

# Why am I here?

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Information and Computer Sciences  
University of Hawaii  
Honolulu HI 96822

**Should software engineering be an institutional priority at UH?**

**Where should the organization home for software engineering be at UH?**

**How should UH build its software engineering program?**

# A brief history of software engineering at UH

# About me in a nutshell

## Teaching

- **Morea Framework**
- **TechFolios**
- **ICS 314: SE**
- **ICS-Portfolios**
- **Courses.ICS**

## Research

- **RadGrad**
- **Open Power Quality**

# Teaching

Home | Morea Framework

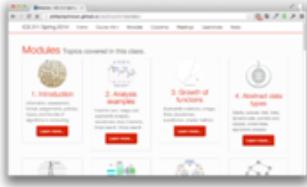
morea-framework.github.io

Morea Framework Home Quick Start User Guide Developer Guide Gallery News Help

Find me on GitHub

## Welcome to the Morea Framework

Easily generate educational websites organized by **Modules, Outcomes, Readings, Experiences, and Assessments.**



### Make the pedagogy visible

Morea implements a simple **pedagogical pattern**: a course is a sequence of *modules*, each with one or more *learning outcomes*. Modules can combine one or more passive *readings* (providing background) with one or more active *experiences* (in-class work or homework). Finally, a module can contain one or more *assessments* to help students determine if they've achieved the learning outcomes.

Our experience shows that students and teachers both benefit by making this course design explicit. For example, Morea generates course websites that organize course content in multiple ways: by modules, outcomes, readings, experiences, and assessments. This makes it easier for teachers to design well structured courses, and easier for students to understand what they need to learn and how to learn it.

### Improve development with Github

Content management systems like [Wordpress](#) make it easy to design the first version of a course website. But they do not make it easy to duplicate and revise a course website in future semesters, or copy and adapt material developed by others.

On the other hand, [GitHub](#) provides marvelous infrastructure for iterative enhancement and deployment of educational websites, including:

- Free storage of content.
- Free private repositories for educators.
- Free hosting of project websites.
- The ability to clone, branch, and fork repositories.

Morea uses Github to make it easier to create courses and improve them over time. Morea and Github help you collaborate with students and teachers to more easily create and improve educational content.



### Focus on content, not styling



Nice websites involve lots of CSS and HTML, which is a pain to maintain manually. [Jekyll](#) is a "static site generator" that enables you to develop your course content in [Markdown](#) format without using HTML.

Morea leverages Jekyll to separate HTML/CSS presentation details from your course content. Morea builds modern, responsive websites using [Twitter Bootstrap](#), so they display well on laptops, tablets, and smart phones.

Modules | ICS 314, Spring 2018 x

philipmjohnson...

courses.ics.hawaii.edu/ics314s18/modules/

ICS 314, Spring 2018 Modules Outcomes Readings Experiences Schedule

Home / Modules

## Modules Topics covered in this class.

This page presents the "modules", or the topics that are covered in this course.

Unless a module is listed as "Coming soon...", you can click on it to go to a page providing more detail about it.



**1. Introduction**

Overview of ICS 314, and some simple initial tasks to get oriented and ready for the course.

09 Jan 2018 - 11 Jan 2018



**2. Professional Persona**

Concepts of a professional persona and initial steps to build and improve your online professional presence.

11 Jan 2018 - 19 Jan 2018



**3. Javascript 1: Basics**

Basic Javascript coding: variables, expressions, conditionals, loops, functions, arrays, objects.

11 Jan 2018 - 19 Jan 2018



**4. Open Source Software**

How to participate effectively in open source software development.

19 Jan 2018 - 26 Jan 2018



**5. Javascript 2: Object orientation**

Object orientation in modern Javascript: using the class construct.

19 Jan 2018 - 26 Jan 2018



**6. Configuration management**

Concepts of configuration management and version control, and how they are implemented using git and GitHub.

26 Jan 2018 - 02 Feb 2018



**7. Javascript 3: Functional programming**

Use the underscore library to experience functional programming constructs: map, reduce, filter, every, some, etc.

26 Jan 2018 - 02 Feb 2018



**8. Development Environments**

Introduction to Integrated Development Environments and the IntelliJ IDEA IDE.

02 Feb 2018 - 09 Feb 2018

Review Sites | Courses.ICS    φ    philipmjohnson...

courses.ics.hawaii.edu/review-sites/

Courses.ICS   Review Sites   Syllabuses   Course Network   Module Browser   Suggestion Box

## Review sites

The following sites are made available for students wishing to review material from courses they have taken. The materials at each site are taken from prior semesters; you may encounter new and different material if you are taking these courses now or in the future.

Click on the tiles below to go to the corresponding Review Site.

**ICS 111**  
**Introduction to Computer Science I**

Overview of computer science, writing programs. Pre: None.

**ICS 141**  
**Discrete Mathematics for Computer Science I**

Logic, sets, functions, matrices, algorithmic concepts, mathematical reasoning, recursion, counting techniques, probability theory.

**ICS 211**  
**Introduction to Computer Science II**

Algorithms and their complexity, introduction to software engineering, data structures, searching and sorting algorithms, numerical errors.

**ICS 215**  
**Introduction to Scripting**

Introduction to scripting languages for the integration of applications and systems. Scripting in operating systems, web pages, server-side application integration, regular expressions, event handling, input validation, selection, repetition, parameter passing, Perl, JavaScript, and PHP.

**ICS 241**  
**Discrete Mathematics for Computer Science II**

Program correctness, recurrence relations and their solutions, divide and conquer relations, relations and their properties, graph theory, trees and their applications, Boolean algebra, introduction to formal languages and automata theory.

**ICS 311**  
**Algorithms**

Design and correctness of algorithms, including divide-and-conquer, greedy and dynamic programming methods. Complexity analyses using recurrence relations, probabilistic methods, and NP-completeness. Applications to order statistics, disjoint sets, B-trees and balanced trees, graphs, network flows, and string matching.

**ICS 312**  
**Machine-Level and Systems Programming**

Machine organization, machine instructions, addressing modes, assembler language, subroutine linkage, linking to higher-level languages, interface to operating systems, introduction to assemblers, loaders and compilers.

