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Deliverable 4

A Real-Time Mobile Survey of Alcohol Use and Sexual Consent in Social Research Participants

Project Overview

The purpose of this capstone is to create a mobile application that can track, in real-time, data from participants about their drinking habits, and to provide a web-facing tool for social science researchers to explore the raw data and provide preliminary analyses. The app allows participants to report their drinking on location, as well as subsequent surveys about perceived levels of drinking, sexual behavior, and stress, and stores this data in a secure database. The web-facing element will assist researchers from the School of Public Health and Social Justice to view both individual and agglomerated data slices in order to perform the preliminary analyses on the drinking and sexual behavior of college students at Saint Louis University.

Background

The motivation behind this project is to improve response accuracy in social research participants. Current research methods rely on online or paper surveys (i.e. Qualtrics, Survey Monkey, etc.) to collect data in order to analyze alcohol consumption and sexual consent. Participants are asked to complete the surveys post-drinking episodes, mixing in a higher degree of human error. The mobile application BoozyMeter will serve to replace the older methods by providing an interface for real-time data collection.

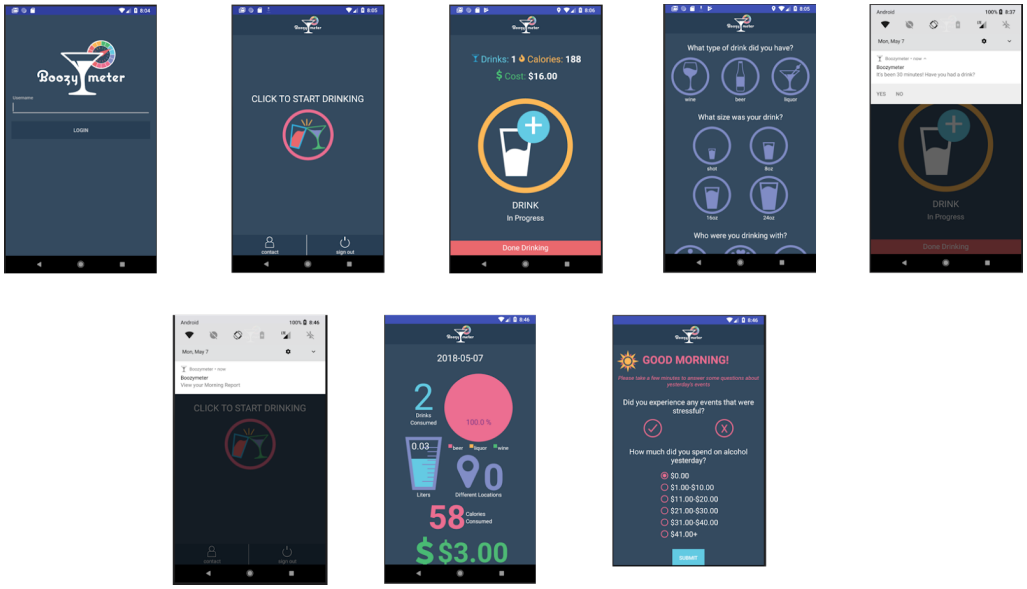
BoozyMeter Functionality

Prior to beginning a drinking episode, the participant must press Start in the mobile application. Every time the participant takes a drink, they must log it into the application and answer four easy questions (type, size, with whom, and where). The answers are logged into the database. The participant can keep logging their drinks, but the application also runs on a timer. If no user input is detected for thirty minutes, the app sends a notification reminding the user to log their activity. If no user input is detected for two hours, the app will stop logging data and revert back to the home screen. Google's location services run in a service (in the background) and allows the app to log location every ten minutes as long as the user is actively logging their drinks. The app assumes that the user has location services enabled, or else no location data will be collected. At 8:00 AM the following morning, the user will receive a notification to fill out a Morning Questionnaire, which contains the sexual consent questions and a morning report summary of their previous night will be displayed for a certain group of participants.

