

Semantic-UI Part IV



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 portfolio of fascinating applications.

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 controllers to single 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 and 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 and interesting ways.

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Department of Computing & Mathematics

BSc (Hons) in the Internet of Things



Waterford Institute of Technology
INSTITIÚD TEICNEOLAÍOCHTA PHORT LÁIRGE

BACHELOR OF SCIENCE (HONOURS)

APPLIED COMPUTING IN THE INTERNET OF THINGS

Program your World!

An exciting new level 8 Honours Degree for 2015. Combine Programming and Electronics and learn how to code cool devices, places and things. Be part of the next wave of innovation in Computing

The background features a stylized network of interconnected icons representing various IoT components like mobile devices, security, and infrastructure, all set against a blue gradient with white arrows indicating connectivity.

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Supported by leading edge research

TSSG
TSSG

 **ctr g**
convergent technologies research group


AUTOMOTIVE CONTROL GROUP
Software Engineering for the Connected Car

Icons

[facebook](#) [twitter](#) [linkedin](#)

```
<footer class="ui segment">
  <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>
```



```
<footer class="ui center aligned segment">
  <a href="http://www.facebook.com/witcomp"> <i class="large facebook icon"></i> </a>
  <a href="http://twitter.com/ComputingAtWIT"> <i class="large twitter icon"></i> </a>
  <a href="http://www.linkedin.com/pub/computing-at-wit"> <i class="large linkedin icon"></i> </a>
</footer>
```

Colours

<http://semantic-ui.com/usage/theming.html>

site/globals/site.variables

less

```
@primaryColor      : @pink;  
@secondaryColor    : @grey;  
@red               : #B03060;  
@orange             : #FE9A76;  
@yellow             : #FFD700;  
@olive              : #32CD32;  
@green              : #016936;  
@teal               : #008080;  
@blue               : #0E6EB8;  
@violet              : #EE82EE;  
@purple              : #B413EC;  
@pink               : #FF1493;  
@brown              : #A52A2A;  
@grey               : #A0A0A0;  
@black              : #000000;
```

Primary Button

Secondary Button

ALL COLORS

Red

Orange

Yellow

Olive

Green

Teal

Blue

Violet

Purple

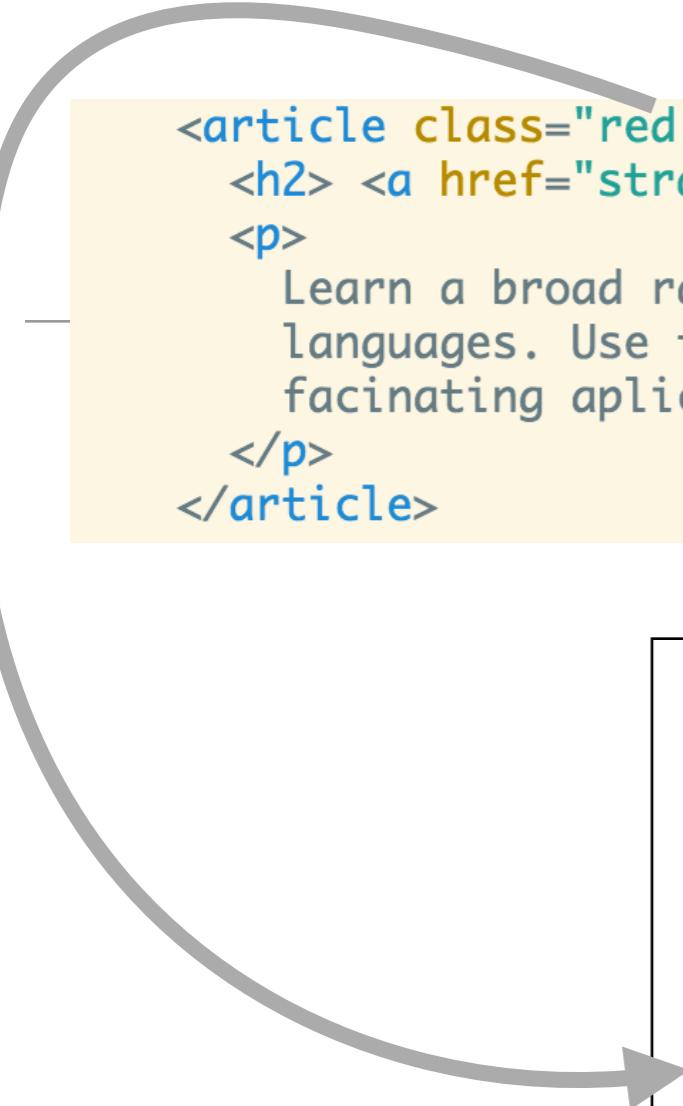
Pink

Brown

Grey

Black

```
<article class="red column">
  <h2> <a href="strands/programming.html"> Programming </a> </h2>
  <p>
    Learn a broad range of programming and problem solving skills, including exciting new p
    languages. Use these skills to build apps for mobile, cloud and device based IoT applic
    facinating applications.
  </p>
</article>
```



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```
<section class="ui three column row">

  <article class="red column">
    ...
  </article>

  <article class="orange column">
    ...
  </article>

  <article class="yellow column">
    ...
  </article>

</section>

<section class="ui three column row">

  <article class="olive column">
    ...
  </article>

  <article class="green column">
    ...
  </article>

  <article class="blue column">
    ...
  </article>

</section>
```

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Networks

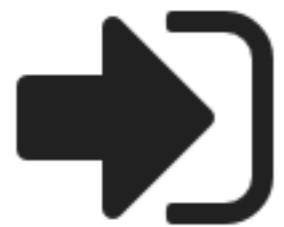
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```
<i class="huge settings icon"></i>
<i class="huge bar chart icon"></i>
<i class="huge space shuttle icon"></i>
<i class="huge cloud upload icon"></i>
<i class="huge lab icon"></i>
<i class="huge wizard icon"></i>
```

```
<article class="red column">
  <h2> Programming </h2>
  <p>
    Learn a broad range of programming and problem solving skills
  </p>
  <div class="ui two column grid">
    <div class="left aligned column">
      <i class="huge settings icon"></i>
    </div>
    <div class="right aligned column">
      <a href="strands/programming.html" class="strandlink">
        <i class="huge sign in icon"></i>
      </a>
    </div>
  </div>
</article>
```

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- Encapsulate icons in 2 column grid
 - Left align first icon
 - Right align second icon

Raised Segment

Raised



A segment may be formatted to raise above the page.

