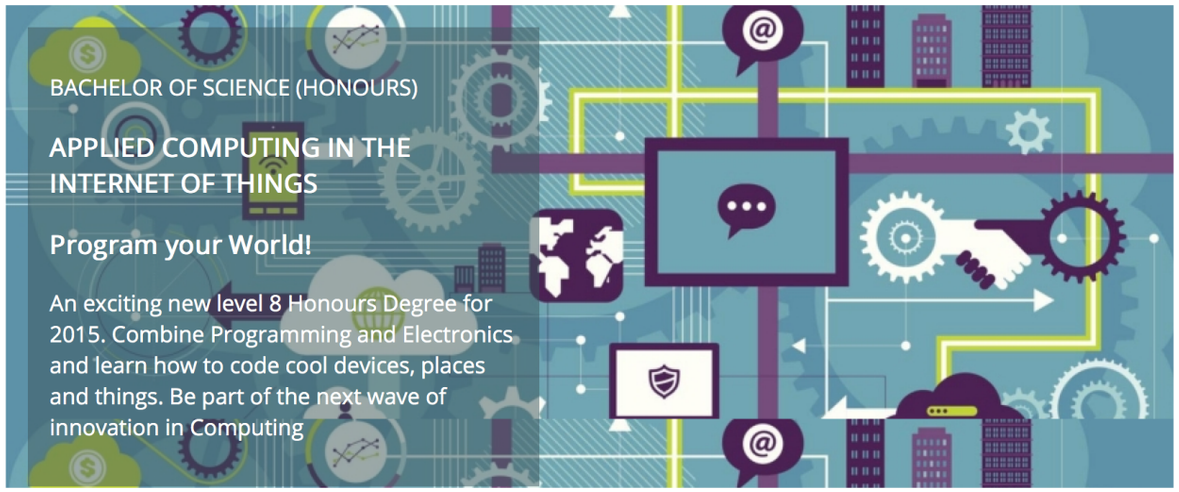
Agenda

- Site Structure
- CSS Layout
- Semantic Elements
- Fonts
- Images

Department of Computing & Mathematics

Waterford Institute *of* Technology
INSTITIÚID TEICNEOLAÍOCHTA PHORT LÁIRGE

BSc (Hons) the Internet of Things



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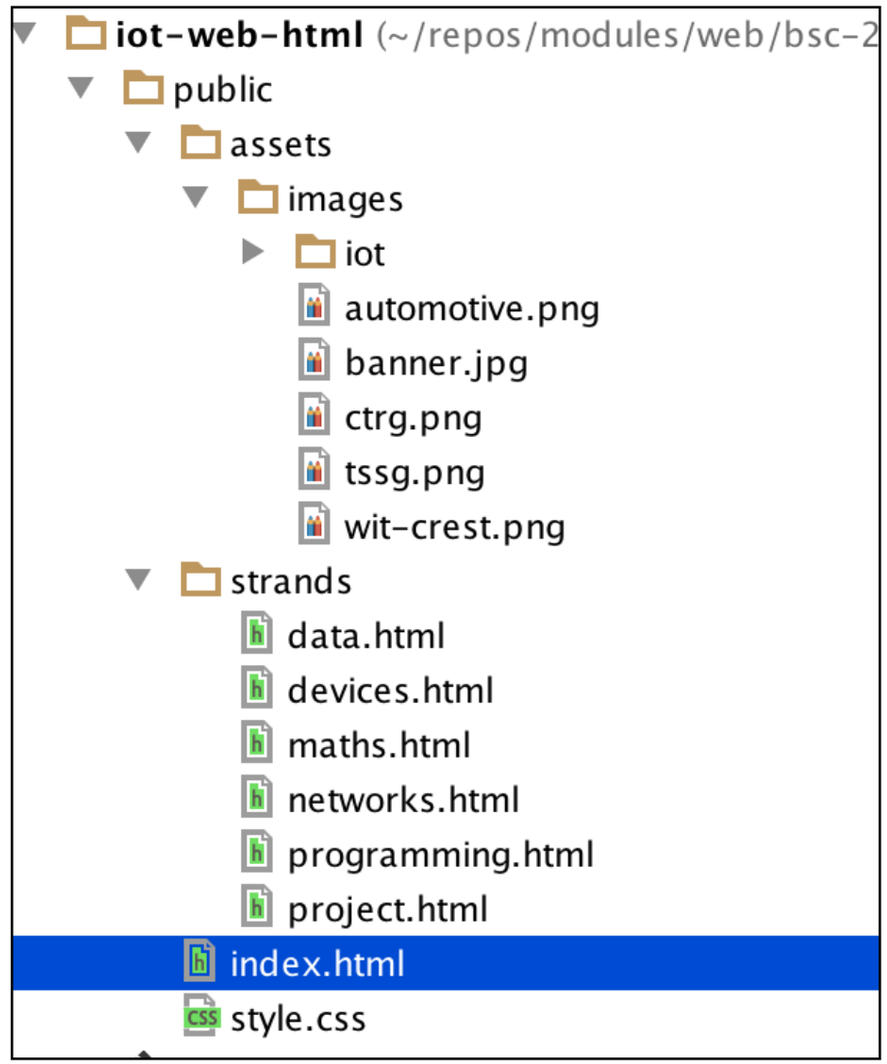

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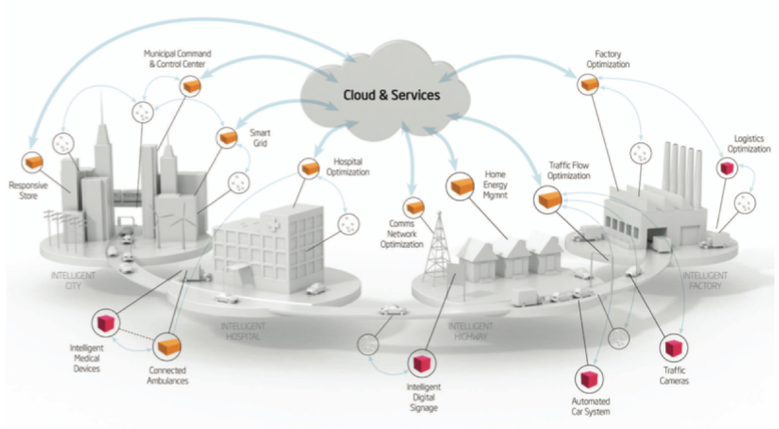

Year 1		Year 2		Year 3		Year 4	
Semester 1	Semester 2	Semester 3	Semester 4	Semester 5	Semester 6	Semester 7	Semester 8
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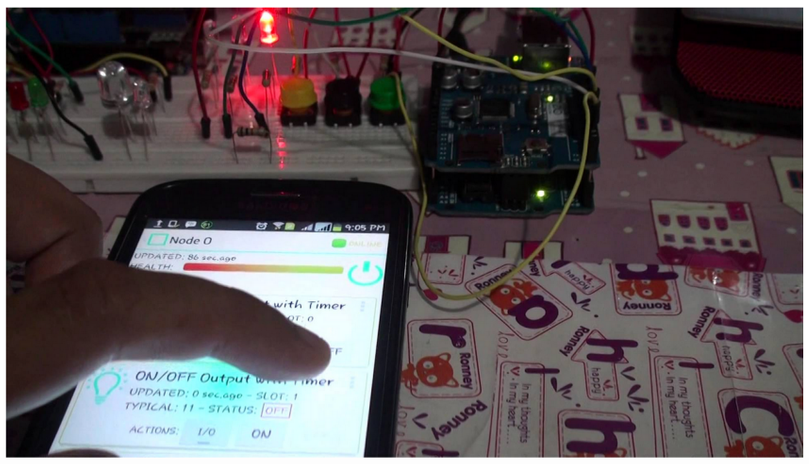
Project Learning Path



