

Visualizing Sensor Data With Angular

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Introduction

- **What We Will Cover**

- Hardware Selection
 - Tessel 2
- Hardware Setup
 - Installing the Tessel 2 & its Modules
 - Sending Sensor Data to Firebase
- Displaying the Sensor Data
 - Creating the Angular App with Kendo UI Charts
 - Populating the Charts with Sensor Data from Firebase

Speaker: Tara Z. Manicsic

- Developer Advocate for Progress
- @tzmanics
- Maker of Things

Kelsey Breseman

@ifoundtheme

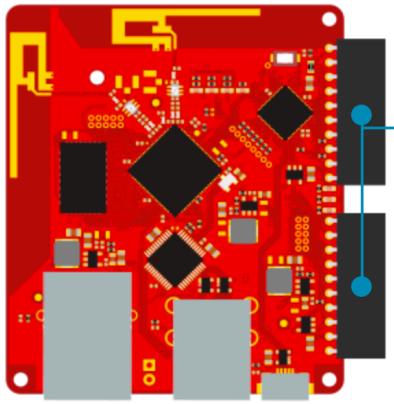


Hardware Selection

Tessel 2 Microcontroller

- Created in 2013 by Tessel to help web developers with IoT
- Plug n' Play sensor modules using npm
- Code in JavaScript





TESEL 2 FEATURES

EVERYTHING YOU NEED TO GET UP AND RUNNING.

2 Tessel Module ports

add sensors and actuators in one step

2 USB ports

use peripherals like cameras and 3G/4G dongles

802.11bgn Wifi

connected out of the box and wirelessly programmable

Ethernet

an ultra-reliable, wired connection

580MHz Mediatek MT7620n

execute your program faster

64 MB DDR2 RAM & 32 MB Flash

plenty of space for your code

48MHz Atmel SAMD21 coprocessor

realtime I/O and better power management

microUSB

power and tethered programming

10-PIN MODULES



Accelerometer



Ambient



Relay



Climate



Infrared



USB MODULES



BLE



Cellular



MicroSD



Camera



Audio



COMMUNITY-CREATED MODULES



Distance



Color Sensor



Keypad



Lights/LEDs



Motion



Limerick Rhyming Structure

Poltergeist sticking charm A

Troll umbrella stand flying A

Golden locket Lily B

Potter pumpkin juice B

Wave your wand out glass A

LIMERICK CHALLENGE!!!!!!

With IoT you shouldn't wrestle
Just plug in sensors to tightly nestle
Grab data you need
With ease and speed
Plug, install & play with **TESSEL!**

Hardware Setup

Finding Tessel & Setting Network

```
[kiwish-4.2]-(~)-[58%]
> t2 list
INFO Searching for nearby Tessels...
USB      Tessel-02A386F29F22
```

```
[kiwish-4.2]-(~)-[57%]
> t2 wifi -n tzmanics -p angularmix
INFO Looking for your Tessel...
INFO Connected to Tessel-02A386F29F22.
INFO Wifi Enabled.
INFO Wifi Configured. (SSID: tzmanics, password: a*****x, security: psk2)
INFO Wifi Connected.
```

Hardware Setup

Create Project Directory & Initialize

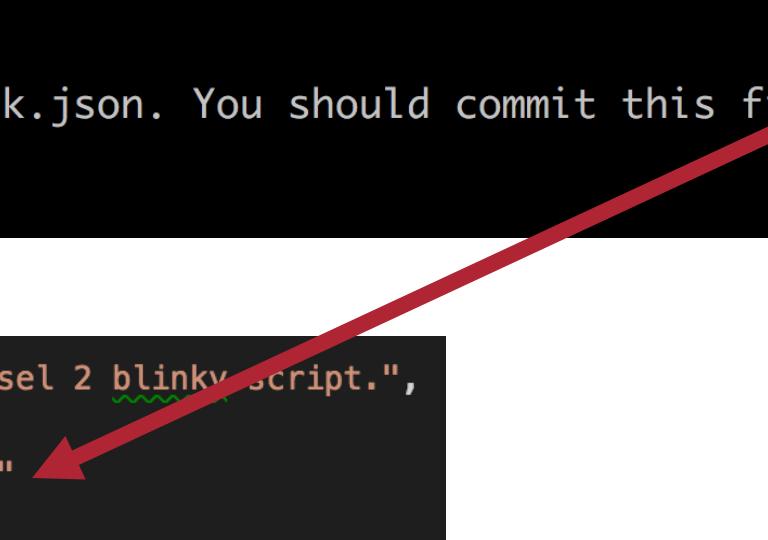
```
mkdir tessel-sensor-data && cd tessel-sensor-data
```

```
[kiwish-4.2]-(~/tessel-sensor-data)-[57%]
-> t2 init
INFO Initializing new Tessel project for JavaScript...
INFO Created ".npmrc".
INFO Created ".tesselinclude".
INFO Created "index.js"
INFO Created "package.json".
```