Control versus Experimental Participants

A key to conducting research studies is to have control and experimental groups that can measure the effects of the variables being tested. In the case of Boozymeter, the control group does not receive any intervention data that could influence their behavior throughout the course of the study. The experimental group views

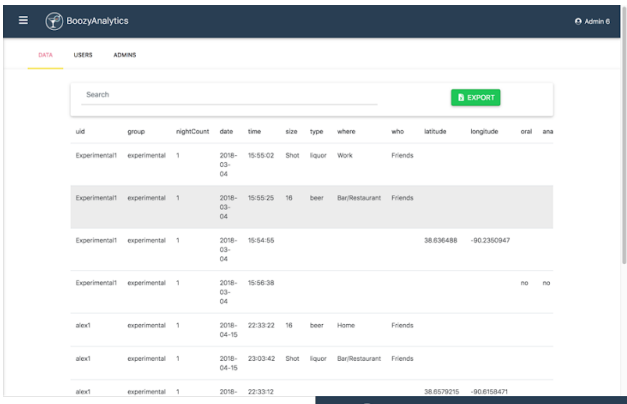
the number of drinks, total calories consumed, and total money spent during a drinking episode. Because they are able to view this data as the drinking episode progresses, the information may influence their behavior. In addition to the live data updates throughout an episode, the experimental group also views a morning report that summarizes the previous days drinking behaviors. Similar to the live data updates, the morning report may potentially have an impact on the users behaviors.

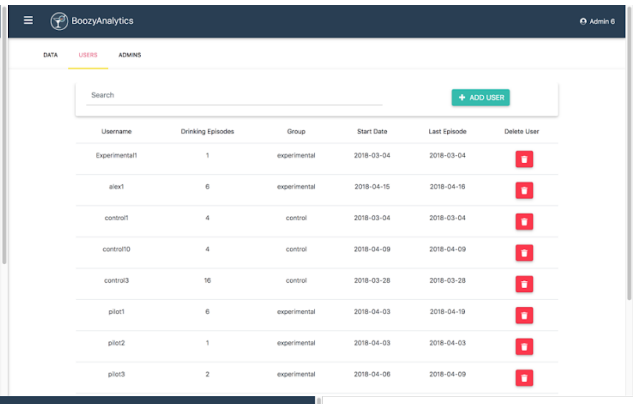


BoozyAnalytics Functionality

The second part of the capstone project includes a web-facing portal and an Excel Analytics Workbook. The portal only allows authorized users (identified as Admins in the database) access to the data. The BoozyAnalytics web-portal is a space for researchers to go and view the data that has been collected from BoozyMeter. It gives the researcher the ability to view and search the raw data table as well as export the data to an excel worksheet. The web-portal also gives the researchers user management capabilities. From the portal, admins are able to add and delete users, therefore taking away log-in capabilities for participants to access the app (note: deleting a user from BoozyMeter authentication does not remove any logged data from the database). The admins are also able to give participants control or experimental conditions, which would be reflected in the functionality of the app. Along with participant management, admins are also able to add and delete other admins from the BoozyAnalytics system. The final functionality of the web-portal provides admins with the ability to view a live dashboard of participants who are actively using the app as well as view individual participant reports that give a brief statistical summary of the users behaviors. This dashboard aims to show the differences in behavior between the control and experimental groups, as that comparison is a key portion of this research study.

BoozyAnalytics also provides researchers with a pre-built Excel Analytics Workbook. This workbook allows the researcher to import both the raw data collected from the users via BoozyMeter as well as the demographic information collected separately into one worksheet.


BoozyAnalytics
Admin 6
DATA
USERS
ADMINS
Search
EXPORT
uid
group
nightCount
date
time
size
type
where
who
latitude
longitude
oral
ana
Experimental1
experimental
1
2018-03-04
15:55:02
Shot
liquor
Work
Friends
Experimental1
experimental
1
2018-03-04
15:55:25
16
beer
Bar/Restaurant
Friends
Experimental1
experimental
1
2018-03-04
15:54:55
38.636488
-90.2350947
Experimental1
experimental
1
2018-03-04
15:56:38
no
no
alex1
experimental
1
2018-04-15
22:33:22
16
beer
Home
Friends
alex1
experimental
1
2018-04-15
23:03:42
Shot
liquor
Bar/Restaurant
Friends
alex1
experimental
1
2018-
22:33:12
38.6579215
-90.6158471