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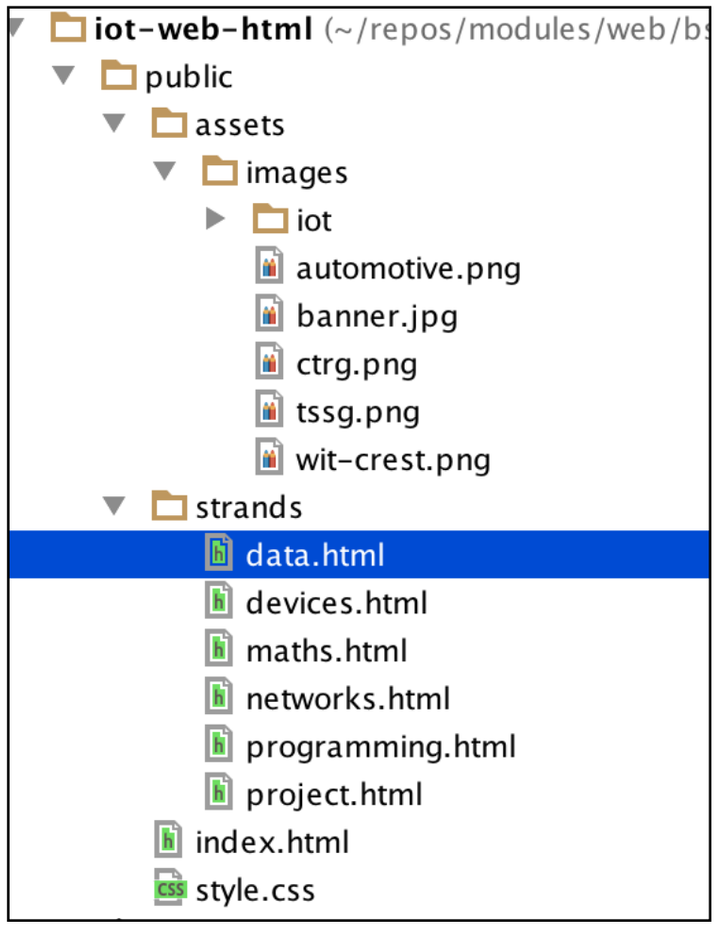

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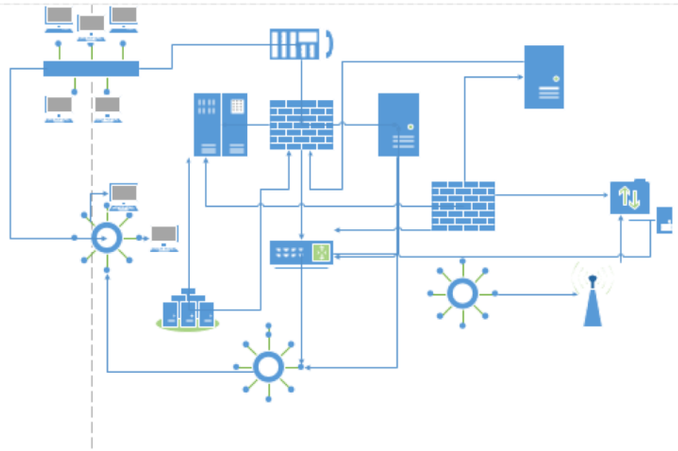
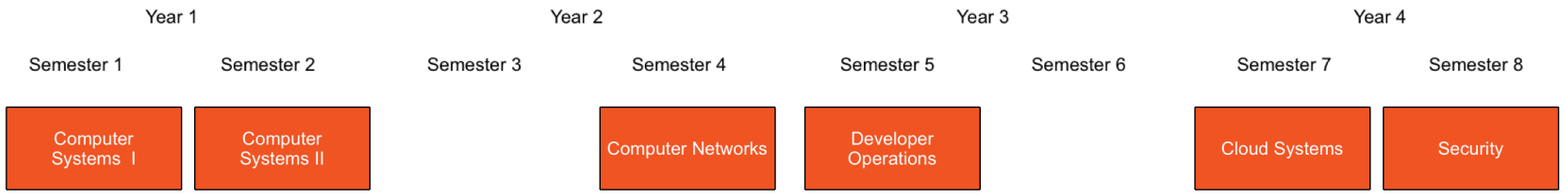
Networks

The network, its configuration, management, and evolution, is at the heart of the IoT. Whether fixed, wireless, ad-hoc, sensor based, or hybrid, intelligent services and applications will derive much of their power from their participation in a secure and robust network. In this context, identity, privacy and trust are inherently bound into the hardware and software systems, which will embody key security principles in their operation and management. Given the magnitude and diversity of devices, network infrastructure automation and programmable infrastructure (a.k.a. infrastructure as code) are critical components of the IoT.





Networks Learning Path

The Networks & Cloud strand will begin with an introduction to Computer Architecture and Operating Systems in the first year. A practical approach to building and configuring systems, using single board computers such as the Raspberry Pi and Intel NUC, will be central to the student's learning environment. In the second year a more in depth coverage of networking is provided examining addressing, routing and networking protocols. Third year will see students explore the emerging area of DevOps and engage in the configuration, deployment and management of Cloud infrastructures. In the final year students will continue to work with Cloud Infrastructure technologies as well as taking a detailed look at device, system and network security.

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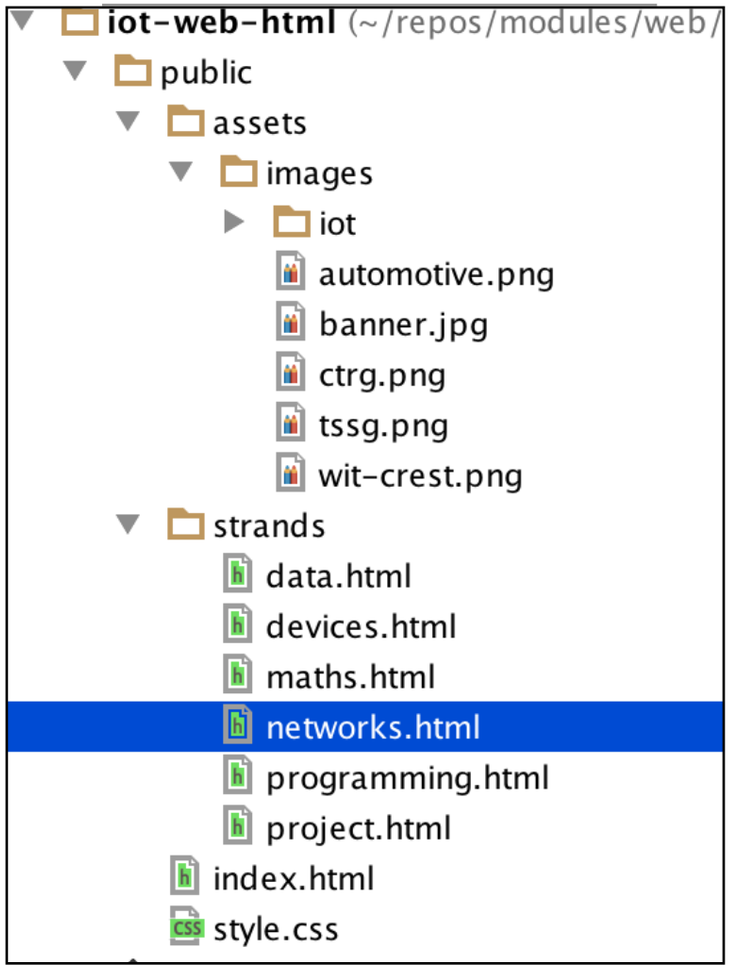