Example



Pellentesque habitant morbi tristique senectus et netus et malesuada fames ac turpis egestas. Vestibulum tortor quam, feugiat vitae, ultricies eget, tempor sit amet, ante. Donec eu libero sit amet quam egestas semper. Aenean ultricies mi vitae est. Mauris placerat eleifend leo.

```
<div class="ui raised segment">
  <p>Pellentesque habitant morbi tristique senectus et netus et
  malesuada fames ac turpis egestas. Vestibulum tortor quam, feugiat
  vitae, ultricies eget, tempor sit amet, ante. Donec eu libero sit amet
  quam egestas semper. Aenean ultricies mi vitae est. Mauris placerat
  eleifend leo.</p>
</div>
```

Padded Segment

Padded



A segment can increase its padding

Example



```
<div class="ui padded segment">
  <p></p>
</div>
```

Stacked Segment

Stacked



A segment can be formatted to show it contains multiple pages

Example



Pellentesque habitant morbi tristique senectus et netus et malesuada fames ac turpis egestas. Vestibulum tortor quam, feugiat vitae, ultricies eget, tempor sit amet, ante. Donec eu libero sit amet quam egestas semper. Aenean ultricies mi vitae est. Mauris placerat eleifend leo.

```
<div class="ui stacked segment">
  <p>Pellentesque habitant morbi tristique senectus et netus et malesuada
fames ac turpis egestas. Vestibulum tortor quam, feugiat vitae, ultricies
eget, tempor sit amet, ante. Donec eu libero sit amet quam egestas semper.
Aenean ultricies mi vitae est. Mauris placerat eleifend leo.</p>
</div>
```

<section class="ui three column padded stacked grid segment">

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The IoT requires a new breed of software skills, with an emphasis on flexible, reactive, and highly networked applications and services. This software runs on a diverse range of systems, is frequently connected to cloud services, and may be capable of leveraging large data sets to deliver inferences and decision support in an informed manner. The software is designed and implemented using agile techniques, with an emphasis on test driven development and quality user experiences..

Year 1

Semester 1

Semester 2

Semester 3

Year 2

Semester 4

Year

Semester 5

Programming Fundamentals I

Web Development I

Programming Fundamentals II

Web Development II

Programming Learning Path

The Data Science strand will begin with the fundamentals of relational databases used to store structured transactions and descriptive analysis required to predict future events and to identify relationships in data. In the third year the students will manage unstructured data (such as text, images, audio, video) using big data technologies like Hadoop and Spark. They will learn how to process and analyze large volumes of data in real-time. The fourth year will focus on machine learning and AI, where students will develop algorithms to automatically extract insights from data. The fifth year will involve research projects and internships in the industry.

- Images set to default size
- Text not positioned correctly

```

<article>
  <h1> Programming </h1>
  <p>
    
    The IoT requires a new breed of software skills, with an emphasis on flexible, reactive, and highly networked applications and services. This software runs on a diverse range of systems, is frequently connected to cloud services, and may be capable of leveraging large data sets to deliver inferences and decision support in an informed manner. The software is designed and implemented using agile techniques, with an emphasis on test driven development and quality user experiences..
  </p>
</article>

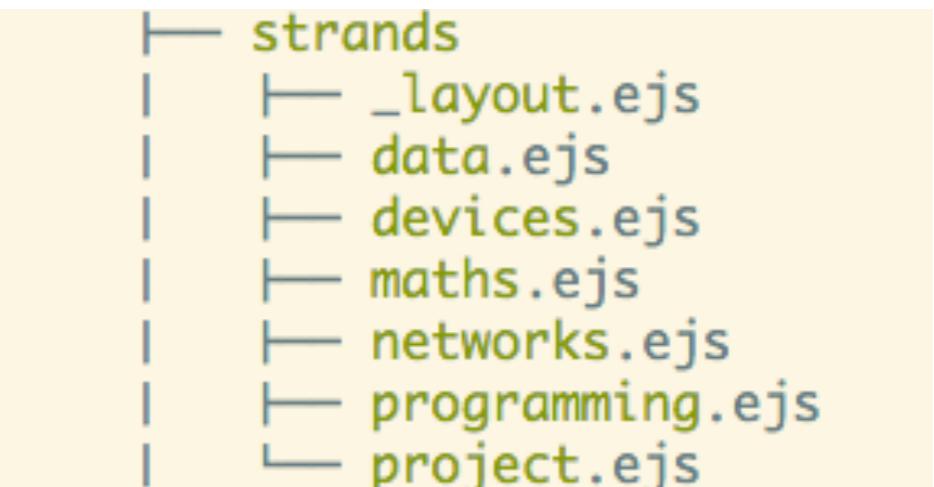
<figure>
  
  
</figure>

<article>
  <h2> Programming Learning Path </h2>
  <p>
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  </p>
</article>

```

_layout.ejs

- A common layout
- All pages in strands folder based on this layout
 - Any change to _layout.ejs
 - —> immediately changes all strands pages



Department of Computing & Mathematics
BSc (Hons) the Internet of Things

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Mathematics

The Mathematics Strand underpins most of the other strands: its purpose is to provide a rigorous foundation for many of the more applied concepts met in the other strands. As such it is offered early in the course.

Discrete Mathematics represents a broad first rather than depth first treatment of concepts such as logic (cf. Programming), complexity and recurrence (cf. Algorithms), sets (cf. Data Structures), enumeration (cf. Statistics), relations (cf. Databases) and graphs (cf. Algorithms and Networking). Its purpose is to ensure that all students have a basic mathematical literacy in such topics. In such a one semester course, the treatment will necessarily be at an introductory level, but the concepts will be covered in greater depth later in the course, mainly in modules on other strands.

Year 1 Year 2

Semester 1 Semester 2

Computer Systems I Computer Systems II

Networks Learning Path

Mathematics Learning Path

Applied Calculus ensures that students understand features of the real world such as rates of change (which are critical to many sensing systems) and can manipulate relationships between quantities that vary on a continuous scale. It also covers much of the engineering mathematics needed to understand the devices themselves, needed for the Devices and Systems Strand, and shows how numerical methods reconcile the finite, discrete world of digital computers and networks with the continuous world in which the IoT devices and networks are deployed. Mathematical Methods (in Semester 3) builds on the Applied Calculus module in Semester 2, and shows how the rate of change concept is extended to multivariate functions and its subsequent applications. However, the major focus of this module is on the concepts and methods of linear algebra, and the various applications in other modules during the programme (e.g., state-space modeling, computer vision and machine learning).

facebook twitter linkedin

_layout.ejs

```
...
<body>
  <section class="ui container">
    <%- partial("../includes/_header.ejs") %>
    <section class="ui grid segment">
      <%- yield %>
    </section>
    <%- partial("../includes/_footer.ejs") %>
  <section>
</body>
...

