Software Development White Paper

CruzSafe Virtual 211 Mobile/Web Application System

I. Subject Domain

According to UCSC PPC Assistant Vice Chancellor Traci Ferdolage, there are around 400 people currently employed by the university whose jobs revolve around the day-to-day maintenance of campus infrastructure. These jobs might require workers to perform tasks such as lighting surveys, trash disposal, road infrastructure inspections, plumbing repairs, and so on. Also according to Ferdolage, if those 400 people were the only people who took note of issues around campus, the entire institution would be completely falling apart.

It is imperative, Ferdolage insists, that campus maintenance facilities receive reports of broken and faulty infrastructure from the general campus population; students, staff, and faculty; everyone who goes on campus in one way or another.

Currently, however, there is no standardized method for people to report safety and maintenance issues to the numerous facilities on campus. A large number of institutions and obscure lines demarcating jurisdictions between facilities leads to an overall confusing and off-putting experience to a person who has already gone out of his or her way to report something.

Because of such, there are not nearly as many people successfully reporting maintenance problems on campus than there could be. As a result, campus facilities generally work at an information deficit regarding the scope of issues across campus, reducing their overall effectiveness in keeping UC Santa Cruz safe and clean.

II. System Proposal

It quickly becomes evident that there is much value in developing a system that would create a direct line of communication between campus dwellers and campus caretakers.

Ferdolage herself, as the Assistant Vice Chancellor of one of the major maintenance facilities on campus, has been deeply interested in the idea integrating such a system within her institution. Ferdolage maintains that, while the introduction of another piece of software into PPC's workflow would undoubtedly create more work for the employees, it would also be an undoubtedly monumental step towards better campus stewardship; a step she wholeheartedly supports.

Other people such as Jason Moore, Physical Security Systems Manager of the UCPD, have emphasized that the receiving of complaints from the inhabitants of campus is much, much more effective in spurring decisive action from facilities as opposed to a single staff member report. Moore has as such expressed great interest in a system that would allow for his own personal voice to be backed by the voices of dozens of complaints from the student body in matters such as surveys of lighting deficiencies on campus.

Michael Krakowiak, a UCPD Public Safety Dispatcher, is very much in support of a system that would allow him to overview present infrastructure issues on campus 24/7. Krakowiak has remarked that while the campus police department normally leave maintenance issues to the respective facilities, in the event of a safety hazard, the police department would want to know as soon as possible. Especially if said hazard occurs in the middle of the night when campus facilities are closed, and when officer action may be necessary to ensure the safety of students in a dangerous situation.

Evidently there is a clear and pressing need for such a system present in the state of UCSC facilities, demanding a new and direct line of communication for campus dwellers to report issues on campus.

III. System Overview

And as such, in cooperation with the Chief of Police Nader Oweis, development of the software application called CruzSafe began in Winter 2019, with a slated full 1.0 release to the general campus population at the end of Spring 2019. The project was originally organized and founded by Professor Richard Jullig in the undergraduate capstone class CMPS 116/117, of which the developers are students of.

The design of CruzSafe features two major aspects: a mobile application and a web application, with both applications containing completely different functionality from each other, each created for very different user groups.

The mobile application, compatible with both Android and iOS devices, is meant for staff, students, and faculty to quickly and easily report maintenance issues on campus with minimal complexity and difficulty. Data fields such as the device location (or pinned location), the incident type as specified by the user, and a picture/video taken by the user all lend the reporting process to being as efficient as possible in communicating the problem while also being as intuitive as possible, allowing for general usability. Users also have the ability to overview sent reports and monitor their status, receiving a notification whereupon their reported issue has been resolved.

The mobile application is the faucet of CruzSafe that is the primary focus of all marketing and promotional material.

The web application, on the other hand, is an interface designed specifically for facility employees and police dispatch officers only. Various pages in the application are

offered for various different occupations, allowing dispatch officers to overview all reports with a map interface, intake facility workers to receive and respond to incoming reports that have been assigned to them, and allowing administrators such as the Chief of Police to supervise overall operations of all users. In addition, detailed analytics functionality allows for many different combinations of report data points, lending the software to having useful statistical and data-gathering purpose as well.

Both the mobile application and the web application feature Shibboleth single-log on system. A valid CruzID and Gold password is required for a user to use the mobile application in order to prevent fraudulent reports and to ensure contact information is present for all reporters. For the web application, only authorized users are allowed to access the system with allocated roles and security privileges, as dictated by system administrators.

When a report is sent in from the mobile application, various factors are taken into consideration in assigning said report to one of the campus facilities. These factors include the incident type and GPS location. Should an incident be marked incorrectly, or should the system flag a report incorrectly, a report can be forwarded manually by an employee to a different facility within the web application interface.

Once a report has been received, the intake worker will be able to perform different tasks as necessary with the report, before ultimately passing the information of the report manually through to preexisting software already in place in their institution that handles worker tickets in order to address the problem. Once the intake worker receives confirmation that the issue has been solved, he or she will complete the report, closing the case and notifying the reporter.

IV. Current Progress

As it stands now, late April of 2019, the primary functionality of CruzSafe has been largely finalized. Both the mobile application and the web application have been developed to the point where the developers believe they feel confident in beginning a beta period wherein valuable feedback is received from both facility employees and student/staff/faculty users.

Major hurdles that have been overcome include the integration of Shibboleth into the application; a task that was especially difficult given the lack of documentation for Node.js on an Apache server. After an 8-week long period however, the developers finally managed to successfully integrate the service into the application; a crucial feature whose absence would have been the death of the project.

Development on both a mobile and web application, both of which being completely separate in functionality, led itself to a very unwieldy development process inducing many technologies to learn and may development environments to set up. Now however, the team has ultimately gotten a firm grasp of both faucets of the application and are confident in their ability to ultimately create a polished product by release 1.0.

V. Planned Release

The developers intend to first release their product for a beta-testing stage a few weeks before the 1.0 release of CruzSafe at the end of Spring 2019. Currently, the application is temporarily being hosted on Google Cloud Platform. However, the application will eventually need to be migrated onto an on-campus server for the 1.0 release. Such a migration would also conceivably require quite a few adjustments from the current design.

Further discussion will be needed in order to ultimately determine the final hosting of the application.

After the official release of CruzSafe to the general student population, two of the five developers will be remaining on campus for the 2019-2020 school year and will continuing on maintaining and improving the application as part of independent study for the future benefit of the campus community.