

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 falling apart.

Ferdolage insists that it is imperative for campus maintenance facilities to receive reports of broken and faulty infrastructure from the general campus population: students, staff, and faculty.

Currently, however, there is no standardized method for people to report safety and maintenance issues to the numerous facilities on campus. An overwhelming number of campus facilities and obscure lines demarcating their jurisdictions can be very confusing and off-putting for those who have already gone out of their way to report a hazard.

For this reason, there are not nearly as many people successfully reporting maintenance problems on campus as 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, as the Assistant Vice Chancellor of one of the major maintenance facilities on campus, has been deeply interested in integrating such a system within her institution. She maintains that, while the introduction of another piece of software into PPC's workflow would undoubtedly create more work for employees, it would also be a monumental step toward better campus stewardship; a step she wholeheartedly supports.

Other people such as Jason Moore, Physical Security Systems Manager of the UCPD, have emphasized that complaints from those on campus are far more effective in spurring decisive action from facilities than a single staff member report would be. As such, Moore has expressed great interest in a system that would allow for his own 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 leaves 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 the hazard occurs in the middle of the night when campus facilities are closed, in which case officer action may be necessary to ensure the safety of students.

Evidently there is a clear and pressing need for a better system for reporting these issues, demanding a new and direct way for campus dwellers to communicate with facilities.

III. System Overview

As such, a software application called CruzSafe was developed, beginning in Winter 2019 with a full 1.0 release to the campus population slated at the end of Spring 2019. The project was organized by Professor Richard Jullig in the undergraduate capstone class CMPS 116/117, with developers from that class working under the guidance of Chief of Police Nader Oweis.

The design of CruzSafe features two major aspects: a mobile application and a web application with completely separate functionality, having been 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 make the process of communicating the problem as efficient as possible while maintaining an intuitive user interface. Users also have the ability to review sent reports and monitor their status, and receive a notification when their reported issue has been resolved. This 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. Various pages in the application are offered for different occupations. Dispatch officers are allowed to overview all reports with a map interface, intake facility workers receive and respond to incoming reports that have been

assigned to them, and administrators such as the Chief of Police can supervise overall operations of all web users. In addition, detailed analytics functionality allow for many different combinations of report data points, which also lends the software to statistical and data-gathering purposes.

Both the mobile application and the web application feature Shibboleth single-sign-on system. A valid CruzID and Gold password is required for all users on 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 as the report is automatically assigned 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, and can manually pass the information of the report to preexisting software from their institution that handles worker tickets. Once the intake worker receives confirmation that the issue has been solved, he or she will complete the report, closing the worker ticket and notifying the reporter of completion.

IV. Current Progress

As it stands now in late April of 2019, the primary functionality of CruzSafe has been nearly finalized. Both the mobile and web applications have been developed to a point where the developers feel confident beginning a beta release wherein valuable feedback can be 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, the developers finally managed to successfully integrate the service into the application; a crucial feature whose absence would have meant the death of the project.

Development of both mobile and web applications with completely separate functionalities led to a very unwieldy development process which required setting up a number of development environments and learning many new technologies. However, the team has now gotten a firm grasp of both facets of the application and are confident in their ability to 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 being hosted temporarily on Google Cloud Platform. However, the application will need to be migrated onto an on-campus server for the 1.0 release. Such a migration could conceivably require quite a few adjustments from the current design; further discussion will be needed 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 continue maintaining and improving the application as part of independent study for the future benefit of the campus community.