```

- Make the segment a ‘grid’
- Rework each strand page to row/column structure
- + use ‘ui image’ for consistent image sizing

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The diagram shows a central yellow circle labeled 'Domain Model' containing icons of a lightbulb, a smartphone, a server, and a sensor. Surrounding this are several concentric rings of components:

- Outermost Ring (Blue):** Triggers, Actions, Automation, Modules.
- Second Ring (Light Blue):** Discovery, Connectivity, Bindings.
- Third Ring (Pink):** REST API.
- Fourth Ring (Orange):** Events.
- Inner Rings:** Persistence, Databases, IoT/Cloud, User Interfaces, Icons, Widgets, Logging.

Below the diagram is a grid showing the course structure over four years:

| | Year 1 | Year 2 | Year 3 | Year 4 |
|------------|----------------------------|-----------------------------|-------------------------|-----------------|
| Semester 1 | Programming Fundamentals I | Programming Fundamentals II | Algorithms | Data Structures |
| Semester 2 | Web Development I | Web Development II | | |
| Semester 3 | | | | |
| Semester 4 | | | | |
| Semester 5 | | | Application Development | |
| Semester 6 | | | | |
| Semester 7 | | | Distributed Systems I | |
| Semester 8 | | | Distributed Systems II | |

Learning Paths

The Data Science strand will begin with the fundamentals of relational databases used to store structured transactional business data. This data holds the basis for reporting and descriptive analysis required to predict future events and to identify relationships in data. In the third year the students will extend their knowledge to NoSQL (especially for managing unstructured data) databases and data warehouses (supporting consistent views of a domain, and as a springboard for statistics and machine learning analyses). In the IoT context the importance of dealing with large volumes of data in terms of storage and analytics is great. The skills they learn will allow them to design and implement the appropriate data solution with a complete understanding and knowledge of the available options. The students will learn about the trade-offs in terms of consistency, availability and partitioning. In the fourth year students will learn and implement the skills of data mining covering classification, prediction and clustering, applied to data that had been managed using methods and technologies they have learned about in previous years.

A screenshot of a code editor showing a snippet of Python code. The code appears to be part of a class or function, likely related to database operations or file handling. It includes comments explaining the logic of adding or removing shortcut links between titles based on their suffixes and prefixes. The code uses variables like \$vars, title_prefix, title_suffix, and shortcut_wrapper, and performs operations like file reading and writing.

fb tw in

ui grid

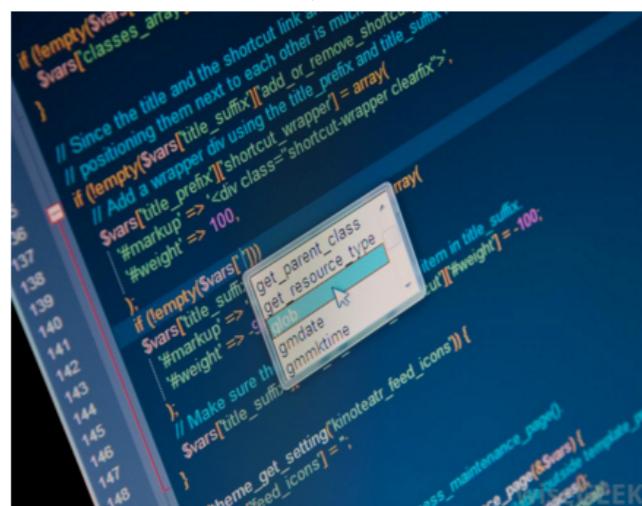
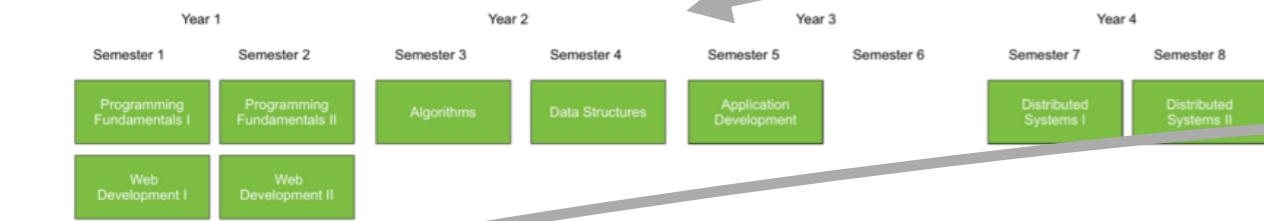
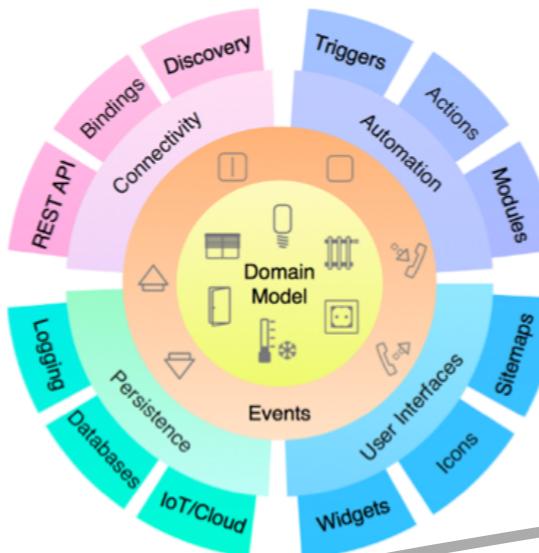
- Each grid is 16 units
- “eight wide” consumes half the available width
- ‘sixteen wide’ consumes full available width

```
<article class="eight wide column">
  <h1> Programming </h1>
  <p>
    The IoT requires a new breed of software skills, with an emphasis on f...
  </p>
</article>

<aside class="eight wide column">
  
  
  
  
  <h2> Learning Paths </h2>
  <p>
    The Data Science strand will begin with the fundamentals of relational...
  </p>
</section>
```