BoozyAnalytics
Admin 6
DATA
USERS
ADMINS
Search
ADD USER
Username
Drinking Episodes
Group
Start Date
Last Episode
Delete User
Experimental1
1
experimental
2018-03-04
2018-03-04
alex1
6
experimental
2018-04-15
2018-04-16
control1
4
control
2018-03-04
2018-03-04
control10
4
control
2018-04-09
2018-04-09
control3
16
control
2018-03-28
2018-03-28
pilot1
6
experimental
2018-04-03
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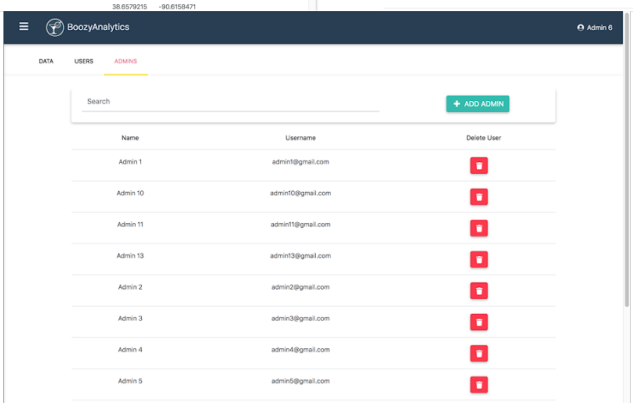
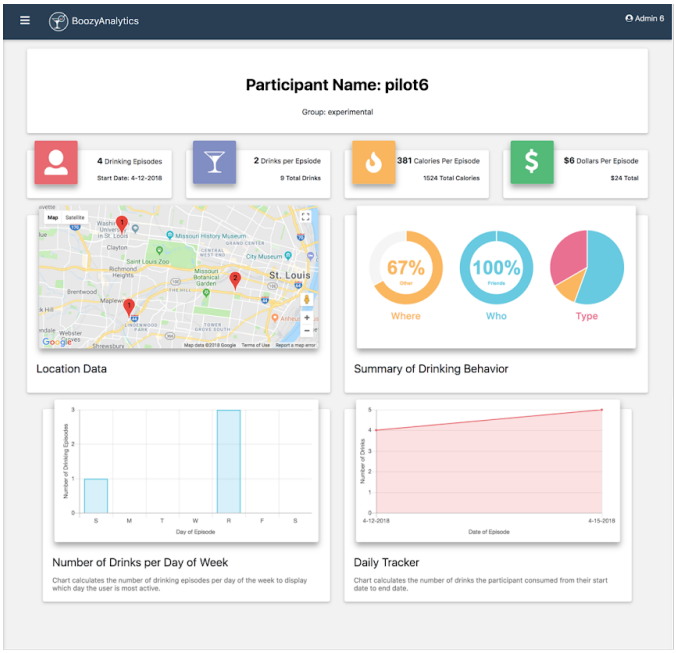
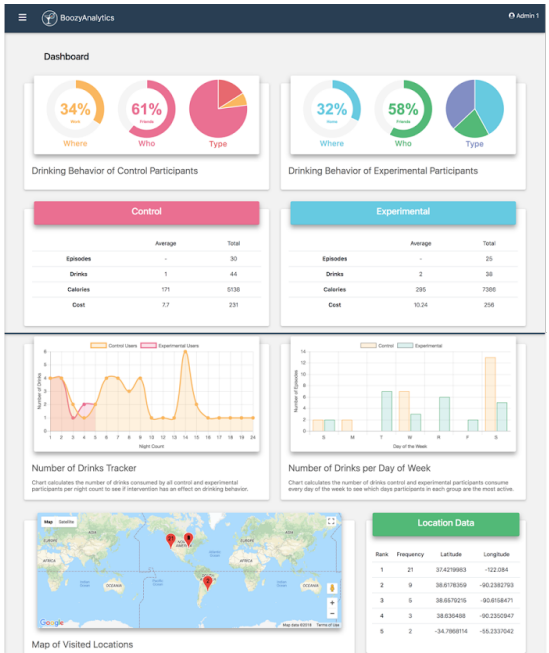
pilot2
1
experimental
2018-04-03
2018-04-03
pilot3
2
experimental
2018-04-06
2018-04-09