Hardware Setup

Installing the Ambient Module

```
[kiwiPi-4.2]-(~/tessel-sensor-data)-[57%]
-> npm install ambient-attx4
npm notice created a lockfile as package-lock.json. You should commit this file.
+ ambient-attx4@0.2.11
added 5 packages in 1.779s
```



```
  "license": "MIT",
  "readme": "A bare bones Tessel 2 blinky script.",
  "dependencies": {
    "ambient-attx4": "^0.2.11"
  }
}
```

package.json

Firebase DB Creation

Firebase tzmanics ▾ Go to docs ⋮

Overview Database Analytics ?

DEVELOP

Authentication

Database

Storage

Hosting

Functions

Test Lab

Crash Reporting

Performance

GROW

Notifications

Database

Realtime Database

Store and sync data in realtime across all connected clients

Learn more

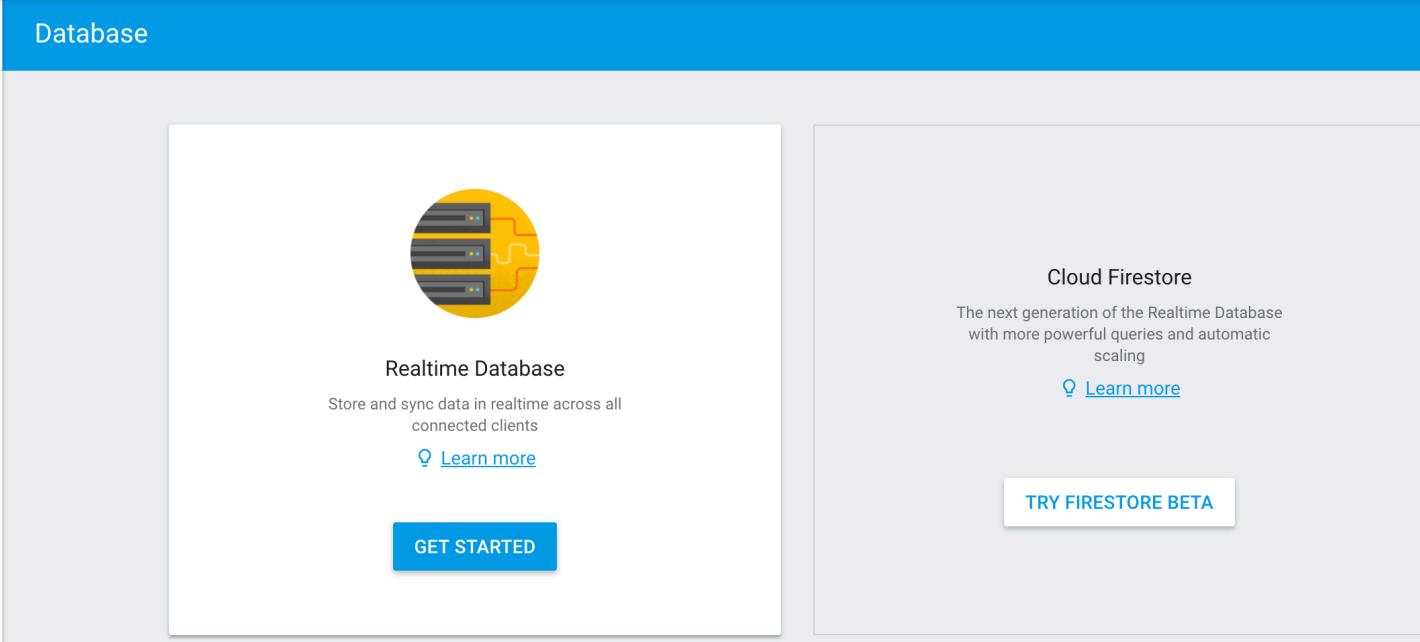
GET STARTED

Cloud Firestore

The next generation of the Realtime Database with more powerful queries and automatic scaling

