

20
20

REFLECTING
ON OUR PAST

FOCUSED
ON OUR FUTURE

STATEWIDE IT
EST. 1995

Multi-touch app development with modern web tools

David Reagan, Advanced Visualization Lab



**RESEARCH
TECHNOLOGIES**

INDIANA UNIVERSITY

University Information Technology Services
Pervasive Technology Institute



**PERVASIVE TECHNOLOGY
INSTITUTE**

INDIANA UNIVERSITY

Advanced Visualization Lab

- A unit of the Research Technologies division of UITS
- Research Technologies is a PTI Cyberinfrastructure and Service Center
- "...to promote the innovative application of visual technologies to advance Indiana University's missions in research, education, creative activity, and community outreach"

Touch hardware



- IQ-Table
- IQ-Tilt
- Touch monitors
- Tablets

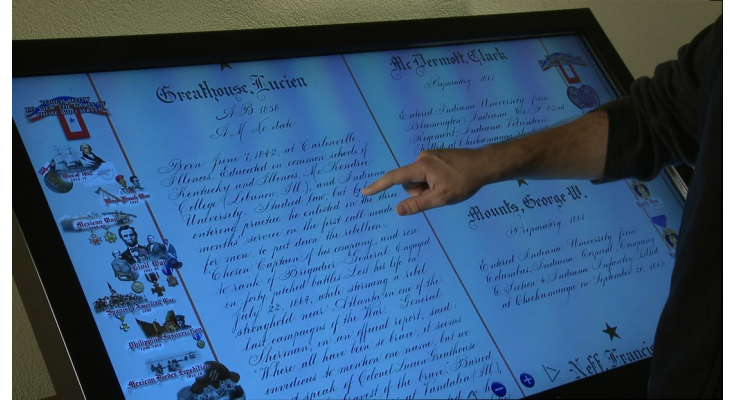
IQ-Table v2

- 55" monitor in table orientation
- Quad-HD resolution
 - 3840 pixels by 2160 pixels
- Capable of 32-point multi-touch
- Built-in Windows PC
- Custom frame, legs, skirt



Early touch projects

- Brownsburg Challenger Center
- Places & Spaces: Illuminated Diagrams
- Conference kiosks
- Stereoscopic video kiosk
- Digital signage
- Digital Golden Book
- Digital *On the Road* manuscript



Collection Viewer

- Developed for the 2012 Smithsonian Folklife Festival, reused many times since
- Simple, multi-user interface to digital media collections
- Flash application using the Open Exhibits framework
- Expanded to serve as interface to 2nd display

Africa

Asia

Oceania

North America

South America



**So why are we talking about web
technology?**

**20
20**

STATEWIDE IT
EST. 1995

Why not Open Exhibits?

- Limited lifespan for Flash, especially on the web
- Philosophical choice: configuration over code
 - Build app once, let community customize through configs
 - Complex configs → AVL still configured apps
 - Feature creep as clients request apps that were similar to, but not exactly, the existing software
 - Ultimately, we didn't save much time

Why web tech for touch applications?

- Recent maturation of HTML/CSS/JavaScript
 - Including tools for entire workflow (more on this later)
- Accessible to most developers
- Deployable to most platforms
- Design and content freedom



HAMMER.JS

You can touch this

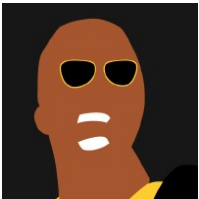
20
20

STATEWIDE IT
EST. 1995

Hammer.js <https://hammerjs.github.io/>

“open-source library that can recognize gestures made by touch, mouse and pointerEvents”

- Provides recognizers for Tap, Press, Swipe, Pan, Pinch, Rotate
- Options to create custom recognizers like 2-finger pan or quadruple-tap
- Also available as jQuery plugin or Angular directive
- Emulator for non-touch devices



AVL development workflow

Development tools: Git + GitHub

“Git is a free and open source distributed version control system designed to handle everything from small to very large projects with speed and efficiency.”

GitHub: “Powerful collaboration, code review, and code management”

3 Git(Hub) talks at SWIT 2015



Development tools: Node.js

“a JavaScript runtime built on Chrome's V8 JavaScript engine”

- JavaScript as a server-side language
 - Developer-side for us
- **npm**: “largest ecosystem of open source libraries in the world”
 - Package manager for our development tools



Development tools: gulp

Automate development tasks, similar to *make*

- **gulp serve** : launch Browsersync server on source files
- **gulp test** : run unit tests with Karma
- **gulp protractor** : run e2e tests with Protractor
- **gulp build** : build optimized application for deployment



Front-end tools: Bower

“A package manager for the web”