Programming

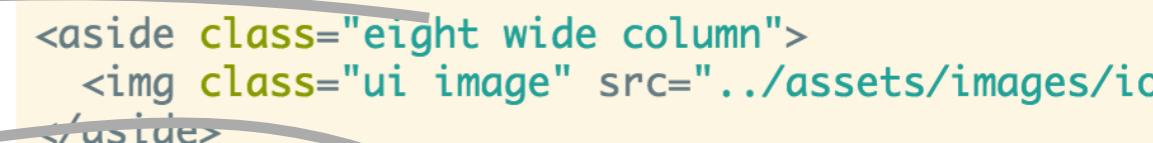
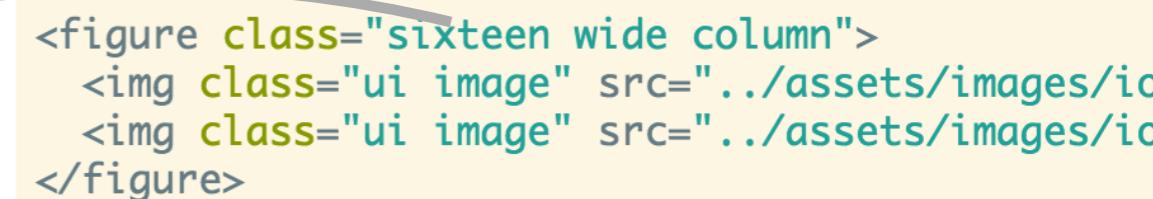
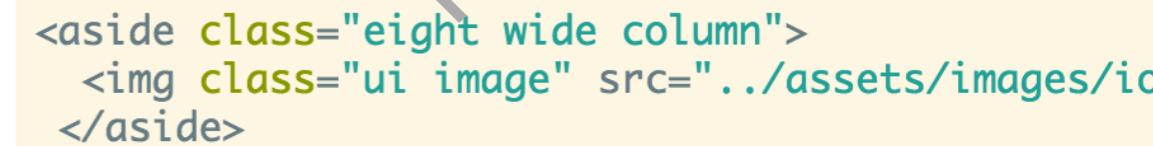
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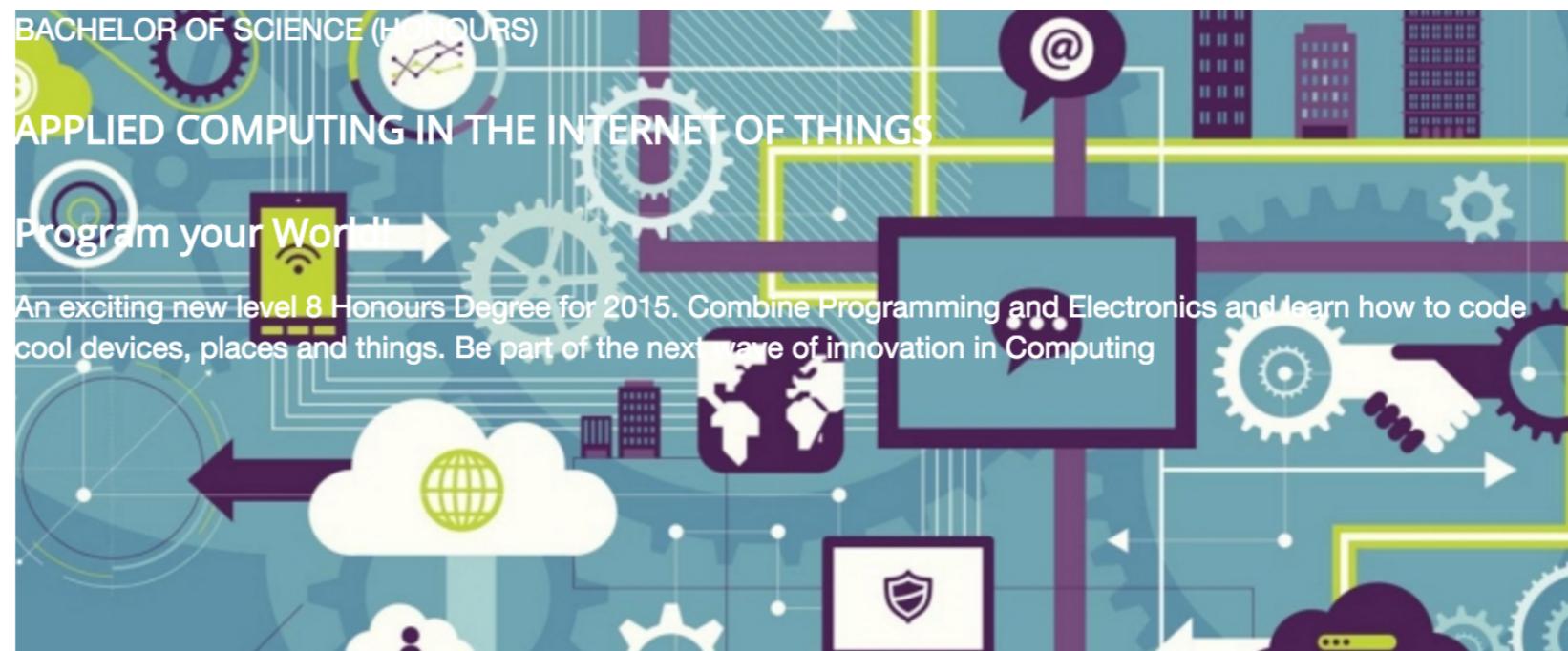
- We could have used ‘ui row’ as well, but just using cols will also suffice

Department of Computing & Mathematics



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Banner
Segment
-current

background image

```
.banner {  
background: url("/assets/images/banner.jpg") top center;  
background-position: top center;  
color: white;  
height:300px;  
}
```

```
<!DOCTYPE html>  
<html lang="en">  
<head>  
  <meta charset="UTF-8">  
  <link rel="stylesheet" type="text/css" href="http://fonts.googleapis.com/  
  <link rel="stylesheet" href="assets/css/semantic.css">  
  <link type="text/css" rel="stylesheet" href="style.css" media="screen"/>  
  <title>BSc in the Internet of Things</title>  
</head>  
<body>  
<section class="ui container">  
  <% partial("includes/_header.ejs") %>  
  <% partial("includes/_summary.ejs") %>  
  <% partial("includes/_curriculum.ejs") %>  
  <% partial("includes/_sponsors.ejs") %>  
  <% partial("includes/_footer.ejs") %>  
</section>  
</body>  
</html>
```

