

2020

Hawai'i Annual Code Challenge (HACC)

Challenge Title	Visualizing Campus Occupancy Trends During (AND After) COVID-19
Department / Organization	University of Hawaii
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The Challenge	
Describe situation to be solved	COVID-19 has completely changed patterns of behavior around uses and density of spaces throughout campus. This challenge looks to create a means to visualize campus occupancy in order to: (1) identify patterns of use to correlate against scheduled and ad hoc/on-demand resource commitments, (2) identify unscheduled patterns of use, in particular around things like study groups, planned or unplanned activities on campus, and unanticipated patterns of use that may require alternative space considerations; and (3) improve future scheduling and use of campus resources to both prevent spread of COVID-19, and increase efficiency of campus operations.
Preconditions <i>(How does it work now)</i>	<ol style="list-style-type: none">1. General use and scheduling of classroom sections is controlled centrally on campus based on planned course offerings, and actual demand based on registration projections. COVID-19 has resulted in dramatic change to course offerings and campus room occupancy policies in order to support required physical distancing and de-densification to help prevent transmission of COVID-19.2. While UH hopes that these policy changes will result in appropriate social distancing and thus lowered transmission rates, we currently have no way of assessing timing, regularity nor density of gatherings on campus.3. Unspecified, but important long term facility and resource planning requires suitable data and analytics – generally not currently available.
Assumptions/Issues <i>(list any conditions that could impact the solution)</i>	<ol style="list-style-type: none">1. The vast majority of students and employees connect to the campus WiFi access points at all locations where functional meetings, workshops, classes, etc., happen in the course of the day.2. Active devices will automatically roam across the campus WiFi network, associating with the nearest (best signal available) WiFi access point, in particular, when static for any length of time, e.g., when in a class or meeting or ad hoc gathering.

Current Approach <i>(how is situation currently being handled)</i>	1. See Preconditions.
Users <i>(Who would use the application - employees or constituents or both? How many users would there be?)</i>	<ol style="list-style-type: none"> 1. The UH campus facility management and planning; UH COVID-19 response team. 2. Campus executive leadership, schedulers, any groups responsible for allocating resources and delivering services to the campus community, IT management responsible for WiFi performance and deployment.
Business Rules	UH has established the maximum occupancy rate of each classroom and public gathering space under social distancing policies.
Special Requirements	No personally identifiable information will be collected. No tracking of devices as they move across campus will be supported by policy.
Technical Platforms <i>(in use or desired to be used)</i>	Occupancy rates will be estimated by sampling the WiFi management platform, and extracting anonymized data to prevent undesired tracking of individual devices (and associating patterns of behavior with individual persons).
Data set to be used or collected	<ol style="list-style-type: none"> 1. UH and ITS will provide a dataset that represents the location of all classrooms, public spaces and WiFi access points on campus, along with the maximum occupancy under social distancing for each space. 2. ITS will generate anonymized usage data for the 3000+ wireless access points across the Manoa campus, sampled for a period of two weeks. This sample dataset will be provided to teams at the start of the challenge. This dataset will provide time-stamped data points indicating the density of connections to each access point. Further datasets may be provided during the challenge at the discretion of the sponsor.
Data set calculations or reporting needs	The essential goal of reporting is to better understand if social distancing policies are being adhered to. Reports can indicate: <ol style="list-style-type: none"> 1. Locations and times when social distancing policies appear to have been violated. 2. Are there regularities in the unexpected patterns or possible violations to space density policies? In other words, does the policy appear to be violated in a given location MWF from 9:00am-10:15am? 3. How accurate is the reporting? Is there the possibility of false positives? False negatives?
Solution Road Map	

Basic Flow <i>(steps of user action/system response)</i>	<ol style="list-style-type: none"> 1. Dataset of campus locations, occupancy limits, and WiFi access points is provided to system. 2. Raw, anonymized WiFi data is provided to system. 3. System generates a tabular report indicating locations and times where occupancy limits appear to have been exceeded. 4. System can also generate a map-based report showing the campus with a “slider” along the bottom indicating a point in time. The campus map is colored. Locations in red indicate places where occupancy rates have been exceeded at the timestamp indicated by the slider. 5. Subject to the team capabilities, creation of visualization widgets to improve use of data products.
Goal of Solution	<ol style="list-style-type: none"> 1. Leverage available data to support effective use of campus spaces and resources. 2. Ensure that physical distancing policies are being adhered to. 3. Detect possible violations of physical distancing policies in an actionable manner. 4. Improve distribution of planned campuses uses to better support physical distancing policies. 5. Validate if WiFi data can be used effectively to improve campus planning and operations, and to assess compliance with physical distancing policies.
Business Value <i>(potential financial or time savings)</i>	<p>Effective use of campus spaces and resources with the aim to reduce operational costs; reduced COVID-19 transmission on campus, with resultant savings in quarantine and response costs and improved safety of UH community members.</p>
Success Scenario <i>(how you know a solution is working)</i>	<p>Readily usable tools to manage campus use and operations; reduction or elimination of “super spreader” concentrations on campus.</p>
To be completed by the HACC Planning Committee	
Community/Industry Data Available	<p>Not applicable</p>
Potential Community/Industry Co-Sponsors	<p>Not applicable</p>