**ICS 314**  
**Software Engineering I**

Problem analysis and design, team-oriented development, quality assurance, configuration management, project planning.

**ICS 321**  
**Data Storage and Retrieval**

Data storage devices, timing and capacity, programming for files, hashed and indexed files, introduction to relational database systems. Pre: 211 or consent.

**ICS 332**  
**Operating Systems**

Operating system concepts and structure, processes and threads, CPU scheduling, memory management, scheduling, file systems, inter-process communication, virtualization, popular operating systems. Pre: (311 or EE 367) and 314.

**ICS 355**  
**Security and Trust I**

Security and trust in computers, networks, and society. Security models. Access and authorization. Availability and Denial-of-Service. Trust processes and network interactions.

Growth of functions | Review K X

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courses.ics.hawaii.edu/ReviewICS311/modules/growth/

Review ICS 311 Prerequisites Modules Outcomes Readings Experiences Suggestion Box

Review Sites / Home / Modules / Growth of functions

## Module: Growth of functions

Asymptotic notations, omega, theta, recurrences, substitution, master method.

### Prerequisite Modules



#### Algorithms

Algorithms, computational complexity, asymptotic notations, pseudocode, greedy algorithms, easy vs. hard problems.

**ICS 141**



#### Big-O Notation

Introduction to Big-O notation and code analysis.

**ICS 211**



#### Advanced counting techniques

Recurrence, generating functions, inclusion-exclusion principle, divide-and-conquer, application to algorithm design.

**ICS 241**

### Learning Outcomes

Characterize algorithms with respect to asymptotic growth, including:

- Growth rates in terms of  $O$ ,  $\Theta$ ,  $\Omega$ ,  $\omega$  or  $\theta$ .

### Readings

#### Asymptotic notations

Notations for this analysis

**ScreenCast** **Suthers** **12 min**

#### Omega and Theta

The omega and theta notations

**ScreenCast** **Suthers** **17 min**

#### little-o and omega

The little guys, properties, and use in equations

**ScreenCast** **Suthers** **16 min**

#### Common Functions

Common functions and useful identities

**ScreenCast** **Suthers** **9 min**

Home | TechFolios

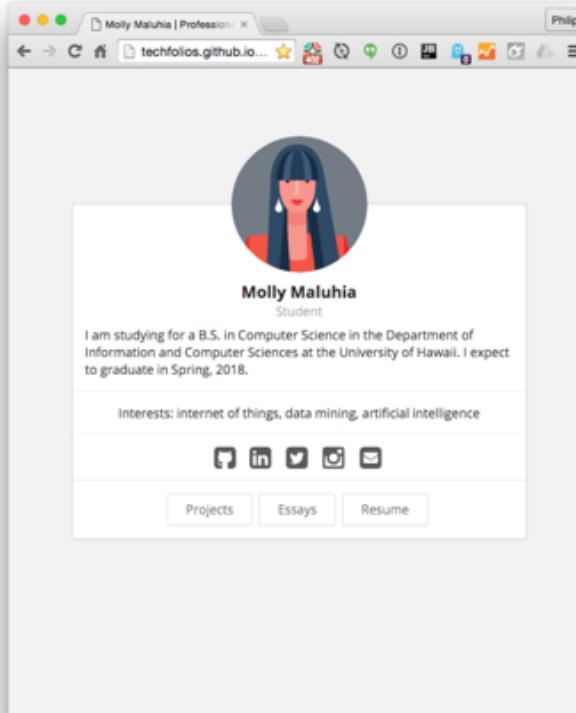
techfolios.github.io

TechFolios Home Quick Start User Guide Gallery News Help

Find me on GitHub

## Welcome to Technical Portfolios (TechFolios)

Easily create technical portfolios using GitHub Pages, Jekyll, Semantic UI, and JSON Resume.



Molly Maluhia | Professional

Molly Maluhia  
Student

I am studying for a B.S. in Computer Science in the Department of Information and Computer Sciences at the University of Hawaii. I expect to graduate in Spring, 2018.

Interests: internet of things, data mining, artificial intelligence

Projects Essays Resume

Create modern, responsive technical portfolio sites fast!

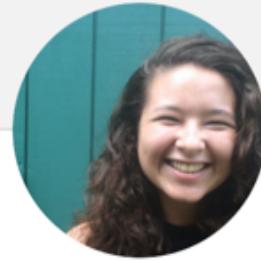
If you have ever tried to build a technical portfolio site using a blogging platform such as WordPress, you know it takes time and the results are not always satisfactory.

The goal of TechFolios is to provide a quick and easy way to build a high quality technical portfolio site, while still enabling custom layout if desired.

Sites built with TechFolio have the following components:

- A **home** page with basic biographical information;
- A **projects** page with pointers to subpages or external sites.
- An **essays** page highlighting your technical writing.
- A **resume** page presenting your online resume.
- **Links** to your professional network sites.

Click on the image to the left to browse a template site for a hypothetical computer science student named Molly Maluhia. Then come back to this page to learn more and get started.

**Elena Barbour**

Student

I am pursuing a B.S. in Computer Engineering from the College of Engineering at University of Hawai'i at Manoa. I expect to graduate in December 2017.

Interests: Cyber-Security, Ethical Hacking, Digital Forensics

[Projects \(3\)](#)[Essays \(5\)](#)[Resume](#)



Elena Barbour

Projects (3)

Essays (5)

Resume



## Adventure Portal

2017

I worked in a 3 person team to develop an app for University of Hawai'i at Manoa students to discover exciting activities around the island of O'ahu to experience the adventures of the 'aina.

ServiceApp

UH Manoa

[Read More](#)

## Project Imua Year 2

2016

Project Imua is back again! 3x the experiments, 3x the work, 3x the fun.

3D design

Python

Raspberry-Pi

[Read More](#)

## Project Imua Year 1

2015

I was a student fellow for the Hawai'i Space Grant Consortium and a member of Project Imua, a UH Community College collaboration.

HSGC

Arduino

C++

[Read More](#)



Elena Barbour

Projects (3)

Essays (5)

Resume

## Four Weeks Later

23 Mar 2017

It's been 3 weeks, 6 days, and approximately 2 hours since I first laid eyes on this brilliant graphic design that indubiously brought pain and destruction in it's wake. Am I being overdramatic? Probably. Am I only using this as...