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```
<article class="banner">  
<div>  
  <p> BACHELOR OF SCIENCE (HONOURS)  
  </p>  
  <h3> APPLIED COMPUTING IN THE INTERNET OF THINGS  
  </h3>  
  <h3> Program your World!  
  </h3>  
  <p> An exciting new level 8 Honours Degree for 2015. Combine Programming to code cool devices, places and things. Be part of the next wave of  
  </p>  
</div>  
</article>
```

Department of Computing & Mathematics



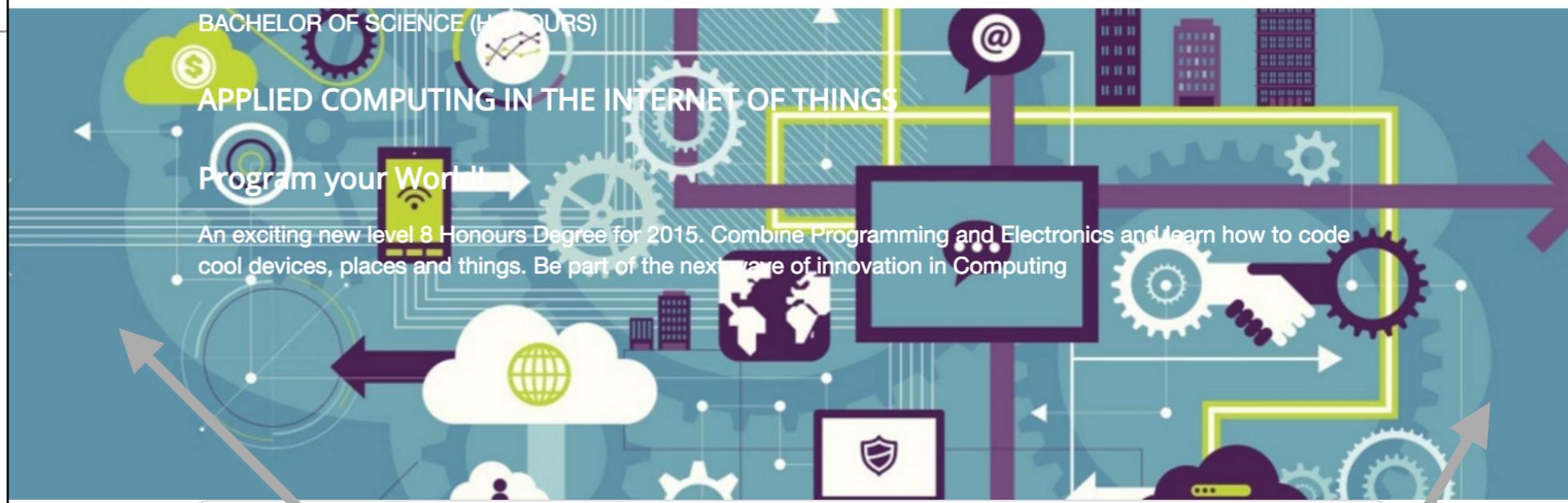
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BSc (Hons) the Internet of Things

Department of Computing & Mathematics



BSc (Hons) the Internet of Things



```
<!DOCTYPE html>
<html lang="en">
<head>
  <meta charset="UTF-8">
  <link rel="stylesheet" type="text/css" href="http://fonts.googleapis.com/css?family=Open+Sans+Condensed:300&subset=latin-ext">
  <link rel="stylesheet" href="assets/css/semantic.css">
  <link type="text/css" rel="stylesheet" href="style.css" media="screen">
  <title>BSc in the Internet of Things</title>
</head>
<body>
  <section class="ui container">
    <%= partial("includes/_header.ejs") %>
  </section>
  <section class="banner">
    <section class="ui container">
      <%= partial("includes/_summary.ejs") %>
    </section>
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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.

- Stretch the background image to the edges

Department of Computing & Mathematics



Waterford Institute of Technology
INSTITIÚID TEICNEOLAÍOCHTA PHORT LÁIRGE

BSc (Hons) the Internet of Things

BACHELOR OF SCIENCE (HONOURS)

APPLIED COMPUTING IN THE INTERNET OF THINGS

Program your World!

An exciting new level 8 Honours Degree for 2015. Combine Programming and Electronics and learn how to code cool devices, places and things. Be part of the next wave of innovation in Computing



Programming

Learn the fundamental concepts of programming and

Data Science

At the forefront of many IoT applications is

Devices

The IoT is built upon a network of sensors and

```

<section class="ui grid">
  <article class="ui seven wide column raised blue segment">
    <div>
      <p>
        BACHELOR OF SCIENCE (HONOURS)
      </p>

      <h3>
        APPLIED COMPUTING IN THE INTERNET OF THINGS
      </h3>

      <h3>
        Program your World!
      </h3>
      <p>
        An exciting new level 8 Honours Degree for 2015. Combine Programming and Electronics and learn how to code cool devices, places and things. Be part of the next wave of innovation in Computing
      </p>
    </div>
  </article>
</section>

```

```

<body>
  <section class="ui container">
    <%= partial("includes/_header.ejs") %>
  </section>
  <section class="banner">
    <section class="ui container">
      <%= partial("includes/_summary.ejs") %>
    </section>
  </section>
  <section class="ui container">
    <%= partial("includes/_curriculum.ejs") %>
    <%= partial("includes/_sponsors.ejs") %>
    <%= partial("includes/_footer.ejs") %>
  </section>
</body>

```

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Programming

Data Science

Devices

Computing & Mathematics



Waterford Institute of Technology
www.wit.ie/witbites/internet-of-things

BSc (Hons) the
Internet of
Things

Programming

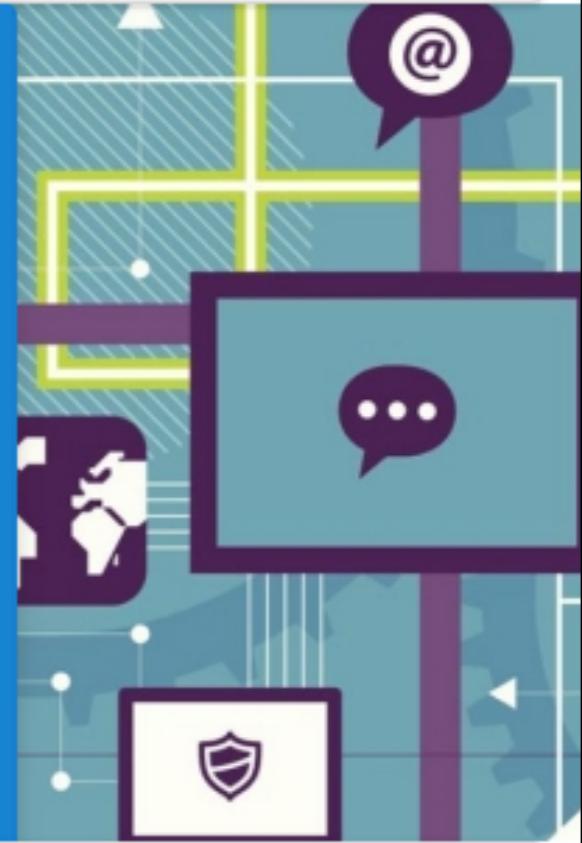
The IoT requires a new breed of software skills, with an emphasis on flexible, reactive, and highly networked applications and services. This software runs on a diverse range of systems, is frequently connected to cloud services, and may be capable of leveraging large data sets to deliver inferences and decision support in