Learn more

TRY FIRESTORE BETA



Installing Firebase

```
[kiwish-4.2]-(~/tessel-sensor-data)-[52%]
└> npm i firebase
+ firebase@4.5.0
added 24 packages in 1.675s
```

Collecting and Sending Data

Using Firebase Realtime Database

```
const ambientlib = require('ambient-attx4');
const firebase = require('firebase');
const tessel = require('tessel');

const ambient = ambientlib.use(tessel.port['A']);

const config = {
  apiKey: "AIzaSyACbmF3GzX81P2TNY9-yJ__mrBETc",
  authDomain: "visualizing-sensor-data-4900f.firebaseio.com",
  databaseURL: "https://visualizing-sensor-data-4900f.firebaseio.com",
  projectId: "visualizing-sensor-data-4900f",
  storageBucket: "visualizing-sensor-data-4900f.appspot.com",
  messagingSenderId: "543703649"
};

};
```

Collecting and Sending Data

Using Firebase Realtime Database

```
ambient.on('ready', () => {
  setInterval(() => {
    ambient.getLightLevel( (err, lightdata) => {
      if (err) throw err;
      ambient.getSoundLevel( (err, sounddata) => {
        if (err) throw err;
        const lightSensorRef = ref.child('ambience/lightSensor');
        const soundSensorRef = ref.child('ambience/soundSensor');
        lightSensorRef.push().set({
          data: lightdata.toFixed(4) * 100,
          time: Date.now()
        });
        soundSensorRef.push().set({
          data: sounddata.toFixed(4) * 100,
          time: Date.now()
        });
      });
    }, 3000);
  });

  ambient.on('error', (err) => {
    console.log('Ambient error:', err);
  });
}
```

index.js (cont'd)