BoozyAnalytics
Admin 6
DATA
USERS
ADMINS
Search
ADD ADMIN
Name
Username
Delete User
Admin 1
admin1@gmail.com
Admin 10
admin10@gmail.com
Admin 11
admin11@gmail.com
Admin 13
admin13@gmail.com
Admin 2
admin2@gmail.com
Admin 3
admin3@gmail.com
Admin 4
admin4@gmail.com
Admin 5
admin5@gmail.com


BoozyAnalytics
Admin 6
Participant Name: pilot6
Group: experimental
4 Drinking Episodes
Start Date: 4-12-2018
2 Drinks per Episode
9 Total Drinks
381 Calories Per Episode
1524 Total Calories
$6 Dollars Per Episode
$24 Total
Location Data
67%
Where
100%
Who
Type
Summary of Drinking Behavior
Number of Drinks per Day of Week
Chart calculates the number of drinking episodes per day of the week to display which day the user is most active.
Daily Tracker
Chart calculates the number of drinks the participant consumed from their start date to end date.


BoozyAnalytics
Admin 1
Dashboard
34%
Where
61%
Who
Type
Drinking Behavior of Control Participants
32%
Where
58%
Who
Type
Drinking Behavior of Experimental Participants
Control
Experimental
Average
Total
Episodes
Drinks
Calories
Cost
Number of Drinks Tracker
Number of Drinks per Day of Week
Map of Visited Locations
Location Data
Rank
Frequency
Latitude
Longitude

Requirements

Requirement	Priority	Description
REQ 1	Nice to Have	Excel Basic Analytics
REQ 2	Completed	Live User Data Dashboard
REQ 3	Completed	Individual Participant Pages
REQ 4	Completed	App Control/Experimental Functionality
REQ 5	Completed	User Feedback Changes For App (Honors Capstone)

Backend/Database

The data for BoozyAnalytics and BoozyMeter is stored in Google's Firebase, a secure cloud-storage system. Firebase allows for easy authentication on both the web and app facing platforms. It is also helpful for displaying live data updates to the researcher because it has the ability to load data in realtime. A good amount of time was spent on structuring the database in order to distinguish between Admins and Users, and further into Control and Experimental Users. The data in the database is stored in a JSON tree format, which had to be parsed in order to export data into the Android application or the website.

Timeline

Deliverable #4: Final product with website, mobile application, and excel query sheet

- Website has a realtime dashboard that updates and displays certain information
- Website has individual participant pages that give an overview of the participant's data
- Explore ways to deploy website to Apache server
- App distinguishes between control and experimental users

User Testing

User testing was a very important element in the development and deployment of Boozymeter. It was necessary before release, that real users with no previous experience and knowledge of the application, test and provide feedback on user interface elements and any bugs. Part of deliverable 4 was to get feedback, both via survey and observation, from the pilot users about the functionality of the app. From the user testing, changes were made based on observation of how data was being logged into the database and based on feedback provided from the pilot users. The various app changes included:

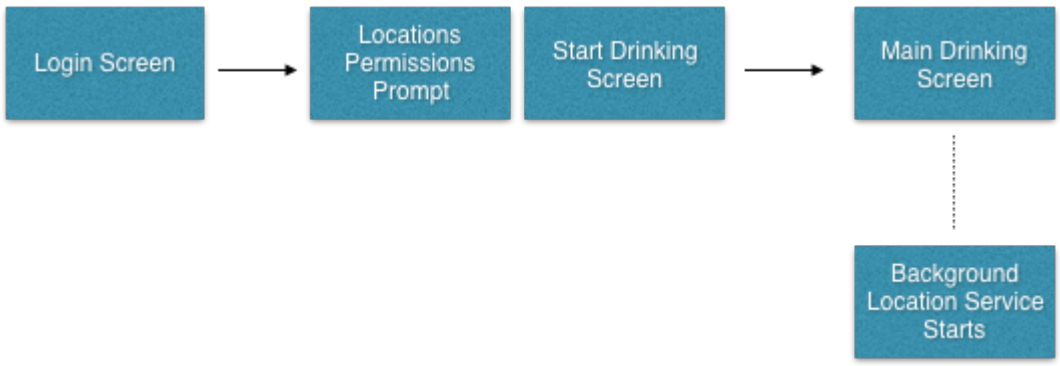
- Removing the timer from the Main Activity: the users expressed confusion from the timer as the reason for having a countdown was not clear and caused them to cancel a drinking episode.
- Changing order of screens: the original version of the app automatically opened to the Morning Questionnaire that began with questions about sexual behavior during the previous drinking episode. It was expressed that these questions being the first thing a participant would see in the morning is too abrasive (change this word). The order of screens was changed to first show the Morning Report (if the user is experimental) and then start the questionnaire with stress questions that lead in to sexual behavior questions.
- Incorrect entry of data: By observing the database as the pilots were using the app, bugs were found in the way in which users submit their responses. Changes to the app now force users to answer questions before moving on to the next screen. This will help prevent any miss-entry of data.