BACHELOR OF
SCIENCE
(HONOURS)

APPLIED
COMPUTING
IN THE
INTERNET OF
THINGS

Program your
World!



Program

Data Science

Learn a broad range of programming and problem solving skills, including exciting new platforms,

Devices

At the heart of many IoT applications is data: measurement events, alarms and other information that must

The 'Things' we connect to are often physical devices. These can range from simple temperature sensors to

Unresponsive Layouts



Programming

The IoT requires a new breed of software skills, with an emphasis on flexible, reactive, and highly networked applications and services. This software runs on a diverse range of systems, is frequently connected to cloud services, and may be capable of leveraging large data sets to deliver inferences and decision support in an informed manner. The software is designed and implemented using agile techniques, with an emphasis on test driven development and quality user experiences..



| Year 1 | | Year 2 | | Year 3 | | Year 4 | |
|----------------------------|-----------------------------|------------|-----------------|-------------------------|------------|-----------------------|------------------------|
| Semester 1 | Semester 2 | Semester 3 | Semester 4 | Semester 5 | Semester 6 | Semester 7 | Semester 8 |
| Programming Fundamentals I | Programming Fundamentals II | Algorithms | Data Structures | Application Development | | Distributed Systems I | Distributed Systems II |
| Web Development I | Web Development II | | | | | | |

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 portfolio of fascinating applications.



Data Science

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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.



Responsive Layouts

Networks

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

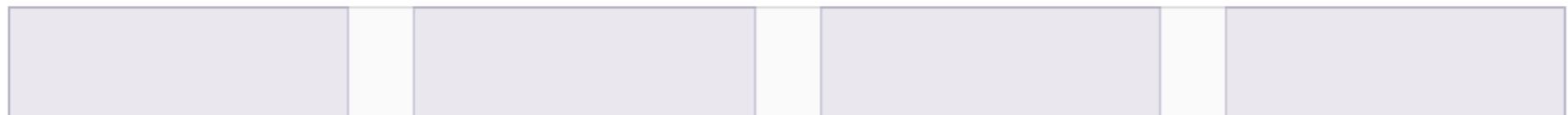


Grids

A grid is a structure with a [long history](#) used to align negative space in designs.

Using a grid makes content appear to flow more naturally on your page.

Toggle Animation



Columns

Grids divide horizontal space into indivisible units called "columns". All columns in a grid must specify their width as proportion of the total available row width.

All grid systems chooses an arbitrary column count to allow per row. Semantic's default theme [uses 16 columns](#).



Responsive Grids

Introduction

Grids

Columns

Rows

Gutters

Negative Margins

Page Grids

Columns

Rows

Varying Grids

Responsive Grids

Containers

Stackable

Reverse Order

Doubling

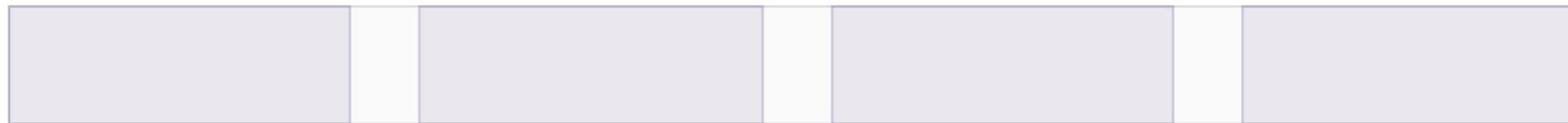
Manual Tweaks

Stackable



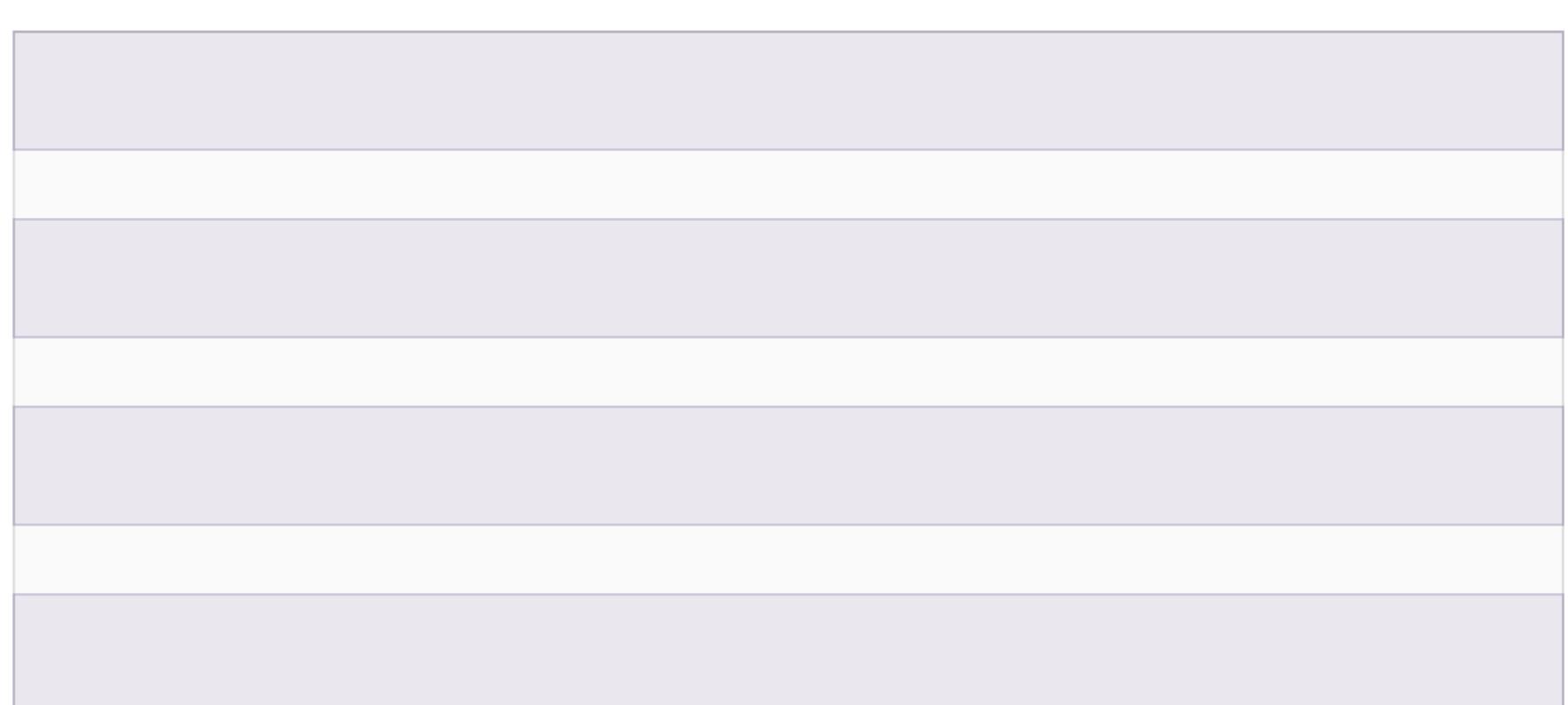
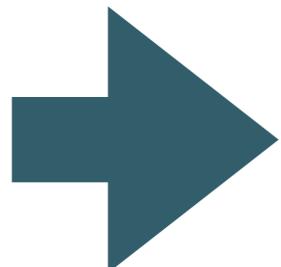
A **stackable grid** will automatically stack rows to a single columns on mobile devices