Sensor Data in Firebase DB

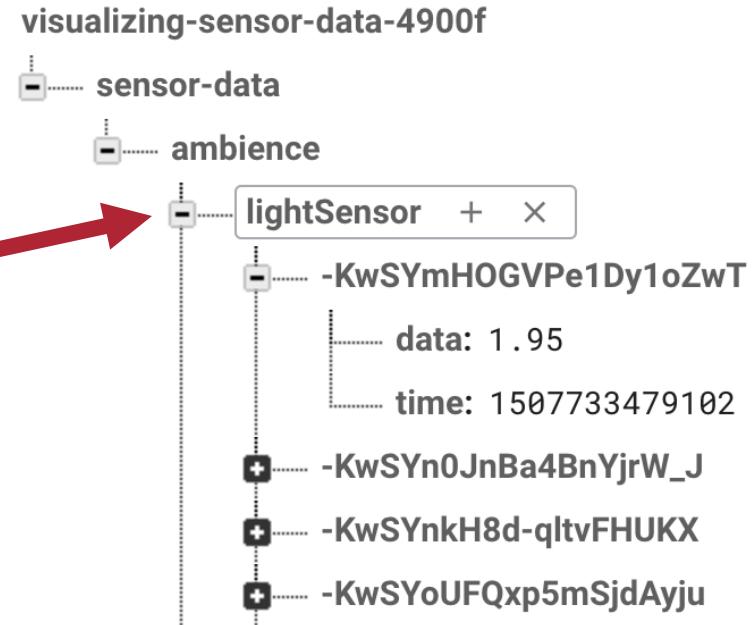
Database Realtime Database ▾

DATA RULES BACKUPS USAGE

<https://visualizing-sensor-data-4900f.firebaseio.com/>

visualizing-sensor-data-4900f

- sensor-data
 - ambience
 - + lightSensor
 - + soundSensor



Displaying the Sensor Data

Creating an Angular App with the CLI

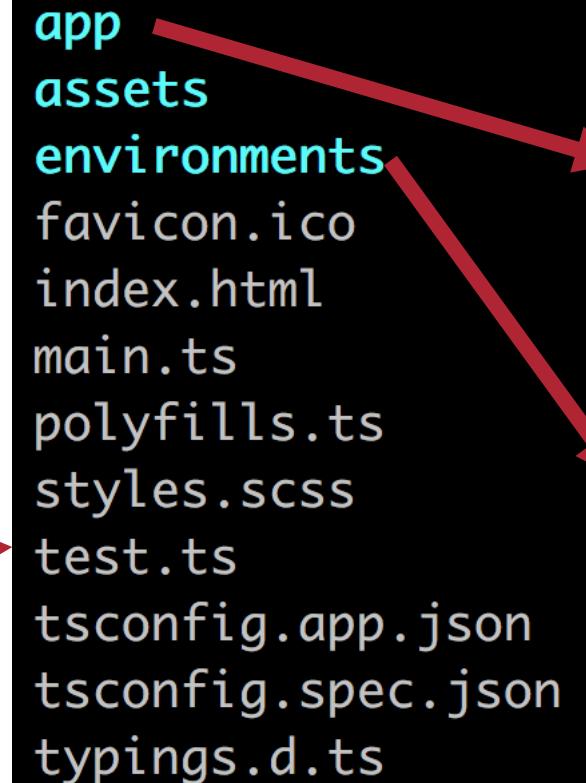
[kiwish-4.2]-(~)-[44%]

```
ng new visualizing-sensor-data --style scss
create visualizing-sensor-data/README.md (1037 bytes)
create visualizing-sensor-data/.angular-cli.json (1260 bytes)
create visualizing-sensor-data/.editorconfig (245 bytes)
create visualizing-sensor-data/.gitignore (516 bytes)
create visualizing-sensor-data/src/assets/.gitkeep (0 bytes)
create visualizing-sensor-data/src/environments/environment.prod.ts (51 bytes)
create visualizing-sensor-data/src/environments/environment.ts (387 bytes)
create visualizing-sensor-data/src/favicon.ico (5430 bytes)
create visualizing-sensor-data/src/index.html (308 bytes)
create visualizing-sensor-data/src/main.ts (370 bytes)
create visualizing-sensor-data/src/polyfills.ts (2498 bytes)
create visualizing-sensor-data/src/styles.scss (80 bytes)
create visualizing-sensor-data/src/test.ts (1085 bytes)
create visualizing-sensor-data/src/tsconfig.app.json (211 bytes)
create visualizing-sensor-data/src/tsconfig.spec.json (204 bytes)
```

Displaying the Sensor Data

Angular App File Structure

```
.angular-cli.json  
.editorconfig  
.git  
.gitignore  
README.md  
e2e  
karma.conf.js  
node_modules  
package-lock.json  
package.json  
protractor.conf.js  
src  
tsconfig.json  
tslint.json
```



```
app  
assets  
environments  
favicon.ico  
index.html  
main.ts  
polyfills.ts  
styles.scss  
test.ts  
tsconfig.app.json  
tsconfig.spec.json  
 typings.d.ts
```

```
app.component.html  
app.component.scss  
app.component.spec.ts  
app.component.ts  
app.module.ts  
  
environment.prod.ts  
environment.ts
```

Angular CLI Wiki

A screenshot of a GitHub repository page for 'angular / angular-cli'. The page title is 'Angular CLI Wiki'. The top navigation bar includes links for 'Pull requests', 'Issues', 'Marketplace', and 'Explore'. Below the title, there's a search bar and a user profile icon. On the right side of the header, there are buttons for 'Watch' (989), 'Star' (12,867), 'Fork' (2,704), and a 'Wiki' button which is highlighted with an orange border. Below the header, there are tabs for 'Code', 'Issues' (560), 'Pull requests' (55), 'Projects' (1), 'Wiki' (highlighted), and 'Insights'. The main content area shows the 'Home' page of the wiki.