[Software Engineering](#)[Web Development](#)[Meteor](#)[Read More](#)

## Meteor Gotchaas

09 Mar 2017

Let's talk about Meteor for a second. If you don't know what Meteor is, then I'm assuming you're like me: a sad excuse for a Computer Engineering major who has had no prior experience of web or app development and...

[Software Engineering](#)[Web Development](#)[Meteor](#)[Read More](#)

## Semantic's Aside . . .

23 Feb 2017

One thing I've learned while driving on the lonely road of late night computer screens and early morning tests is how much I detest, loathe, despise any type of webpage development required of me. Just this year, I've started to...

[Software Engineering](#)[Web Development](#)[UI Frameworks](#)[Semantic UI](#)[Read More](#)

## Let's Raise Our Standards, Coding Standards

02 Feb 2017

Ever since I downloaded IntelliJ IDEA I have been bombarded by a massive collection of hot-keys, coding styles, and GitHub applications. I now know more than I ever thought I could about what it means to use a coding style,...

[Software Engineering](#)[IntelliJ IDEA](#)[Coding Standards](#)[Read More](#)

## We're going to con-figure this out.

02 Feb 2017

At the beginning of the year, I knew nothing about Github (I had an account of course).

Elena M Barbour | Professional Secure | https://elenambarbour.github.io/bio/ philipmjohnson...

Elena Barbour Projects (3) Essays (5) Resume

## Elena Barbour

[elenambarbour.github.io](https://elenambarbour.github.io) [ebarbour@hawaii.edu](mailto:ebarbour@hawaii.edu) [elenambarbour](https://github.com/elenambarbour) [ebarbourhi](https://www.linkedin.com/in/ebarbourhi)

**Interests** Cyber-Security , Ethical Hacking , Digital Forensics

**Skills** **Languages and Frameworks:** C, C++, Javascript, Python, Assembly, Meteor  
**Toolsets/OS:** Windows 10, Unix

**Education** **University of Hawaii, Honolulu, HI** 2013 - Present  
B.S., Computer Engineering (expected Fall, 2017)

- Object Oriented Programming
- Digital Systems & Computer Design
- Discrete Math for Engineers

**Work** **ResNet Support Assistant, UH Manoa** 2016 - Present  
Provided technical support to UH Manoa residents

- Troubleshooting problems involving wi-fi, LAN connections, and router issues
- Help staff in a variety of long term and short term projects in programming, troubleshooting, documentation, maintenance, and networking

**Supplementary Instruction Leader, Windward Community College** 2014 - 2015

- Provide additional resources, study methods, and learning techniques for students
- Develop plans for sessions reviewing material and providing extra help with difficult concepts

**Activities** **Worship Service Leader, Mountain View Community Church** 2009 - Present  
[www.mvcchawaii.org](http://www.mvcchawaii.org)  
Lead keyboardist and singer

- Monthly commitment to various responsibilities including sound equipment set-up and break-down
- Create cohesive song lists and lead morning worship services

**Youth Group Mentor, Mountain View Community Church** 2012 - Present  
[www.mvcchawaii.org](http://www.mvcchawaii.org)  
Provide guidance and spiritual mentoring for youth from 5th - 12th grade

- Youth Camp planning
- Monthly lesson planning and coordination
- Outreach and event production

ICS Portfolios

Secure | https://ics-portfolios.github.io

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**ICS Portfolios**

A directory of professional portfolios from students, faculty, and alumni in the [Department of Information and Computer Sciences](#) and [College of Engineering](#) at the [University of Hawaii](#).

**B.A./B.S.  
(177)**

**M.S./Ph.D.  
(5)**

**Faculty  
(5)**

**Alumni  
(41)**

ICS Portfolios

https://ics-portfolios.github.io/undergrads/

ICS Portfolios B.A./B.S. (177) M.S./Ph.D. (5) Faculty (5) Alumni (41) All (228) Notable (6)

Filter By Interests OR AND

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**Mai Abe**  Student  
I am a student pursuing for a BS degree in Computer Science at University of Hawaii at Manoa. I am expected to graduate in Spring 2019.

Interests:  
Technology, Artificial Intelligence, Software Engineering, Basketball

[See portfolio](#)

**Barry Abe**  Student  
I am studying for a B.S. in Computer Engineering in the Department of Engineering at the University of Hawaii. I expect to graduate in Spring, 2019.

Interests:  
Hearthstone, Software Engineering, App Development

[See portfolio](#)

**Christine Adamos**  Student  
I am studying for a B.A. in Computer Science in the Department of Information and Computer Sciences at the University of Hawaii. I expect to graduate in Spring, 2018.

Interests:  
Web Development, Graphic Design, Mobile App Development

[See portfolio](#)

**Darlene Agbayani**  Information and Computer Science Major (ICS)  
Information and Computer Science Major. Expanding understanding of Software Engineering. Strongest skills include HTML & CSS. I love Photoshop and enjoy creating an overall look and feel for a webpage. My current work includes managing the Network 2000 LLC business page.

Interests:  
Software Engineering, Digital Marketing

[See portfolio](#)

**Aidan Akamine**  Student  
I am studying for a B.S. in Computer Science in the Department of Information and Computer Sciences at the University of Hawaii. I expect to graduate in Spring, 2019.

Interests:

[See portfolio](#)

**Cristian Aspacio**  Student  
I am studying for a B.S. in Computer Science in the Department of Information and Computer Sciences at the University of Hawaii. I expect to graduate in Spring, 2019.

Interests:

[See portfolio](#)

**April-Angela Bala (April)**  Student  
I am studying for a B.S. in Computer Science in the Department of Information and Computer Sciences at the University of Hawaii. I expect to graduate in Spring, 2019.

Interests:  
Web Design and Development, Interest of

[See portfolio](#)

**Kyle Balisacan**  Student  
I am studying for a B.S. in Computer Science in the Department of Information and Computer Sciences at the University of Hawaii. I expect to graduate in Spring, 2018.