Example



```
<div class="ui stackable four column grid">
  <div class="column"></div>
  <div class="column"></div>
  <div class="column"></div>
  <div class="column"></div>
</div>
```

- Grid elements
‘stackable’ if
the browser
width to narrow

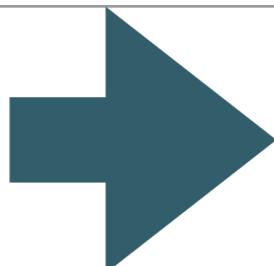


Computing & Mathematics



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Things



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```
<header class="ui two column center aligned middle aligned stacked stackable grid segment">
  <div class="column">
    <h2 class="ui header"> Department of Computing & Mathematics </h2>
    <h3 class="ui header"> BSc (Hons) the Internet of Things </h3>
  </div>
  <div class="column">
    <p>
      
    </p>
  </div>
</header>
```

- Distinguish between ‘stackable’ and ‘stacked’?

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Stackable

```
<section class="ui three column padded stacked stackable grid segment">

  <article class="red column">
    <h2> Programming </h2>
    <p>
      Learn a broad range of programming and problem solving skills, including software tools and languages. Use these skills to build apps for mobile IoT applications. Evolve a portfolio of fascinating applications.
    </p>
    <div class="ui two column grid">
      <div class="left aligned column">
        <i class="huge settings icon"></i>
      </div>
      <div class="right aligned column">
        <a href="strands/programming.html">
          <i class="huge sign in icon"></i>
        </a>
      </div>
    </div>
  </article>
</section>
```

- ‘stackable grid’ class makes all columns in the grid stack up as browser narrows

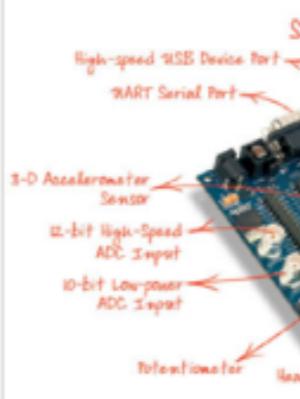
_layout.ejs

```
<body>
  <section class="ui container">
    <%- partial("../includes/_header.ejs") %>
    <section class="ui stackable grid segment">
      <%- yield %>
    </section>
    <%- partial("../includes/_footer.ejs") %>
  <section>
</body>
```

- All strand pages now responsive, as they are based single _layout.ejs

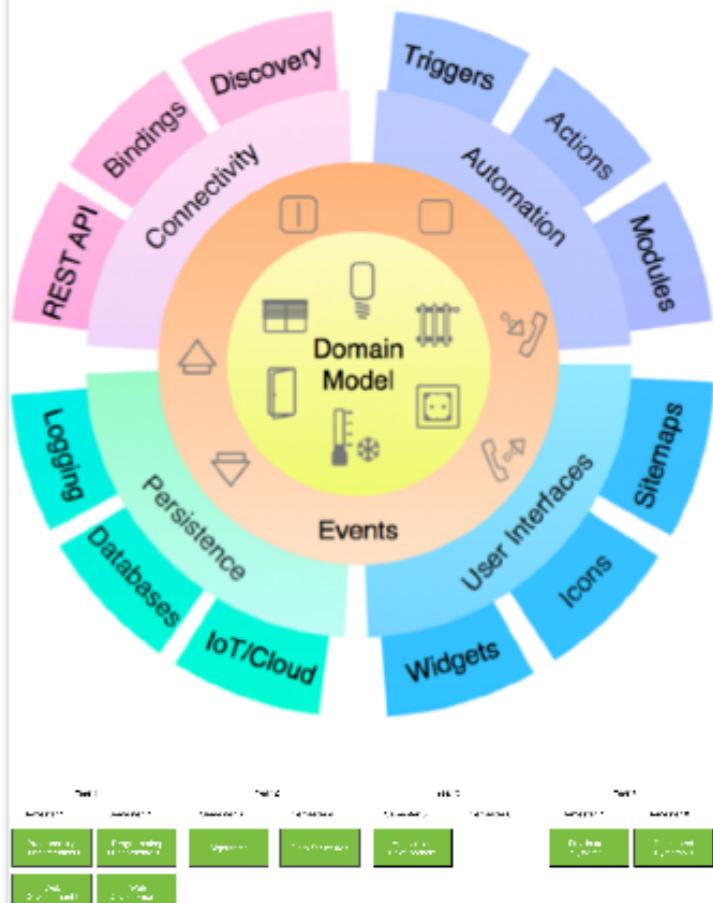
Devices

The IoT professional must be comfortable when dealing with the many kinds of devices and systems that are the means for the Internet to interact with the environment. Such an awareness of the devices and systems made to perform well attributes may be ch



Programming

The IoT requires a new breed of software skills, with an emphasis on flexible, reactive, and highly networked applications and services. This software runs on a diverse range of systems, is frequently connected to cloud services, and may be capable of leveraging large data sets to deliver inferences and decision support in an informed manner. The software is designed and implemented using agile techniques, with an emphasis on test driven development and quality user experiences..