Home

Sumit Arora edited this page on May 15 · 9 revisions

Angular CLI

▶ Pages 58

Overview

The Angular CLI is a tool to initialize, develop, scaffold and maintain [Angular](#) applications

Getting Started

To install the Angular CLI:

```
npm install -g @angular/cli
```

Generating and serving an Angular project via a development server [Create](#) and [run](#) a new project:

- [Angular CLI](#)
- [Generate](#)
- [Stories](#)

Clone this wiki locally

<https://github.com/angular/angular-cli>

[Clone in Desktop](#)

Displaying the Sensor Data

Kendo UI Angular Components

Kendo UI for Angular

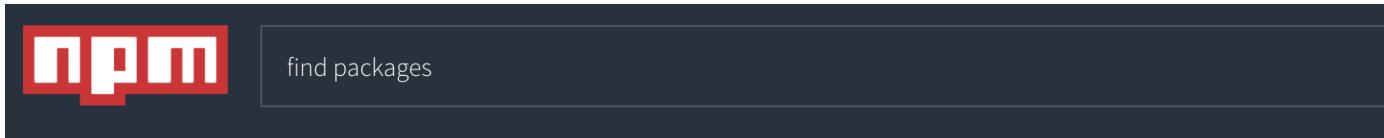
Professional Grade Angular
UI Components

GET STARTED



Displaying the Sensor Data

Kendo UI Modules



- ★ @progress/kendo-angular-dateinputs public

Kendo UI for Angular

This package is part of the **Kendo UI for Angular** suite.

License

This is commercial software. To use it, you need to agree to the **Telerik End User License Agreement for Kendo UI Complete**. If you do not own a commercial license, this file shall be governed by the trial license terms.

Displaying the Sensor Data

Kendo UI Components for Angular

AutoComplete

Button

ButtonGroup

Calendar

Charts

ComboBox

DateInput

DatePicker

Dialog

DropDownButton

DropDownList

File Saver

Grid

Label

MaskedTextBox

MultiSelect

NumericTextBox

PanelBar

Popup

Ripple

ScrollView

Slider

Sortable

SplitButton

Switch

TabStrip

TextBox

TimePicker

Upload

Add new					
Produ...	Price	Disco...	Units I...	command	
Chai	18	false	39	<button>Edit</button> <button>Remove</button>	
Chang	19	false	17	<button>Edit</button> <button>Remove</button>	
Aniseed Syrup	10	false	13	<button>Edit</button> <button>Remove</button>	
Chef Anton's Cajun Seasoning	22	false	53	<button>Edit</button> <button>Remove</button>	
Chef Anton's Gumbo Mix	21.35	true	0	<button>Edit</button> <button>Remove</button>	
◀ ◀ 1 2 3 4 5 6 7 8 ▶ ▶	1 - 10 of 77 items				

Displaying the Sensor Data

Kendo UI Chart Component

Categorical

Categorical charts have built-in support for displaying dates. They are considered to be discrete because the categories represent unique values that bear no mathematical relationship to each other.



Area



Bar



Box Plot



Bullet



Line



Radar



RangeArea



RangeBar



Waterfall

LIMERICK CHALLENGE!!!!!!

Kiss complex code bye bye
And give this library a try
Build Angular apps
With no DOM wraps
It's time to use **Kendo UI!**

Displaying the Sensor Data

Install Kendo UI Component & Styling

```
[kiwish-4.2]-(src/environments)-[git:master]-[42%]
```

```
> npm install --save @progress/kendo-angular-charts @progress/kendo-angular-intl  
@progress/kendo-angular-l10n @progress/kendo-drawing hammerjs @angular/animations  
+ hammerjs@2.0.8  
+ @angular/animations@4.4.4  
+ @progress/kendo-angular-charts@1.3.1  
+ @progress/kendo-drawing@1.4.0  
+ @progress/kendo-angular-intl@1.2.2  
+ @progress/kendo-angular-l10n@1.0.4  
added 11 packages and updated 1 package in 8.127s
```

```
[kiwish-4.2]-(src/environments)-[git:master*]-∞  
> npm install --save @progress/kendo-theme-default  
+ @progress/kendo-theme-default@2.42.2  
added 1 package in 5.409s
```

Theme Builder

Progress® Sass ThemeBuilder



Select Base Theme

This section allows users to choose a base theme. It features two cards: one for 'Default' and one for 'Bootstrap'. The 'Default' card is selected, indicated by a blue checkmark and a red horizontal bar. The 'Bootstrap' card is based on Bootstrap 4, indicated by a blue horizontal bar. Below each card is a preview of the theme's color palette. The 'Default' palette includes #FFF, #EDEDED, #FF6358, and #EB5B51. The 'Bootstrap' palette includes #656565.