Interests:  
Software Engineering, Video

[See portfolio](#)

ICS Portfolios

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https://ics-portfolios.github.io/undergrads/

ICS Portfolios B.A./B.S. (177) M.S./Ph.D. (5) Faculty (5) Alumni (41) All (228) Notable (6)

Filter By Interests OR AND

Artificial Intelligence (43) x Sustainability (7) x

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**Matt Schultz** Student 

Hi there! I'm a part time web developer and a computer science student currently studying at the University of Hawaii in Manoa.

Interests:  
software engineering, cyber security, artificial intelligence, health, social equality, nature conservation, open source software

[See portfolio](#)

# Research

Secure | https://radgrad.ics.hawaii.edu

RADGRAD

GUIDED TOURS

Home

# Welcome to RADGRAD

Developing awesome computer scientists, **one** graduate at a time.

Kelsie Y. B.S. in Computer Science	Brian B. B.A. in Info. & Comp. Sci.	Michele S. B.S. in Computer Science	Sy M. B.S. in Computer Science
 92  Data Science  Databases	 68  Software Engineering  Research	 86  Game Design  Unity	 65  Hardware  Networks

## Why use RADGRAD?

Discover your interests.  
Build your community.  
Strengthen your preparation.  
Define, then achieve your career goals.  
Pay it forward.

18 CAREER GOALS

57 INTERESTS

71 OPPORTUNITIES

62 STUDENTS, FACULTY, MENTORS

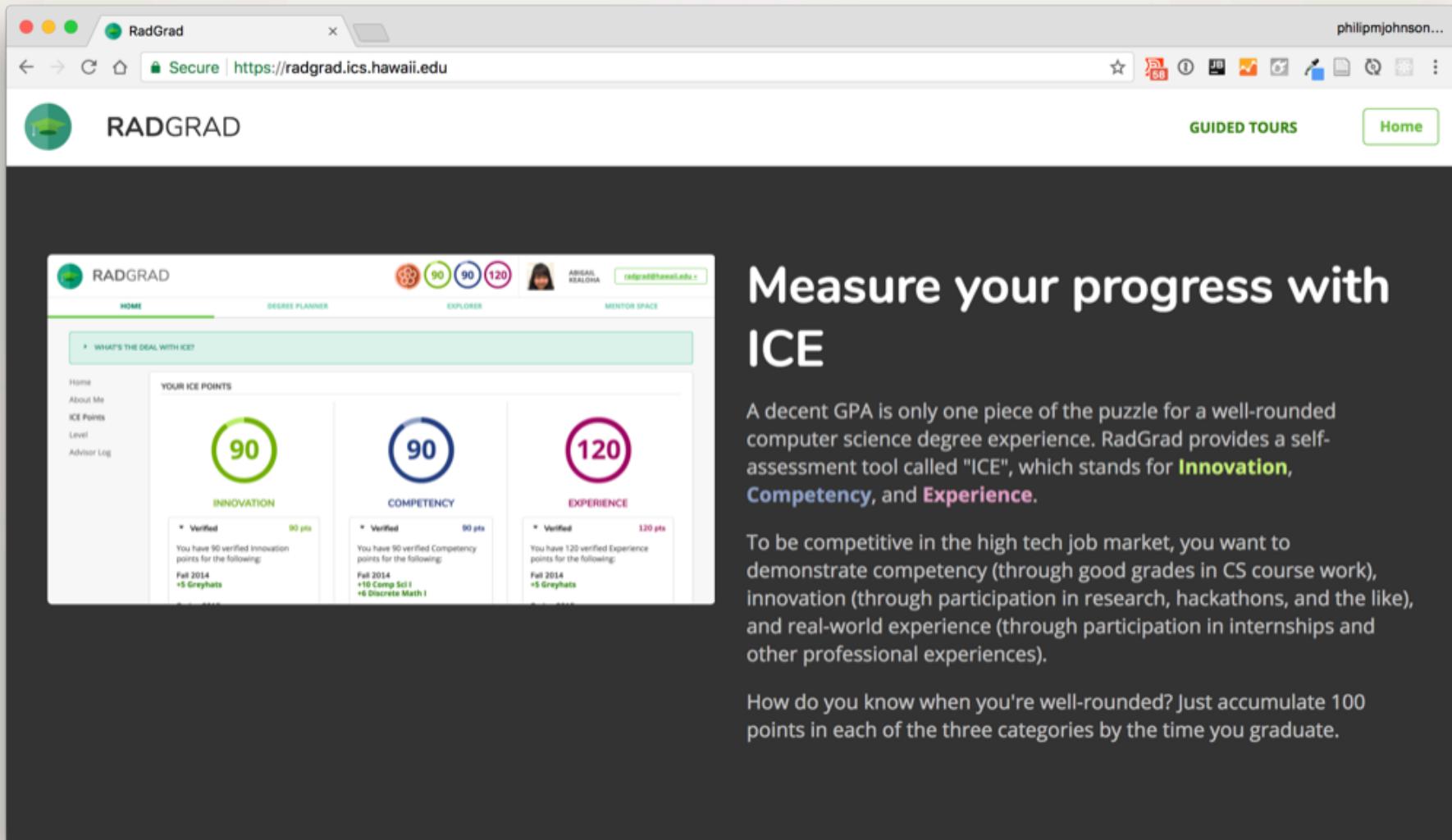
The screenshot shows the RadGrad website homepage. At the top, there's a navigation bar with icons for back, forward, search, and user account. The URL is https://radgrad.ics.hawaii.edu. Below the header, there's a green circular icon with a graduation cap, followed by the word "RADGRAD". To the right are links for "GUIDED TOURS" and "Home". The main content area features a large green banner with the text "Specify your degree, career goals, and interests". Below the banner, there's a sub-section titled "Getting started with RadGrad is easy. Just meet with your advisor, and they will set up your account and answer your questions." Another section below it says "To start, you'll select one of the 3 degree programs, one out of 18 career directions, and a few of the 57 interest areas. Don't worry, you can change them later!" On the left side of the main content, there's a sidebar with "ABOUT ME" information: Name (Abigail Kealoha), Picture (Upload), Career Goals (Software Development, Software Engineering), Desired Degree (B.S. CS), Email (abi@hawaii.edu), Website (http://abi.github.io), and Interests (Application Development, Research). There are also "Edit in career explorer", "Edit in degree explorer", and "Edit in interest explorer" buttons.

