HTML Interfaces

Embedded Interface Design

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Learning Objectives

- Students will be able to…
  - Recognize the use of HTML and web interfaces for embedded devices
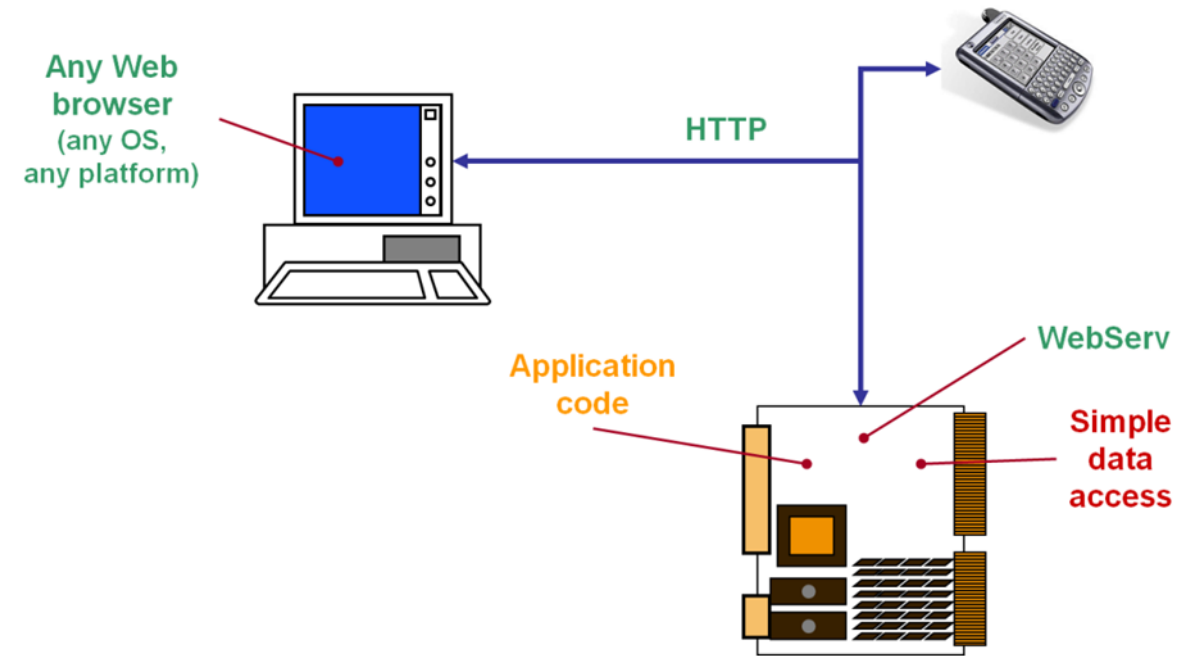 - Develop HTML interfaces for class projects

UIs for Embedded Devices

- If you consider talking to an embedded device for monitoring or controlling it, there are several approaches
    - A direct UI on the device (such as LEDs and switches -OR- a QT display on a connected touchscreen)
    - A command line interface to the device OS (e.g. ssh)
    - A remote UI
        - On another device, a connected computer, a smart phone or tablet
        - On a webpage served by the device
    - Or something more indirect
        - A device controlled and monitored by connection to the cloud via an API
    - You can probably think of other variations

HTML UIs for Embedded Devices

- One common pattern for Embedded Device UIs is a served HTML page from an embedded device's own web server [1]
- This approach requires a web server on the device, and the development of HTML pages that the device will serve to external browsers that connect to the device
- In addition, exposing this connection to your device immediately raises security concerns

Any Web browser (any OS, any platform)

HTTP

Application code

WebServ

Simple data access

CSS

- CSS 3 – Cascading Style Sheets – describes how HTML elements are to be displayed
    - CSS syntax: selector {property:value;}
        - Example: h1 `{ color:blue; font-size:12px;}`
- CSS styles can be set for HTML by external style sheets, internal style sheets, or inline
- Easy to find examples on the web
- Tutorial at W3Schools [4]
- Many HTML and CSS cheatsheets [5]

HTML

- HTML 5 – HyperText Markup Language – standard language for creating web pages or applications

```
<!DOCTYPE html>
<html>
    <body>
        <h1>My First Heading</h1>
        <p>My first paragraph.</p>
    </body>
</html>
```

- Examples all over the web
- Simple tutorials at W3Schools [2]
- Two page cheatsheet at [3]

jQuery

- jQuery – a rich JavaScript library for developing web UIs (and more) including many standard UI widgets (buttons, menus, tabs, etc.)
- Example shown from JQuery UI [6]
- Complete info at jQuery [7]

Widget Factory

Create stateful jQuery plugins using the same abstraction as all jQuery UI widgets.

Examples

Default functionality

color me

change

color me

change

color me

change

Toggle disabled option

Go green

Putting it all together

- The best way to learn these languages is to look at examples and write some code
- Again – W3Schools has HTML, CSS, JavaScript, jQuery, SQL, and Node.JS [8]
- If you need more of a reference for HTML, JavaScript, and jQuery, I have used Dane Cameron's book "A Software Engineer Learns HTML5, JavaScript and jQuery" [9] – great book

A Software Engineer Learns

HTML5
JavaScript
& jQuery

DANE CAMERON
A guide to standards-based web applications

Look at some code?

- An example
- https://jqueryui.com/

References

[1] https://www.embedded.com/design/connectivity/4439644/Using-an-embedded-Web-server
[2] https://www.w3schools.com/html/
[3] https://web.stanford.edu/group/csp/cs21/htmlcheatsheet.pdf
[4] https://www.w3schools.com/Css/
[5] https://cssauthor.com/html-and-css-cheat-sheets/
[6] https://jqueryui.com/widget/#default
[7] https://jquery.com/
[8] https://www.w3schools.com/default.asp
[9] https://www.amazon.com/Software-Engineer-Learns-JavaScript-jQuery-ebook/dp/B00GAMTRI8/ref=la_B00GXWU0KO_1_1?s=books&ie=UTF8&qid=1488134026&sr=1-1