- Specify frameworks, libraries, etc in config file
- ***bower install*** : download local copies
- **gulp** task to automatically inject includes into index.html



Front-end tools: AngularJS

- Framework for creating dynamic single-page web applications
- Maintained by Google and others
- Model-View-Controller architecture
- Declarative programming for UI, imperative for logic



Development tools: Yeoman

“The web's scaffolding tool for modern webapps”

- Generators to help you assemble new projects
- Automatically configure your build system, package manager, and more
- We use **generator-gulp-angular**



Example step 1: AngularJS ng-repeat

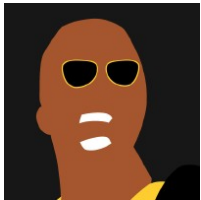
```
<div>
  <md-card ng-repeat="awesomeThing in main.awesomeThings">
    
  </md-card>
</div>
```



Example step 2: Angular Hammer

Hammer gesture recognizers
as Angular directives

```
<md-card hm-panmove="card.touchThis"  
  hm-pinchmove="card.touchThis"  
  hm-rotatemove="card.touchThis"  
  hm-panend="card.cantTouchThis"  
  hm-rotateend="card.cantTouchThis"  
  hm-pinchend="card.cantTouchThis">  
    
</md-card>
```



```
/**  
 * Process touch event  
 */  
scope.card.touchThis = function (event) {  
  var transform = scope.card.transform;  
  
  newTransform = {  
    translate: {  
      x: transform.translate.x + event.deltaX,  
      y: transform.translate.y + event.deltaY  
    },  
    angle: transform.angle + event.rotation,  
    scale: transform.scale * event.scale  
  };  
  
  applyTransform(newTransform);  
};  
  
/**  
 * Save transform  
 */  
scope.card.cantTouchThis = function () {  
  scope.card.transform = newTransform;  
};
```

Example step 3: Angular Material

- Implementation of Google's Material Design in Angular
- We primarily use it for the touch ripple, but also useful for layout, UI components, etc

```
<div>
  <avl-card ng-repeat="awesomeThing in main.awesomeThings | filter:main.query"
            thing="awesomeThing"></avl-card>
</div>

<div style="padding: 20px">
  <h1 class="md-title">Filter</h1>
  <div layout="row">
    <md-input-container>
      <label>Query</label>
      <input ng-model="main.query">
    </md-input-container>
    <md-button ng-click="main.query = ''">Clear</md-button>
  </div>
</div>
```

Example step 4: Angularartics

- Use familiar web analytics for user tracking
- Plug-ins available for >20 analytics vendors
- Automatic page view tracking
- Declarative event tracking within a page

```
<md-button ng-click="main.query = ''"  
  analytics-on="click"  
  analytics-category="Filter"  
  analytics-label="Clear">Clear</md-button>
```

Find reports & more

Events

Create Shortcut **BETA**

- Dashboards
- Shortcuts
- Intelligence Events
- Real-Time
- Overview
- Locations
- Traffic Sources
- Content
- Events
- Conversions

Right now

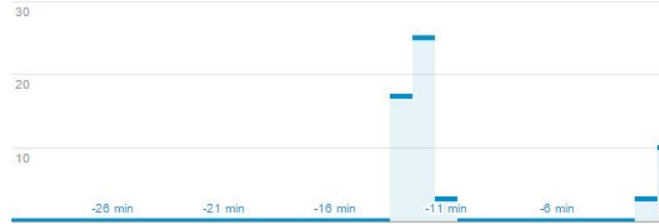
2

active users on site

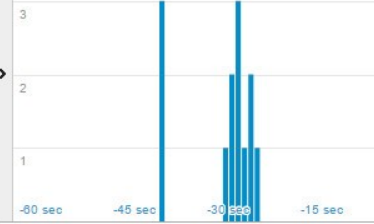


Events

Per minute



Per second



Viewing: Active Users Events (Last 30 min)

Active Users with Events: 2 (100% of total)

Event Category	Event Action	Active Users
1. Filter	CLEAR	2 100.00%

Deployment

Deploy to desktop: browser

Best results with Chrome

- Set *chrome://flags* options
 - *Overscroll history navigation = Disabled*
 - *Enable viewport meta tag = Enable*
- Kiosk extension
- Lockdown application
- Disable right-click, charms, etc in Windows
- Run simple webserver for local file access



Deploy to desktop: standalone executable

- NW.js or Electron
- Bundle your webapp with node.js and Chromium
- Yeoman generators available for both
 - Swap sample app with your own



Deploy to mobile

- Deploy to mobile browsers over the web
- Bundle your webapp into a mobile app for Android, iOS, etc with Apache Cordova



**Example app GitHub repo:
<http://go.iu.edu/LUA>**

**dmreagan@iu.edu
vishelp@iu.edu**