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    <img class="header-crest-img" src="assets/images/wit-crest.png"
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    <h3>
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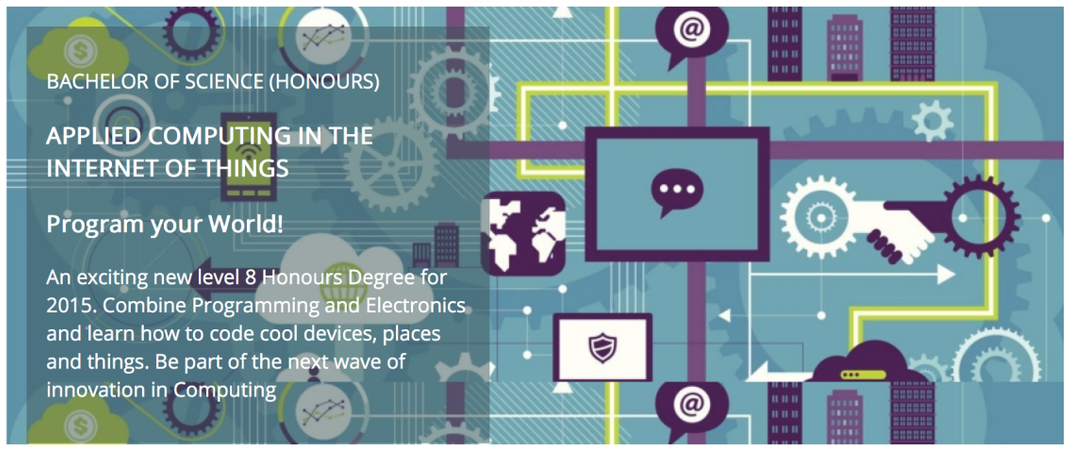

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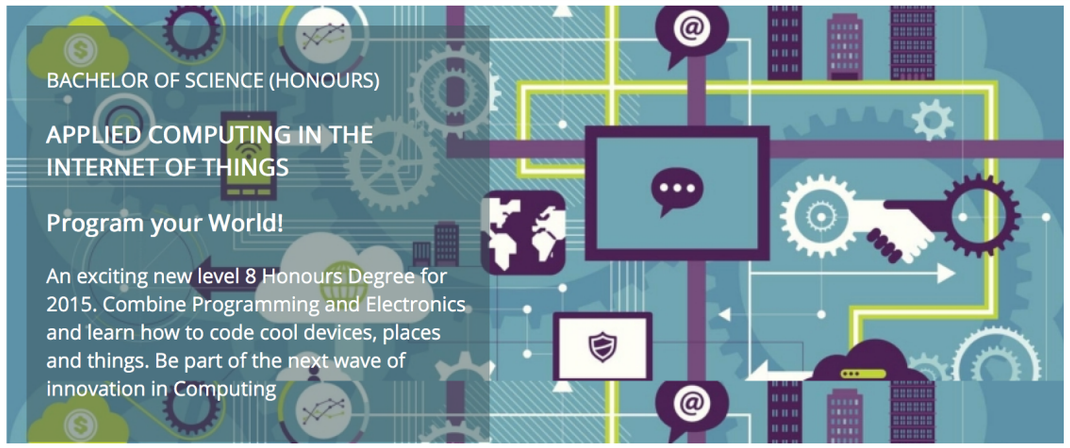

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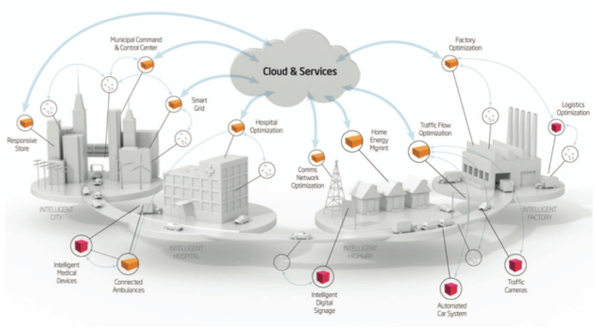

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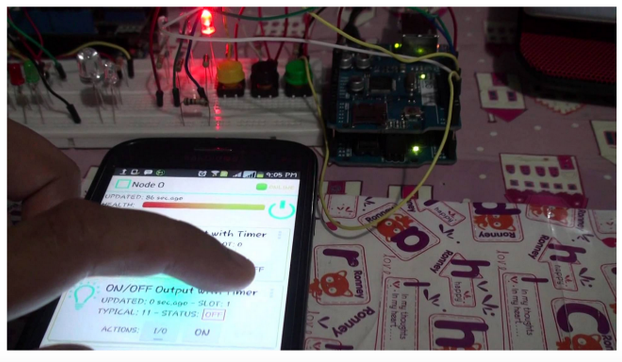

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  </h2>
  <h3>
    <a href="../index.html"> BSc (Hons) the Internet of Things </a>
  </h3>
  <hr>
</header>

<article>
  <h1> Devices </h1>
  <p>
    <img class="strand-right-img" src="../assets/images/iot/devices/devices-1.png">
    The IoT professional must be comfortable when dealing with the many kinds of
     devices and sysems that are the means for the Internet to interact with the
     environment. Such competence must be built on an awareness of the various means
     with which devices and systems perform, how they can be made to perform well and
     how their perfromance attributes may be changed
  </p>
</article>

<figure>
  <img class="strand-timeline-img" src="../assets/images/iot/timeline.png">
  <img class="strand-modules-treble-img" src=".
   ./assets/images/iot/devices/devices-modules.png">
</figure>