## Generate a custom degree experience

Based on your degree, career goals, and interests, RadGrad helps you plan what you'll do each semester: not just the classes you'll take, but also *relevant* extracurricular opportunities such as hackathons, internships, clubs, and more. RadGrad currently provides you with **71** opportunities to choose from, with more on the way!

RadGrad recognizes that what you do outside of class is sometimes just as important as what you do in it.

The screenshot shows the RadGrad Degree Planner interface. It features a grid-based academic calendar for years 2014 through 2018. Each grid cell contains course information, such as "KIS 111 Graphics" or "KIS 314 Software Engineering I". To the right of the calendar, there's an "INSPECTOR" panel for "KIS 314 Software Engineering I", which includes fields for "Course", "Prerequisites", "Description", and "View in Explorer". Below the calendar, there's an "ACADEMIC PLAN" section with a dropdown for "Year" (2016) and "Name" (B.S. in Computer Sciences). The plan shows a grid of courses for Fall, Spring, and Summer semesters across three years.



The screenshot shows a web browser window for the RadGrad website (<https://radgrad.ics.hawaii.edu>). The page displays a dashboard titled "YOUR ICE POINTS" with three categories: INNOVATION (90 points), COMPETENCY (90 points), and EXPERIENCE (120 points). Each category has a "Verified" status and a list of activities contributing to the points.

Category	Points	Verified	Activities
INNOVATION	90	Verified	Fall 2014 +5 Greghats
COMPETENCY	90	Verified	Fall 2014 +10 Comp Sci I +6 Discrete Math I
EXPERIENCE	120	Verified	Fall 2014 +5 Greghats

**Measure your progress with ICE**

A decent GPA is only one piece of the puzzle for a well-rounded computer science degree experience. RadGrad provides a self-assessment tool called "ICE", which stands for **Innovation**, **Competency**, and **Experience**.

To be competitive in the high tech job market, you want to demonstrate competency (through good grades in CS course work), innovation (through participation in research, hackathons, and the like), and real-world experience (through participation in internships and other professional experiences).

How do you know when you're well-rounded? Just accumulate 100 points in each of the three categories by the time you graduate.

Secure | https://radgrad.ics.hawaii.edu

GUIDED TOURS

Home



## Level up

The RadGrad path to an improved degree experience is long and challenging. To recognize stages in your progress, RadGrad defines six levels of achievement: white, yellow, green, blue, brown and black.

Right now, there are **3** student(s) at Level One, **19** at Level Two, **8** at Level Three, **4** at Level Four, **0** at Level Five, and **0** at Level Six.

Once you achieve a level, the corresponding badge appears in your profile and is visible to other community members. In addition, your advisor will give you a laptop sticker representing your level.  
Congratulations, grasshopper!



RadGrad

Secure | https://radgrad.ics.hawaii.edu

RADGRAD

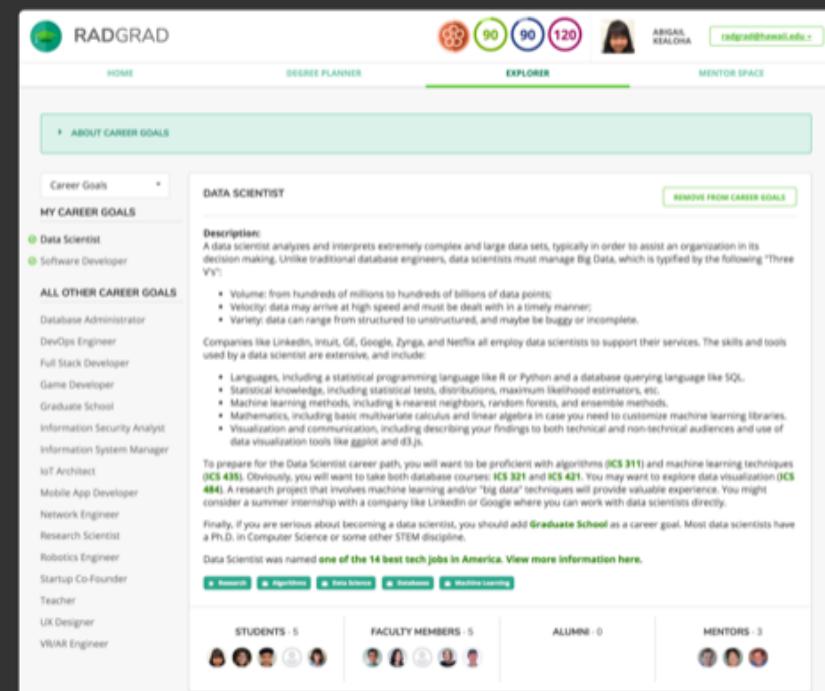
GUIDED TOURS

Home

# Discover new directions

Computer science is changing all the time, and so your interests and career goals might evolve as well.

RadGrad provides "Explorers" for career goals, interests, degrees, and more so you can stay on top of the latest trends. For example, RadGrad's career goals include: **Data Scientist, Database Administrator, DevOps Engineer, Full Stack Developer, Game Developer, Graduate School, Information Security Analyst, Information System Manager, IoT Architect, Mobile App Developer, Network Engineer, Research Scientist, Robotics Engineer, Software Developer, Startup Co-Founder, Teacher, UX Designer, VR/AR Engineer.**



The screenshot shows the RADGRAD website with the "EXPLORER" tab selected. The main content area is titled "DATA SCIENTIST". It includes a sidebar with "CAREER GOALS" sections for "MY CAREER GOALS" (Data Scientist, Software Developer) and "ALL OTHER CAREER GOALS" (Database Administrator, DevOps Engineer, Full Stack Developer, Game Developer, Graduate School, Information Security Analyst, Information System Manager, IoT Architect, Mobile App Developer, Network Engineer, Research Scientist, Robotics Engineer, Startup Co-Founder, Teacher, UX Designer, VR/AR Engineer). The main content area describes the Data Scientist role, mentions the "Three V's" (Volume, Velocity, Variety), and lists skills and tools. It also notes that companies like LinkedIn, Intuit, GE, Google, Zynga, and Netflix employ data scientists. A note for preparing the Data Scientist path is present, along with a link to more information. At the bottom, there are sections for STUDENTS (5), FACULTY MEMBERS (5), ALUMNI (0), and MENTORS (3).