```
if (emptyStar->
  Stars[classes_.all->
    ] Since the title and the shortcut link are
  Stars[title_.suffix][add_ or remove_short-
    ] add_ or remove_short-
  Stars[title_.suffix][add_ or remove_short-
    ] add_ or remove_short-
  Stars[title_.suffix][add_ or remove_short-
    ] add_ or remove_short-
```

Semantic-UI Libraries

```
iot-web-ejs
├── harp.json
└── public
    ├── assets
    │   ├── css
    │   │   ├── semantic.css
    │   │   └── themes
    │   │       ├── basic
    │   │       └── default
    │   │           └── github
    │   └── images
    ...
    ...
```

- This is the library:
 - semantic.css
 - + a set of icons and other assets
- The project is not heavily dependent on these files

- semantic.css is linked from all pages:

```
<link rel="stylesheet" href="/assets/css/semantic.css">
```

Alternative Mechanisms for Linking Semantic.css

- Replace

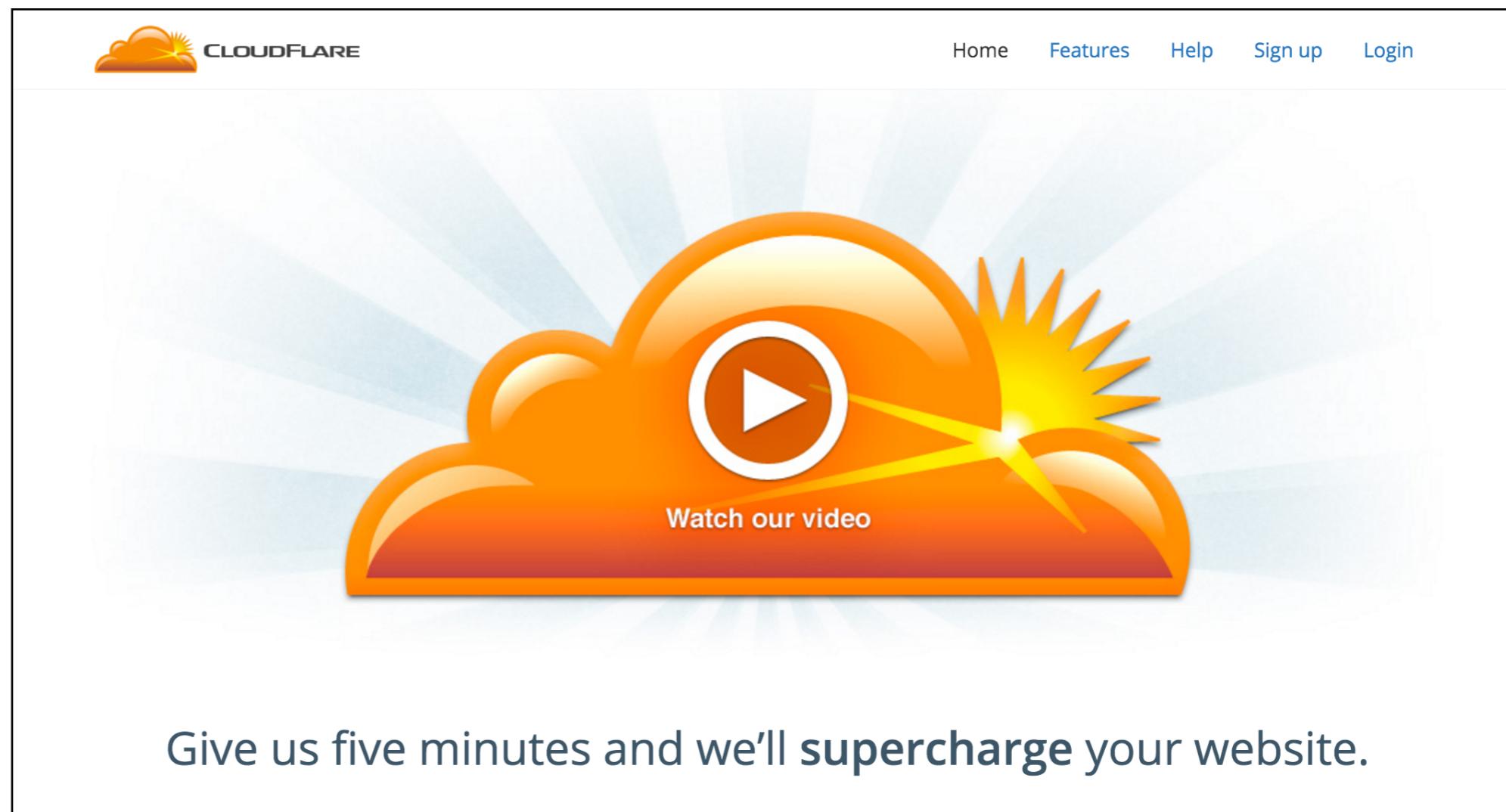
```
<link rel="stylesheet" href="/assets/css/semantic.css">
```

-
- With

```
<link rel="stylesheet" href="https://cdnjs.cloudflare.com/ajax/libs/semantic-ui/2.1.6/semantic.min.css" type="text/css">
<script type="text/javascript" src="http://cdnjs.cloudflare.com/ajax/libs/jquery/2.0.3/jquery.min.js"></script>
<script type="text/javascript" src="https://cdnjs.cloudflare.com/ajax/libs/semantic-ui/2.1.6/semantic.min.js"></script>
```

- Cloud flare is a Content Delivery Network (CDN)

- It hosts many common libraries and assets in the cloud, simplifying access



class =“ui container”

class =“ui segment”

class =“ui header”

class =“ui image”

class =“ui grid”

class =“ui row”

class =“ui column”

class =“ui table”

class =“ui icon”

Summary of Classes (encountered so far)

Variations: grid

stackable, {number} column (*16 for full row*)

Variations: segment

raised, stacked, padded, left/center/right aligned,
top/middle/bottom aligned, {colour}

Variations: table

striped, single line, celled, collapsing

Variations: sizes of image & icon

mini, tiny, small, medium, large, big, huge, massive