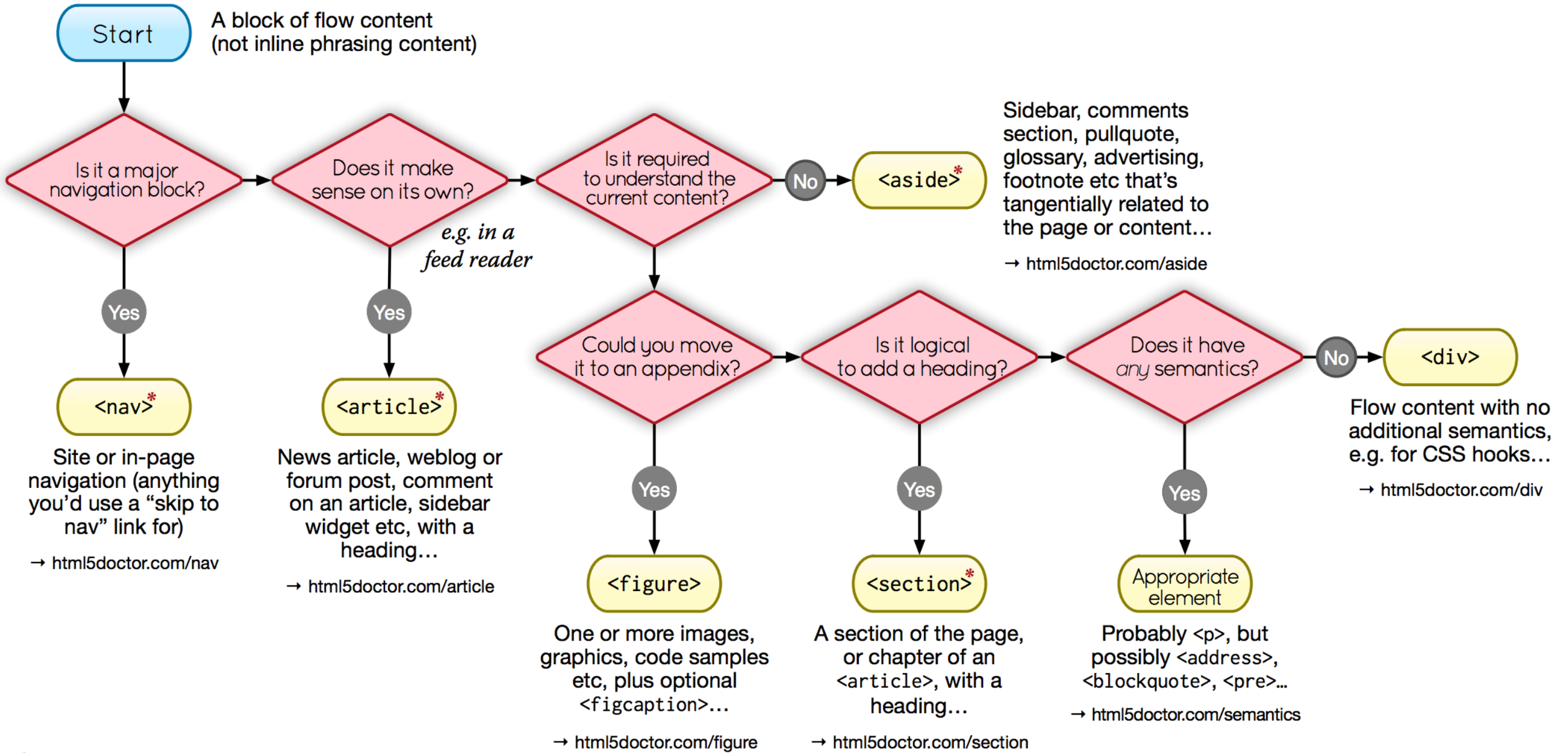
<article>
  <h2> Devices Learning Path </h2>
  <p>
    <img class="strand-left-img" src="../assets/images/iot/devices/devices-2.png">
    As a student on this programme, you will start to build this competence with the
     single board computer, the single board micro-controllers and fundamental analogue
     electronics, which when combined together will afford the environmental
     input-output capability with basic access to the network. The single board
     micro-controllers combined with the fundamental analogue topics will give ready
     access to the analogue and low-level digital world, whose key parameters of
     interest can be sensed and if necessary conditioned for conversion into digital
     form, as well as offering an effective actuation interface for analogue change.
     Protocol-defined communications covering all aspects from framing commands and
     information to the hierarchy of reliable communications, will open up the ability
     to convey information and commands over various media types and allow the
     candidates a complete education in more complex microcontroller based internet
     access points.
  </p>
</article>

<footer>
  <hr>
  <p class="footer-social-links">
    <a href="http://www.facebook.com/witcomp"> facebook </a>
    <a href="http://twitter.com/ComputingAtWIT"> twitter </a>
    <a href="https://ie.linkedin.com/pub/computing-at-wit/a9/221/1b6"> linkedin </a>
  </p>
</footer>
```

HTML5 Element Flowchart

Sectioning content elements and friends

By @riddle & @boblet
www.html5doctor.com



*Sectioning content element

These four elements (and their headings) are used by HTML5's outlining algorithm to make the document's outline
→ html5doctor.com/outline

2011-07-22 v1.5
For more information:
www.html5doctor.com/semantics

```
<!DOCTYPE html>
<html lang="en">
<head...>
<body>

<header id="header"...>

<article class="banner"...>

<article id="curriculum">
   <hr>
   <section id="col1"...>
   <section id="col2"...>
</article>

<section id="sponsors"...>

<footer id="footer"...>

</body>
</html>
```

Department of Computing & Mathematics

BSc (Hons) the Internet of Things

Waterford Institute *of* Technology
INSTITIÚID TEICNEOLAÍOCHTA PHORT LÁIRGE

Programming

Learn a broad range of programming and problem solving skills, including exciting new platforms, software tools and languages. Use these skills to build apps for mobile, cloud and device based IoT applications. Evolve a porfolio of facinating aplications.

Data Science

At the heart of many IoT applications is data: measurements, events alarms and other information that must be relayed, stored and ultimately turned into knowledge. Learn the fundamentals of modern approaches to data in this strand.

Devices

The 'Things' we connect to are often physical devices. These can range from simple temperature sensors to sophisticated control systems like traffic lights or cameras. Connecting to and interacting with the physical world is the subject of this strand.

Networks

This strand will explore modern networks and cloud technology. Be able to configure, network and manage all categories of computer systems from simple controlers to single board board computers, mobiles and full workstations.

Project

Building exciting IoT projects in every semester of the programme. Your projects will combine skills acquired from the other strands and enable you to build a comprehensive an compelling portfolio of IoT applications and services.

Mathematics

Introduce foundation concepts for many of the more applied concepts in the other Strands. Learn mathematical techniques in a modern context and apply core principles in new an interesting ways.

Supported by leading edge research at...

TSSG

ctrg
convergent technologies research group

AUTOMOTIVE CONTROL GROUP
Software Engineering for the Connected Car

---

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Department of Computing & Mathematics

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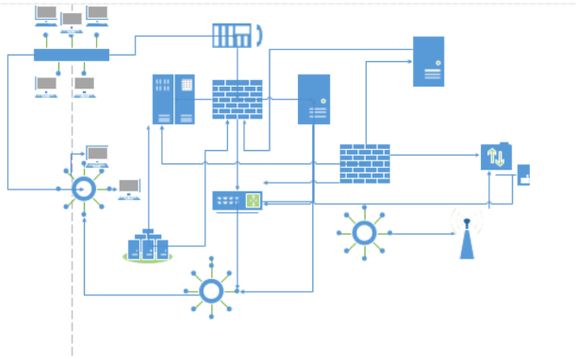
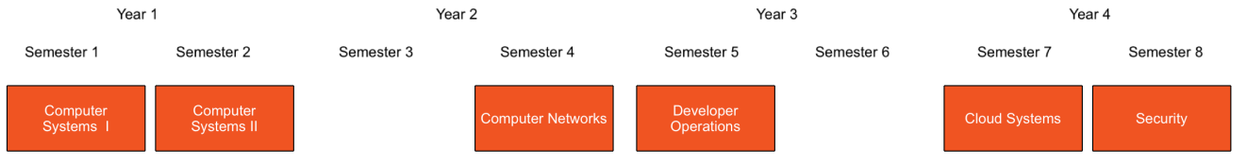
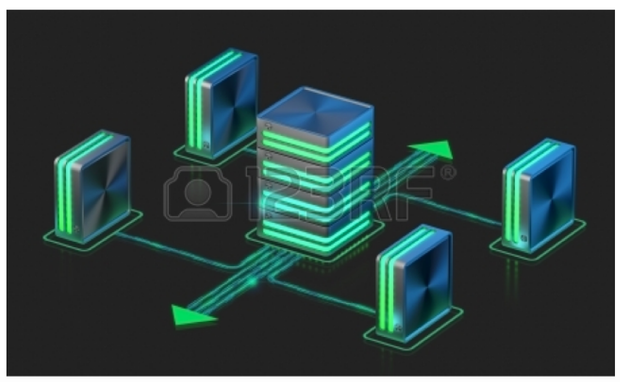
Networks

The network, its configuration, management, and evolution, is at the heart of the IoT. Whether fixed, wireless, ad-hoc, sensor based, or hybrid, intelligent services and applications will derive much of their power from their participation in a secure and robust network. In this context, identity, privacy and trust are inherently bound into the hardware and software systems, which will embody key security principles in their operation and management. Given the magnitude and diversity of devices, network infrastructure automation and programmable infrastructure (a.k.a. infrastructure as code) are critical components of the IoT.





Networks Learning Path



The Networks & Cloud strand will begin with an introduction to Computer Architecture and Operating Systems in the first year. A practical approach to building and configuring systems, using single board computers such as the Raspberry Pi and Intel NUC, will be central to the student's learning environment. In the second year a more in depth coverage of networking is provided examining addressing, routing and networking protocols. Third year will see students explore the emerging area of DevOps and engage in the configuration, deployment and management of Cloud infrastructures. In the final year students will continue to work with Cloud Infrastructure technologies as well as taking a detailed look at device, system and network security.

facebook twitter linkedin