Default	Bootstrap
#FFF	#656565
#EDEDED	Based on Bootstrap 4
#FF6358	Bootstrap
#EB5B51	

Displaying the Sensor Data

Importing the Charts Module

```
import { AngularFireModule } from 'angularfire2';
import { AngularFireDatabase } from 'angularfire2/database';
import { BrowserModule } from '@angular/platform-browser';
import { BrowserAnimationsModule } from '@angular/platform-browser/animations';
import { ChartsModule } from '@progress/kendo-angular-charts';
import { NgModule } from '@angular/core';

import { AppComponent } from './app.component';
import { environment } from '../environments/environment';

import 'hammerjs';

@NgModule({
  declarations: [
    AppComponent
  ],
  imports: [
    AngularFireModule.initializeApp(environment.firebaseio),
    BrowserModule,
    BrowserAnimationsModule,
    ChartsModule
  ],
  providers: [AngularFireDatabase],
  bootstrap: [AppComponent]
})
export class AppModule { }
```

npm i angularfire2



src/app/app.module.ts

Displaying the Sensor Data

Adding the Chart Component to the Template

```
<kendo-chart [transitions]="false" [categoryAxis]="{{ labels: { rotation: -90 } }}>
  <kendo-chart-title text="Ambient Sensor Data"></kendo-chart-title>
  <kendo-chart-legend
    position="bottom" orientation="horizontal"
  ></kendo-chart-legend>
  <kendo-chart-series>
    <kendo-chart-series-item
      [data]="lightSensorData | async"
      field="data"
      categoryField="time"
      name="Light Data"
      type="area"
      opacity=0.5
    ></kendo-chart-series-item>
    <kendo-chart-series-item
      [data]="soundSensorData | async"
      field="data"
      categoryField="time"
      name="Sound Data"
      type="area"
      opacity=0.5
    ></kendo-chart-series-item>
  </kendo-chart-series>
</kendo-chart>
```

Displaying the Sensor Data

Grabbing Sensor Data from Firebase DB

```
import { Component } from '@angular/core';
import { AngularFireDatabase, AngularFireList } from 'angularfire2/database';
import { Observable } from 'rxjs/Observable';

@Component({
  selector: 'app-root',
  templateUrl: './app.component.html',
  styleUrls: ['./app.component.scss']
})
export class AppComponent {
  private title = 'Visualizing Sensor Data';
  private lightSensorDataRef: AngularFireList<any>;
  private lightSensorData: Observable<any[]>;
  private soundSensorDataRef: AngularFireList<any>;
  private soundSensorData: Observable<any[]>

  constructor(db: AngularFireDatabase) {
    this.lightSensorDataRef = db.list('sensor-data/ambience/lightSensor');
    this.lightSensorData = this.lightSensorDataRef.valueChanges();
    this.soundSensorDataRef = db.list('sensor-data/ambience/soundSensor');
    this.soundSensorData = this.soundSensorDataRef.valueChanges();
  }
}
```



src/app/app.component.ts

Observables

Telerik Developer Network

TOPICS ▾

COMMUNITY

RSS

Telerik.com



MOBILE

WEB

An Introduction to Observables for Angular Developers



Mobile by



Jen Looper

January 23, 2017

8 Comments



Let's Take a Look!

Please use EventsXD to fill out a session evaluation.

Thank you!



LIMERICK CHALLENGE!!!!!!

To get our Angular fix
And learn all the tips & tricks
Knowledge you can't beat
Amazing people to meet
How awesome is **Angular Mix**?!?





Thank you!
@tzmanics || @KendoUI