Secure | <https://radgrad.ics.hawaii.edu>

**RADGRAD** GUIDED TOURS Home

# Pay it forward

RadGrad offers opportunities for students to give back to their academic community both during their degree program and after they graduate.

During your time as a student, you can provide advice about courses you've already taken to those coming after you. Students have contributed **64** course reviews so far.

After you graduate, you can become a mentor, and answer student questions about life after graduation and how to best prepare for it. We have **6** mentors from locations including: **Palo Alto, CA, Honolulu, HI, New York City, NY, San Francisco, CA.**

Home | Open Power Quality    philipmjohnson...

openpowerquality.org

Open Power Quality    Home    Organization▼    Manual    Slack    Publications    News

Find OPQ on GitHub

## Welcome to Open Power Quality

Open source hardware, software, and data for low cost, crowd-sourced power quality monitoring, storage, and analysis

**Designed for utilities, campuses, renewable energy providers, power specialists, consumers, and anyone else who wants increased use of renewable energy sources.**

Our target users include macro-grid providers (electrical utilities), micro-grid providers (military, academia, and large corporations), renewable energy providers, power quality specialists, and even everyday consumers interested in their power quality.

See the [community](#) page for more details on these user groups.

**Our ultimate goal is to help society move from reliance on fossil fuels to more efficient, robust, and renewable energy sources.**



Home | Open Power Quality × philipmjohnson...

← → C ⌂ ⓘ openpowerquality.org

Open Power Quality Home Organization Manual Slack Publications News

A circular image showing a close-up of a printed circuit board (PCB) with various electronic components, including a central microcontroller and several sensors or connectors.

## OPQBox: Low cost, open source hardware

Our OPQBox costs less than US\$100 to manufacture, and the schematics are published under an open source hardware license if you want to build it yourself.

We want to create and support an ecosystem of hardware developers that accelerate the development of new designs to satisfy different needs.

## OPQ Cloud: A suite of cloud-based, open source software services

Each OPQBox sends power quality events and data to our collection of cloud-based services: OPQ Mauka, OPQ Makai, and OPQ View.

OPQ cloud services can be installed and run locally, or deployed to a hosting environment. We also host an instance ourselves.

For consumers, this means that you can easily determine if a power quality problem is local to your own house or is more widespread in your neighborhood or city by accessing our hosted cloud services.

For organizations, this means you can deploy OPQBoxes throughout your facility, and install OPQ Cloud yourself if you want to keep your power quality information private.

A block diagram illustrating the OPQ Cloud architecture. Three OPQBox units are shown on the left, each connected to a central dashed box labeled "OPQ Cloud". Inside the "OPQ Cloud" box, there is a cylinder labeled "Ingested Data" with three arrows pointing to it from the OPQBoxes. One arrow is labeled "High Fidelity (Measurement)" and another is labeled "Low Fidelity (Measurement)". The third arrow points to a box labeled "OPQMauka". From "OPQMauka", two arrows point outwards: one labeled "Events" pointing to "OPQView", and another labeled "Measurement Waveforms Events" pointing back to the "Ingested Data" cylinder. There is also a direct connection between "OPQMauka" and "OPQView".

A screenshot of the "Live Device Monitor" interface for OPQ View. It displays two graphs: one for Voltage (ranging from 121.60 to 122.20) and one for Frequency (ranging from 59.970 to 60.020 Hz). The voltage graph shows a fluctuating line with a prominent peak around 121.669 V. The frequency graph shows a fluctuating line with a prominent peak around 59.997 Hz. Both graphs have a timestamp range from 10:19:34 to 10:20:22.

## OPQ View: Open source analytics for the smart grid

Uploading the raw data is only the start. The real power of the OPQ ecosystem is the kinds of analytics it makes possible.

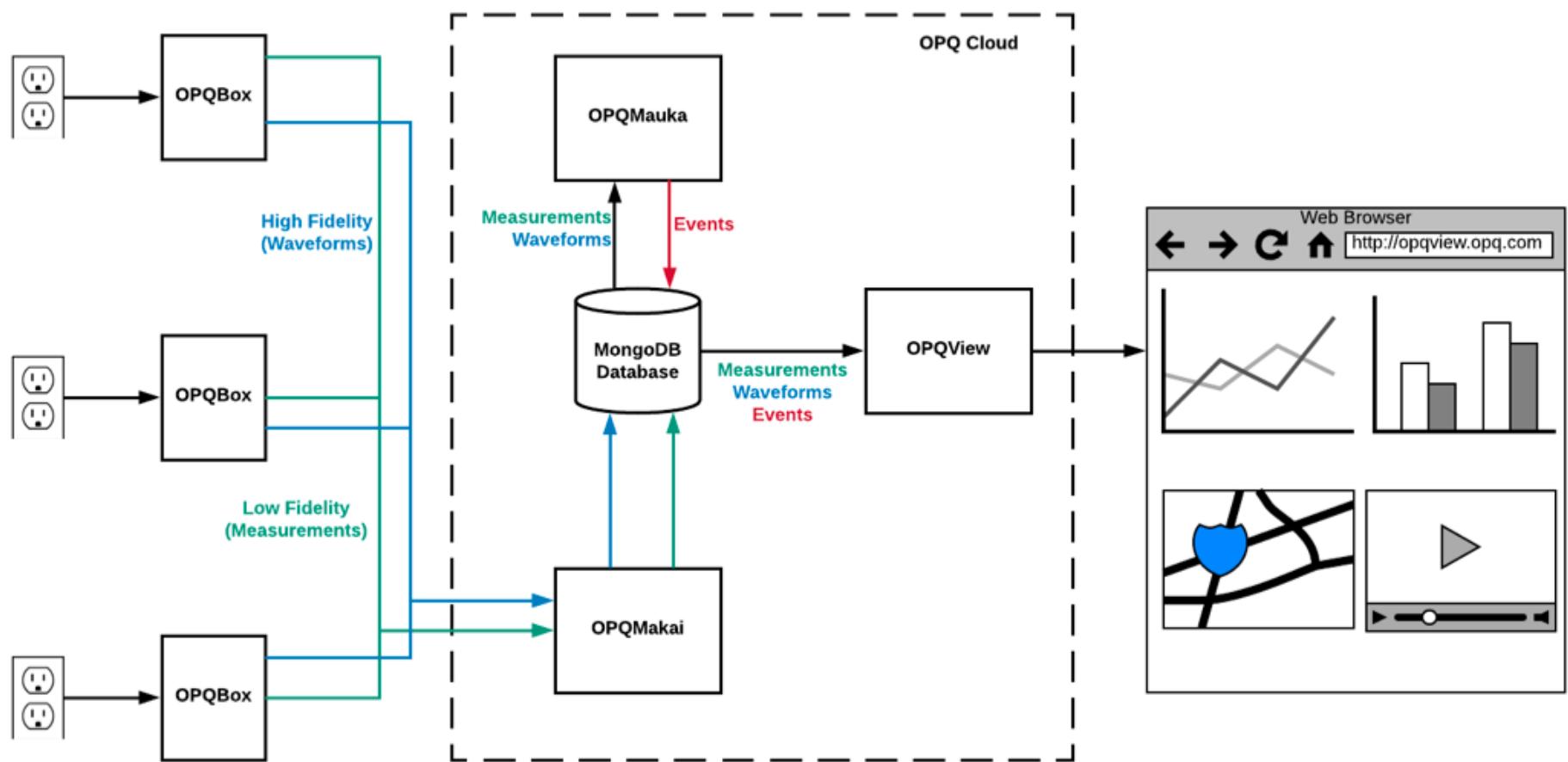
First, each OPQBox is associated with an owner-supplied location, such as a zipcode. This enables OPQ View to provide geographic views of power quality data, which can be superimposed with substation information from the utility provider.