```
<!DOCTYPE html>
<html lang="en">
<head...>
<body>

<header...>

<article...>

<figure...>

<article...>

<footer...>

</body>
</html>
```

http://www.cssfontstack.com/

- Web Safe Fonts:
    - Pre-installed by many operating systems. While not all systems have the same fonts installed, you can use a web safe font stack to choose several fonts that look similar, and are installed on the various systems that you want to support.
- Web Fonts
    - Web fonts are not pre-installed but are downloaded by the browser while rendering the webpage. May slow slow your site's load time.
- Common Pattern: If using a web font, include it first followed by similar series web safe fonts. If a browser is unable to use the web font it will fall back on the web safe fonts in the stack.

Web Safe

- Sans-serif
- Serif
- Monospaced
- Fantasy
- Script

Sans-serif

Arial	**Arial Black**	Arial Narrow
Win: 99.84% Mac: 98.74%	Win: 98.08% Mac: 96.22%	Win: 88.39% Mac: 94.77%
Arial Rounded MT Bold	Avant Garde	Calibri
Win: 59.53% Mac: 95.14%	Win: 0% Mac: 1.08%	Win: 83.41% Mac: 38.74%
Candara	Century Gothic	**Franklin Gothic Medium**
Win: 83.08% Mac: 34.41%	Win: 87.62% Mac: 53.15%	Win: 99.18% Mac: 2.1%

Serif

Big Caslon	Bodoni MT	Book Antiqua
Win: 0% Mac: 92.61%	Win: 55.81% Mac: 0%	Win: 86.09% Mac: 49.01%
Calisto MT	Cambria	Didot
Win: 58.43% Mac: 46.31%	Win: 83.35% Mac: 35.32%	Win: 0% Mac: 93.51%
Garamond	Georgia	Goudy Old Style
Win: 86.47% Mac: 49.91%	Win: 99.4% Mac: 97.48%	Win: 58.11% Mac: 47.57%

Monospaced

Consolas	Courier New	Lucida Console
Win: 82.97% Mac: 34.77%	Win: 99.73% Mac: 95.68%	Win: 99.18% Mac: 0%
Lucida Sans Typewriter	Monaco	Andale Mono
Win: 74.81% Mac: 99.64%	Win: 2.74% Mac: 99.82%	Win: 4.16% Mac: 94.59%

Fantasy

COPPERPLATE
Win: 66.87% Mac: 92.61%

Script

Brush Script MT
Win: 59.64% Mac: 90.99%

Font | Size | Weight | Style

Helvetica Full Stack | Select One: | Select One: | Select One:

Variant | Line Height

Select One: | Select One:

Apply To

Header | Save Heading Setting

HTML:

CSS:

```
h1 {
        font-family: 'Helvetica Neue', Helvetica, Arial, sans-serif;
        font-size: 24px;
        font-style: normal;
        font-variant: normal;
        font-weight: 500;
        line-height: 26.4px;
}
h3 {
        font-family: 'Helvetica Neue', Helvetica, Arial, sans-serif;
        font-size: 14px;
        font-style: normal;
        font-variant: normal;
        font-weight: 500;
        line-height: 15.4px;
}
p {
        font-family: 'Helvetica Neue', Helvetica, Arial, sans-serif;
        font-size: 14px;
        font-style: normal;
        font-variant: normal;
        font-weight: 400;
        line-height: 20px;
}
```

E.g: Helvetica

Your headline is in Helvetica

This is a sub heading in Helvetica.

This paragraph is in Helvetica. Keep reading for how to use the buttons to the left. Change your settings, and choose what section you want the font to apply to. Once you are pleased with the settings for that section you can click save. Your selections will remain as you look for another font for another section of this preview.

Another sub heading in Helvetica.

The setting for a paragraph continues down here. There is a blockquote next to it. You may want to make that stand out. The setting for a paragraph continues down here. There is a blockquote next to it. You may want to make that stand out.

> Make other Helvetica text stand out!

```
/* This text is in Helvetica */
.class {
        font-family: Helvetica Neue,Helvetica,Arial,sans-serif;
}
```

http://www.cssfontstack.com/Helvetica

Web

Sans-serif

Serif

Cursive

Serif

Adamina | Alice | Alike

Alike Angular | Andada | Arapey

Artifika | Arvo | Bentham

Bevan | Bitter | Brawler

Sans-serif

Abel | Aclonica | Actor

Aldrich | Allerta | Allerta Stencil

Amaranth | Andika | Anonymous Pro

Antic | Anton | Arimo

Bowlby One | Bowlby One SC | Buda

Cabin | Cabin Condensed | Cagliostro

Candal | Cantarell | Carme

Carter One | Chivo | Coda Caption

Architects Daughter | Asset

Atomic Age | Aubrey

Bigshot One | Black Ops One

Butcherman Caps | Cabin Sketch | Calligraffitti

Cedarville Cursive | Changa One | Cherry Cream So

Chewy | Chicle | Coda

HTML:

```
<link rel="stylesheet" type="text/css" href="//fonts.googleapis.com/css?family=Open+Sans" />
```

CSS:

```
h1 {
        font-family: 'Open Sans';
        font-size: 24px;
        font-style: normal;
        font-variant: normal;
        font-weight: 500;
        line-height: 26.4px;
}
h3 {
        font-family: 'Open Sans';
        font-size: 14px;
        font-style: normal;
        font-variant: normal;
        font-weight: 500;
        line-height: 15.4px;
}
p {
        font-family: 'Open Sans';
        font-size: 14px;
        font-style: normal;
        font-variant: normal;
        font-weight: 400;
        line-height: 20px;
}
```

Your headline is in Open Sans

This is a sub heading in Open Sans.

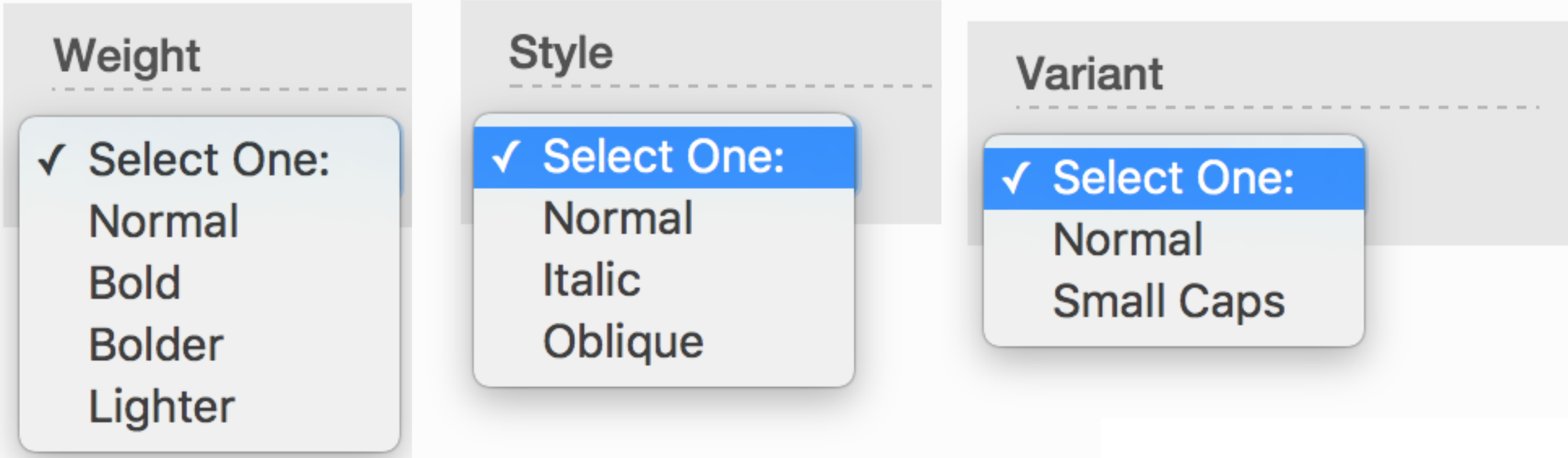
This paragraph is in Open Sans. Keep reading for how to use the buttons to the left. Change your settings, and choose what section you want the font to apply to. Once you are pleased with the settings for that section you can click save. Your selections will remain as you look for another font for another section of this preview.

Another sub heading in Open Sans.

The setting for a paragraph continues down here. There is a blockquote next to it. You may want to make that stand out. The setting for a paragraph continues down here. There is a blockquote next to it. You may want to make that stand out. The setting for a paragraph continues down here. There is a blockquote next to it. You may want to make that stand out. The setting for a paragraph continues down here. There is a blockquote next to it. You may want to make that stand out.

> Make other Open Sans text stand out!

