



SlugLife

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JACK BASKIN SCHOOL OF ENGINEERING

Senior Design Project



Abstract

The University of California, Santa Cruz, campus is spread out over 2000 acres overlooking Monterey Bay. The school provides a lot of services for its students in order to make students' lives easier and productive. For example, UCSC has a very active and efficient transportation system to make it easier for its students and other community members to get around the vast campus. Also, UCSC encourages students to get involved in campus activities, which results in lots of events happening near or on campus. The school's five on-campus dining halls provide students a variety of food options with dinner menus changing daily. As a result, there are lots of moving parts at UCSC and keeping track of all of them may be a difficult task for students that are also juggling coursework for various classes.

SlugLife is a mobile application for Android and iOS devices designed to organize UCSC's transportation, events, and dining information so that students and other UCSC community member can be informed and discover what's happening on and around campus in real-time. This application aims to build a unified college community by connecting and actively engaging the students.

Features

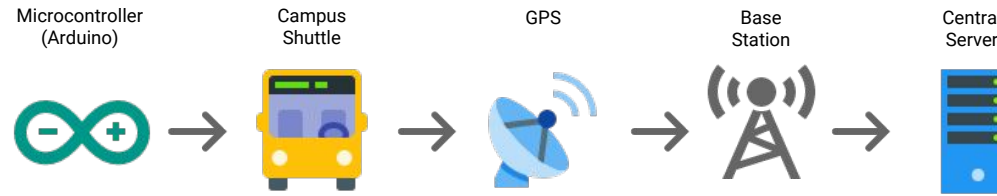
Campus Transportation: Displays the real-time geographical positions of campus shuttles on a map centered on UCSC, organizes campus shuttles, from closest to furthest, depending on user's current location, displays the ETA of each active shuttle to the user's closest bus stop, and notifies the user when a bus is 1, 2, or 3 bus stops away from the user specified bus stop.

Events: Informs users of current and future events that occur on or near the UCSC campus. Searching returns an event's description, location, date, and time.

OPERS Facility Counts: Informs users of the current people count at various OPERS facility locations.

Dining Options (Future): Displays current menu options (since they change daily) at the five on-campus dining halls.

System Architecture



Push Notifications

"I want to know when the bus is going to be here!"

We use the midpoint formula

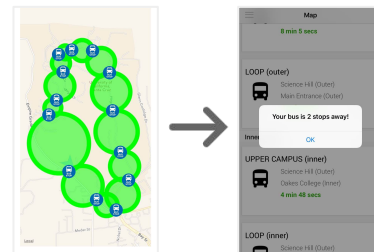
$$B_x = \cos \varphi_2 \cdot \cos \Delta \lambda$$

$$B_y = \cos \varphi_2 \cdot \sin \Delta \lambda$$

$$\varphi_m = \arctan 2(\sin \varphi_1 + \sin \varphi_2, \sqrt{(\cos \varphi_1 + B_x)^2 + B_y^2})$$

$$\lambda_m = \lambda_1 + \arctan 2(B_y, \cos(\varphi_1) + B_x)$$

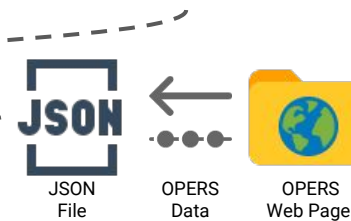
to define points around which we draw artificial circles (represented on this poster below as green circles) between bus stops. We use this to determine the number of stops a campus shuttle is from a specific bus stop. Based on a customizable setting for number of bus stops away, a notification fires when the campus shuttle hits the threshold.



"What's happening on campus today?"

To gather Event data, we scraped UCSC's Events page using a REST API placing the data in a JSON file. We then used JSON parsing libraries, JSONReader (Android) and SwiftYJSON (iOS), to display the data.

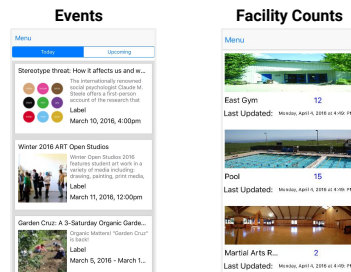
We use Google's Material Design Standards for the Modern Day User Interface. One outcome of the standards is to use Google Now Cards which we use to display Events.



OPERS Facility Counts

"How many people are at the Fitness Center right now?"

To gather OPERS facility counts, we used a similar process to Events gathering, except we scraped OPERS' web pages.



Software Implementation

The on-campus base stations pick up signals from GPS transmitters located on each individual campus shuttle and pass along the GPS coordinates to the central server as NMEA sentences.

The central server stores information about each active campus shuttle in a database. Every three seconds, a PHP script queries the database and builds an XML file containing this information on all active campus shuttles. We parse the XML file and use Apple Mapkit (iOS) and Google Maps SDK (Android) to display the campus shuttles on SlugLife as markers on a campus map.

On-campus events, dining options, and OPERS facility counts are scraped from UCSC official web pages using an open source library, Portia. We use a REST API to build a JSON file with the scraped data and parse the JSON file to display it on SlugLife.

Future Work

We can add many more features such as library room reservations, access to a live stream of KZSC (UCSC's public radio), bookstore deals, and current UCSC campus parking lot status.

SlugLife is the first communal application for UCSC. Our vision is to build a framework that can be used by others at different universities to build their campus community applications.

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