Second, the community nature of OPQ data makes it trivial to determine if a power quality event is local to you or more widespread on the grid.

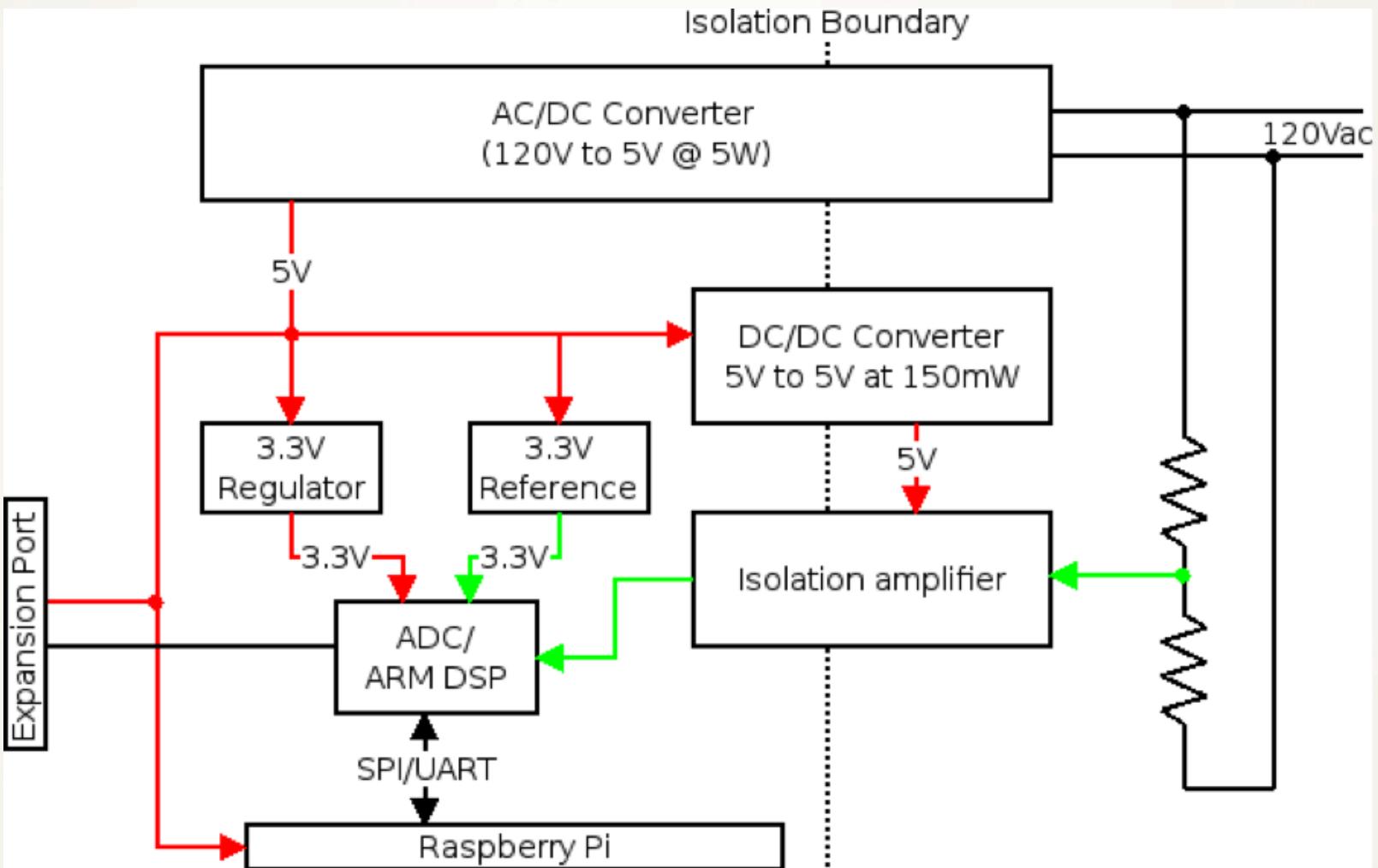
Third, correlation of power quality data with other forms of information can provide valuable insight into the impact of renewable energy. For example, are power quality events more common in areas with high concentration of rooftop solar? Do power quality events correlate with weather data—for example, a rapidly moving cloud cover?

The OPQ architecture is designed to support "plugin" analytics. Have an idea for a new analytic? Let us know!