```
/* This text is in Open Sans */
.class {
      font-family: Open Sans;
}
```




```
h1 {
        font-family: 'Open Sans';
        font-size: 24px;
        font-style: normal;
        font-variant: normal;
        font-weight: 500;
        line-height: 26.4px;
}
```

Open Sans

https://en.wikipedia.org/wiki/Open_Sans

From Wikipedia, the free encyclopedia

Open Sans is a sans-serif typeface designed by Steve Matteson and commissioned by Google. According to Google, it was developed with an "upright stress, open forms and a neutral, yet friendly appearance" and is "optimized for legibility across print, web, and mobile interfaces."[3] Its design is almost identical to that of Droid Sans, with the exception of wider characters and the inclusion of italic variants. Whereas Droid Sans is used primarily in the user interfaces of some Android phones, Open Sans is used in some of Google's web pages as well as its print and web advertisements.

Open Sans is available in a large number of variants for a font with an open license. There are 5 variants for weight (300 Light, 400 Normal, Semi-Bold 600, Bold 700 and Extra Bold 800) and each one has an italic version, totaling 10 variants. There is also a separate font called Open Sans Condensed with 3 width variations.[4]

Contents [hide]

1 Use
2 Unicode coverage
3 References
4 External Links

Open Sans

Category	Sans-serif
Classification	Humanist
Designer(s)	Steve Matteson
Foundry	Ascender Corporation
Date created	2010[1]
Date released	2011[2]
License	Apache License 2.0
Website	www.google.com/fonts/specimen/Open+Sans

Challenges Rendering Images on the Web (1)

- Problem 1: PPI
- PPI - Pixels Per Inch, a measurement of the Pixel Density.
- Phone, tablet and desktop screens vary wildly.

Calculation of monitor PPI [edit]

Theoretically, PPI can be calculated from knowing the diagonal size of the screen in inches and the resolution in pixels (width and height). This can be done in two steps:

1. Calculate diagonal resolution in pixels using the Pythagorean theorem:

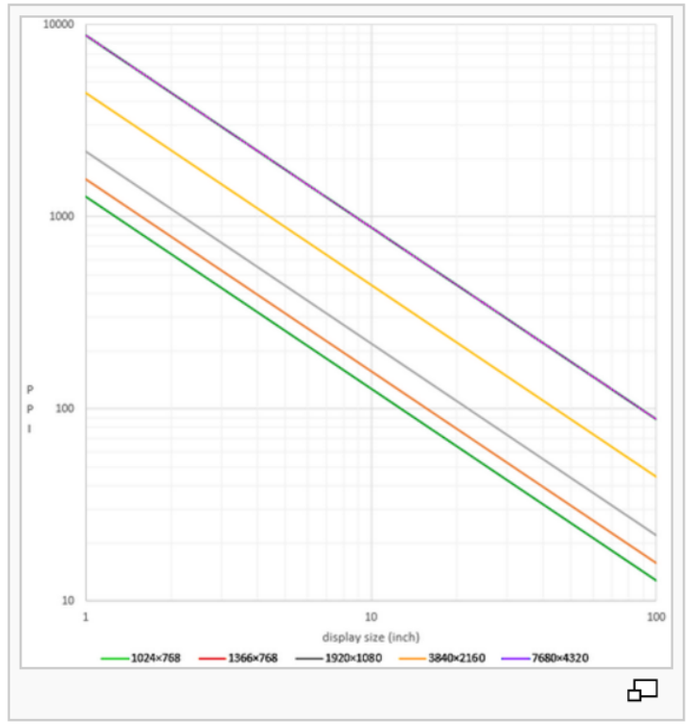
$$d_p = \sqrt{w_p^2 + h_p^2}$$

2. Calculate PPI:

$$PPI = \frac{d_p}{d_i}$$

where

- d_p is diagonal resolution in pixels
- w_p is width resolution in pixels
- h_p is height resolution in pixels
- d_i is diagonal size in inches (this is the number advertised as the size of the display).



PPI also applied to Image Files

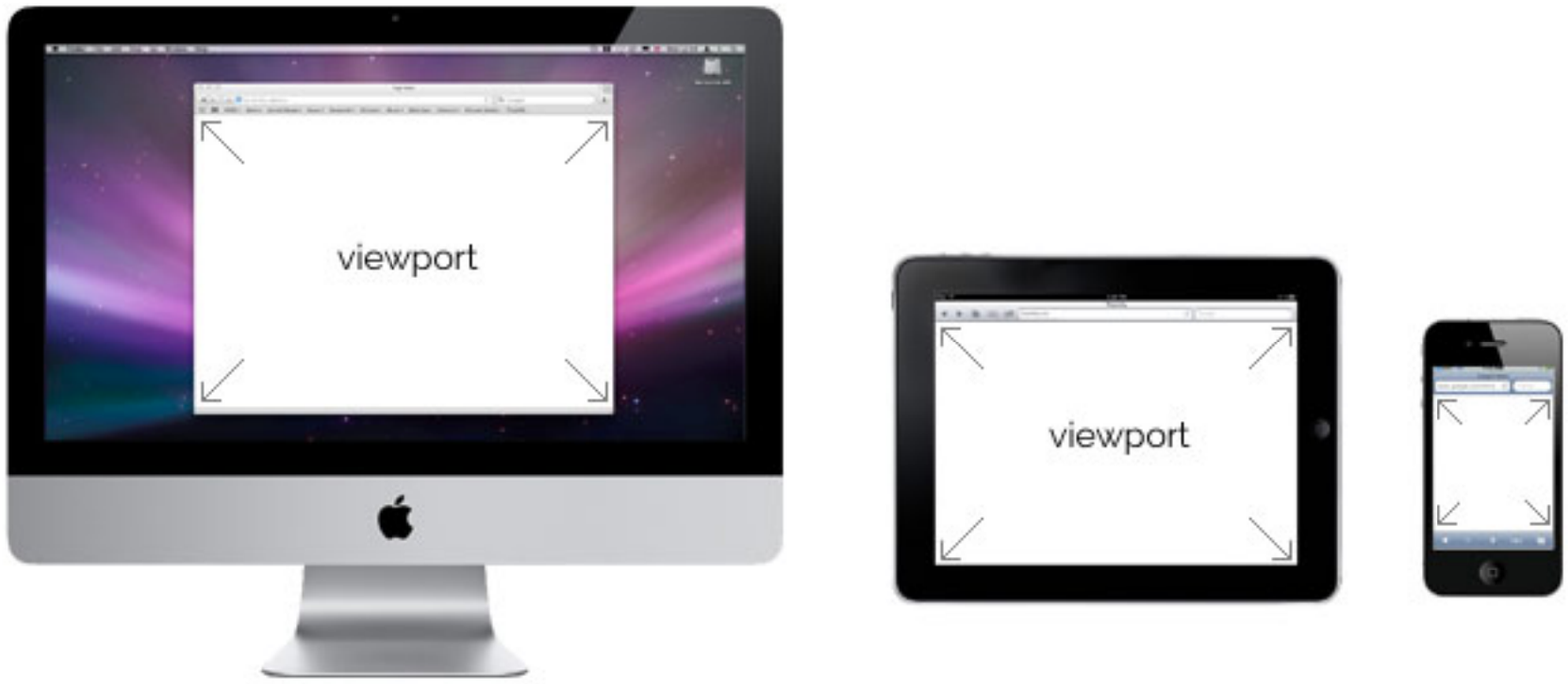
- Eg. Google Android developer documentation groups displays by their approximate pixel densities into the following categories:
  - LDPI: Low density, ~120 dots per inch
  - MDPI: Medium density, ~120-160 dots per inch
  - TVDPI: Medium High density, ~160-213 dots per inch
  - HDPI or HiDPI: High density, ~213-240 dots per inch
  - XHDPI: eXtra High density, ~240-320 dots per inch
  - XXHDPI: eXtra eXtra High density, ~320-480 dots per inch
  - XXXHDPI: eXtra eXtra eXtra High density, ~480-640 dots per inch

Challenges Rendering Images on the Web (2)

- Problem 2: The ‘Viewport’

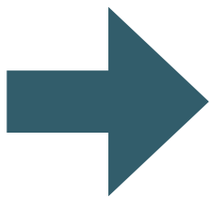
- The browser windows may be a fixed size - on phones & tablets for instance - and dependent of the model/make

- On a desktop the user can of course change the browser dimensions



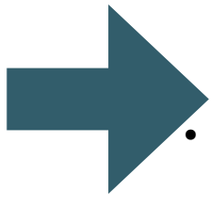
Solutions

- Solution 1: Ignore differences - images renders with simple <img> element and rendered ‘as is’.



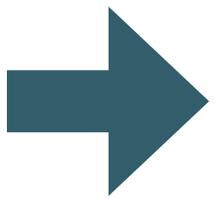
images look appropriate on a small subset of devices

- Solution 2: Set a ‘height’ property in the <img> element. The image will be resized (but not distorted) to the specified dimensions.



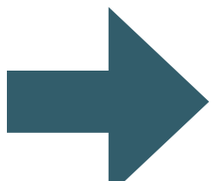
  - Image looks appropriate on specific pixel density screens (but not on others)
  - Browser has to process the image - resizing it. This may consume resources (processor, battery)

- Solution 3: use Javascript



requires ‘programmed’ instead of ‘declarative’ solution

- Solution 4: use **scrset** attribute and/or **<picture>** element



Support still building in browsers - but ‘polyfills’ available

<picture> element

- Offers a declarative approach towards image resource loading.
- Gives web developers more flexibility in specifying image resources.

- *Art direction-based selection*
  - Is this a mobile device held in a portrait orientation or a wide desktop monitor? Load an image that is optimized for the given screen dimensions.
- *Device-pixel-ratio-based selection*
  - Does the device have a high DPI display? Load a higher resolution image.
- *Viewport-based selection*
  - Is the image meant to always fill a fixed proportion of the viewport? Load images relative to the viewport.
- *Image format-based selection*
  - Can the browser support additional image file types that offer performance boosts such as smaller file sizes? Load an alternative image file.

“Art Direction”

Instead of having one image that is scaled up or down based on the viewport width, multiple images can be designed to more appropriately fill the browser viewport

---

Using only one image that is scaled up or down based on the viewport width.

```
img {
    max-width: 100%;
    height: auto;
}
```

Use several different images to more appropriately fill the browser viewport.

<picture> element

- The <picture> element has no unique attributes of its own - it requires a <source> & <img> elements.

- The <source> element can be used for loading media such as video and audio and images

```
<picture>
  <source
      media="(min-width: 650px)"
      srcset="images/iot/devices/devices-modules-wide.png">
  <source
      media="(min-width: 465px)"
      srcset="images/iot/devices/devices-modules.png">
  <img
      src="images/iot/devices/devices-modules.png"
      alt="Devices Module List">
</picture>
```

<source> element

- **srcset**
  - Accepts a single image file path
- **media**
  - Accepts a ‘media query’ which will be matched against device

```
<picture>
  <source
      media="(min-width: 650px)"
      srcset="images/iot/devices/devices-modules-wide.png">
  <source
      media="(min-width: 465px)"
      srcset="images/iot/devices/devices-modules.png">
  <img
      src="images/iot/devices/devices-modules.png"
      alt="Devices Module List">
</picture>
```

- The <img> element is used <picture> as the fallback in case a browser does not support the picture element or if no source element tags are matched.

srcset

- Support for high resolution displays using pixel density descriptors such as 1x, 1.5x, 2x, and 3x.

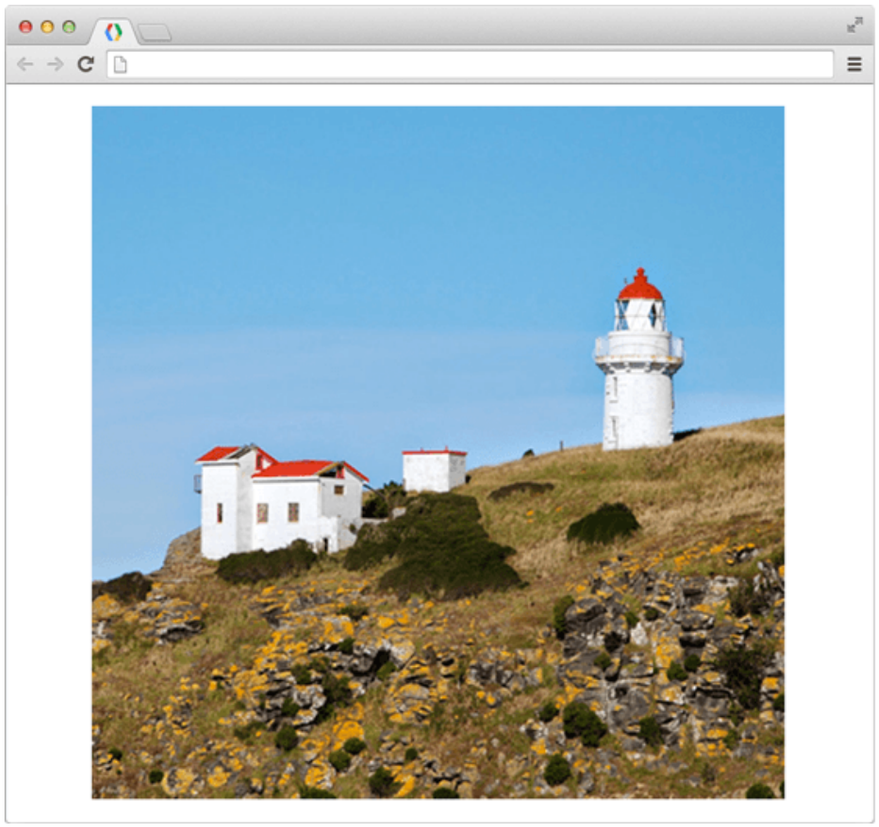
- Applies to both <img> and <source> elements.

```
<picture>
  <source
    media="(min-width: 650px)"
    srcset="images/kitten-stretching.png,
            images/kitten-stretching@1.5x.png 1.5x,
            images/kitten-stretching@2x.png 2x">
  <source
    media="(min-width: 465px)"
    srcset="images/kitten-sitting.png,
            images/kitten-sitting@1.5x.png 1.5x
            images/kitten-sitting@2x.png 2x">
  <img
    src="images/kitten-curled.png"
    srcset="images/kitten-curled@1.5x.png 1.5x,
            images/kitten-curled@2x.png 2x"
    alt="a cute kitten">
</picture>
```

<img> srcset examples

The viewport on the left is approx. 800px wide. The browser will load lighthouse-640.jpg unless the device pixel ratio is 2x—in which case, lighthouse-1280.jpg will be loaded instead.

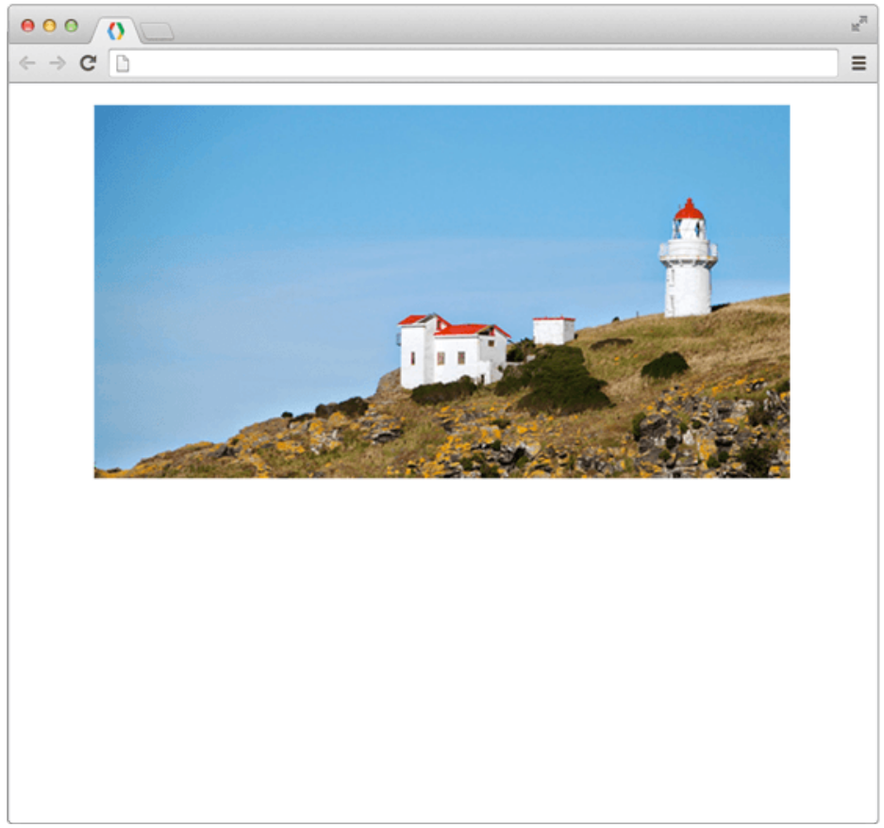
```
<img src="lighthouse-160.jpg" alt="lighthouse"
     sizes="80vw"
     srcset="lighthouse-160.jpg 160w,
             lighthouse-320.jpg 320w,
             lighthouse-640.jpg 640w,
             lighthouse-1280.jpg 1280w">
```



<picture> example

The viewport on the left is above 800px wide so a landscape version of the lighthouse photo will be displayed.

```
<picture>
  <source media="(min-width: 800px)"
          sizes="80vw"
          srcset="lighthouse-landscape-640.jpg 640w,
                  lighthouse-landscape-1280.jpg 1280w,
                  lighthouse-landscape-2560.jpg 2560w">
  <img src="lighthouse-160.jpg" alt="lighthouse"
       sizes="80vw"
       srcset="lighthouse-160.jpg 160w,
               lighthouse-320.jpg 320w,
               lighthouse-640.jpg 640w,
               lighthouse-1280.jpg 1280w">
</picture>
```



Picturefill

A RESPONSIVE IMAGE POLYFILL

The `picture` element, `srcset` and `sizes` attributes, and associated features allow web developers to deliver an appropriate image to every user depending on a variety of conditions like screen size, viewport size, screen resolution, and more. Picturefill enables support for the `picture` element and associated features in browsers that do not yet support them, so you can start using them today!

Picturefill development is sponsored by filament group and bocoup , and maintained by the Picturefill Team. Ongoing discussion of the project is conducted via Slack.

CONTRIBUTING, BUG REPORTS, AND MORE INFORMATION

For more information on the development of Picturefill and how you can file bugs or contribute fixes, check out the project on GitHub.

- Support for Picture elements in older browsers via ‘Polyfills’
- A Javascript library to permit use of <picture>
- Disabled if browser has native support