# OPQ System Diagram



# OPQBox component diagram



# OPQView

Philipmjohnson...

emilia.ics.hawaii.edu

Home Public Monitor OPQBox Settings Account

System Status

17662 TOTAL EVENTS    14779 TOTAL BOX EVENTS    5 TOTAL OPQ BOXES

2074610 TOTAL MEASUREMENTS    1086080 TOTAL TRENDS    0 TOTAL USERS

1 OPQ BOX    ONLINE STATUS    Live Measurements →

2 OPQ BOX    OFFLINE STATUS    Live Measurements →

3 OPQ BOX    ONLINE STATUS    Live Measurements →

4 OPQ BOX    ONLINE STATUS    Live Measurements →

5 OPQ BOX    ONLINE STATUS    Live Measurements →

Monthly Trends

January, 2018 - [Box ID: 1] - [Trend: voltageMin]

Min Voltage

OPQBox ID: 1

Voltage

Day of Month

Voltage

118.66 V MONTHLY AVG

127.59 MAX on 1/11/2018

119.59 MIN on 1/18/2018

Frequency

60.00 Hz MONTHLY AVG

62.51 MAX on 1/25/2018

58.14 MIN on 1/25/2018

THD

0.03 MONTHLY AVG

0.02 MIN on 1/25/2018

10.09 MAX on 1/25/2018

OPQBox Uptime

98.55 % MONTHLY AVG

Events

Feb 1, 2018 - Now

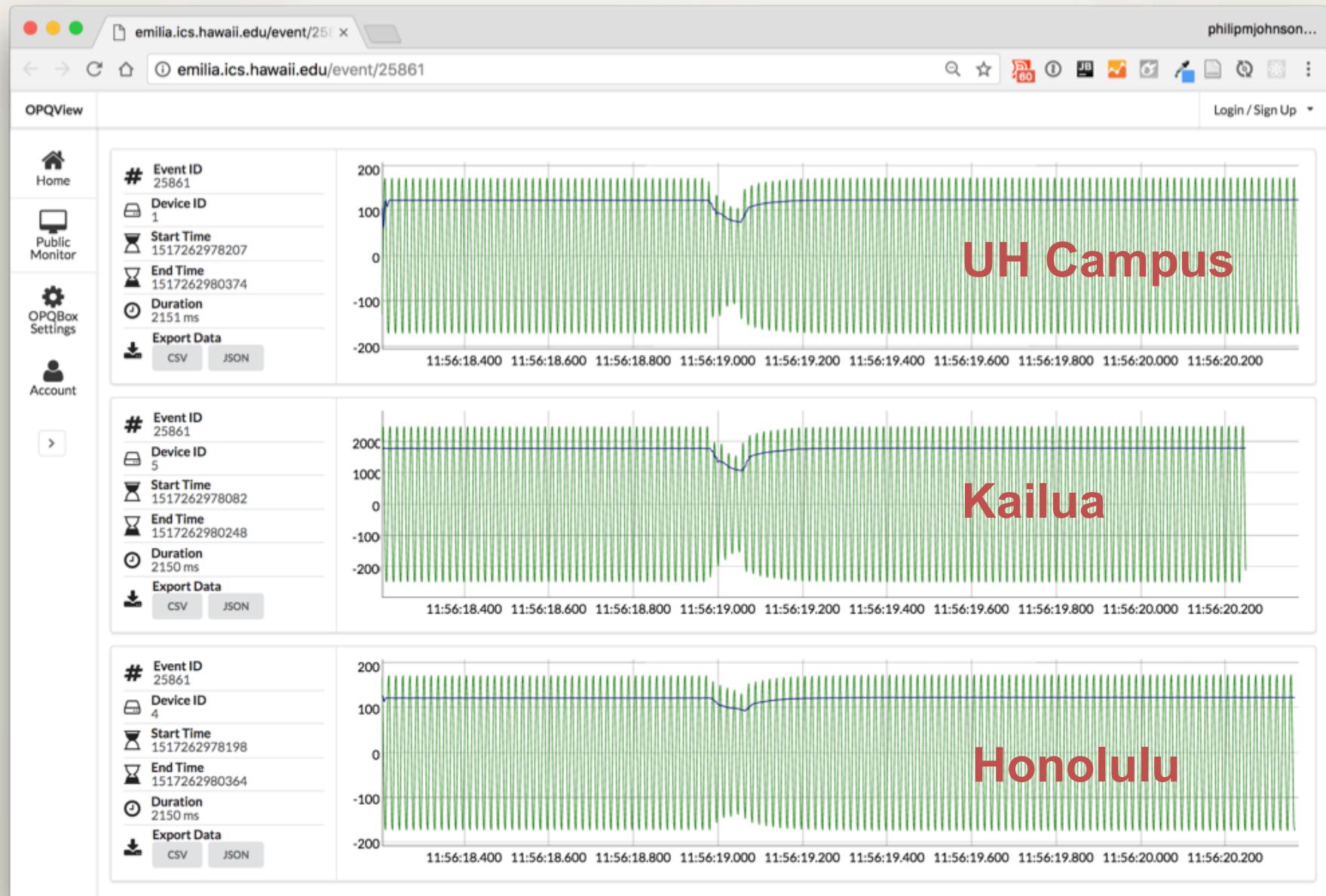
Event ID	Type	Boxes Triggered	Boxes Received	Description	Start Time	End Time	Details
26020	VOLTAGE_SWELL	5	1,4,3,5	4 1517527375449- 1517527382115	13:22:54 [01 Feb 2018]	13:23:03 [01 Feb 2018]	<a href="#">View</a>
26019	VOLTAGE_SWELL	5	1,3,4,5	4 1517526761949- 1517526066049	13:12:40 [01 Feb 2018]	13:13:26 [01 Feb 2018]	<a href="#">View</a>

Daily Event Count

Feb 1, 2018

Device 5

# Campus Power Outage (Mon, Jan 29, 2017)



## Future directions

### Short term

- **OPQ kickstarter campaign**
- **RadGrad deployments, grants**
- **EE 467**

### Medium term

- **EE-Portfolios**
- **Courses.EE**
- **Professional M.S. in SE**

### Long term (for UH):

- **ICS: information sciences**
- **EE: technical design and implementation**
- **ITM: technical management**

**Should software engineering be an institutional priority at UH?**

**Where should the organization home for software engineering be at UH?**

**How should UH build its software engineering program?**