BoozyMeter - Android Life cycle

Technical Architecture

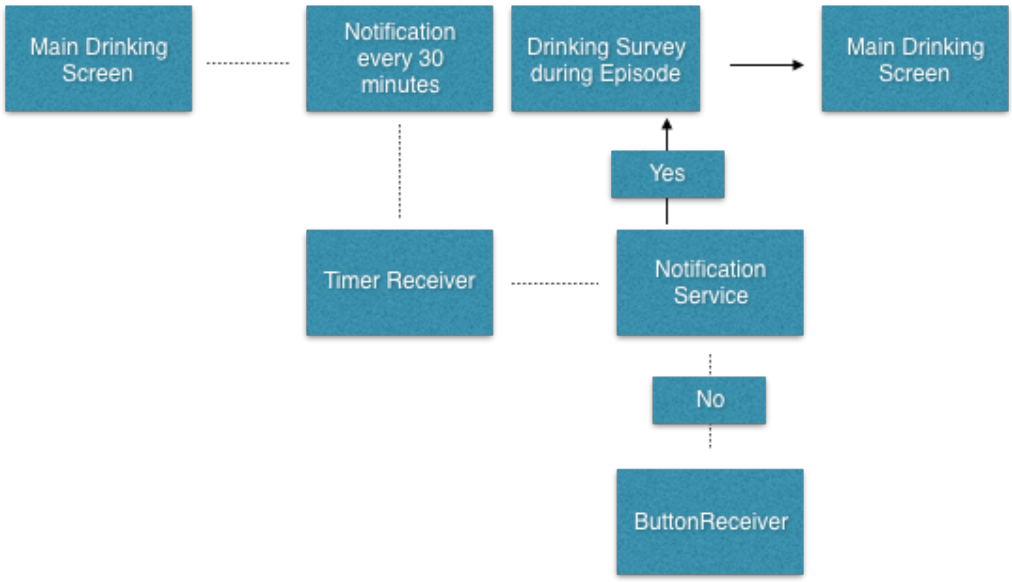
Google Location Services

When the participant first signs on, they are prompted to enable location services. Unless manually turned off by the user, the app will populate the database with location data every time the user starts a drinking episode. When the user starts a drinking episode, the app sends a request to the BackgroundLocationService activity to start collecting location data. When drinking episode ends and the app goes back to the “Start Drinking Screen”, the service is terminated and location updates stop. Location services are stored in a service because we want to ensure that location data is being collected in the absence of WiFi or if the user exits out of Boozymeter.



Notifications and Internal Timer

When the user clicks the “Start Drinking” button, an internal countdown timer begins for 2 hours.



Both notifications and Background Location Services implement passive elements that are not controlled by the user.

Future Extensions

While Boozymeter and Boozyanalytics combined make a fully functioning Mobile Survey System, there are still further developments that could be made in order to increase flexibility in the project.

- Wearable Implementation: wearable technology is more popular than ever, and extending Boozymeter to a wearable platform would create the ability for users to quickly and easily respond to questions.
- Extending to IOS: Boozymeter currently serves as an Android-only application, but extending the app to IOS would increase the population pool that researchers could pull from for participants.
- More Interventions for Experimental Users: currently, the application provides real-time updates and summary data of participants behaviors for experimental users, but further interventions such as linking the app with Uber or Lyft, or determining when participants have had too much to drink, could influence the data tremendously.
- Continued Analysis: Boozyanalytics provides summary and baseline analysis on the participant pages and the live dashboard, but more analysis in real time could help researchers adjust the study as it progresses instead of seeing results at the end of the study.
- More behavioral studies: the BoozySystem provides an example as to how researchers can collect real time alcohol consumption and sexual behavior data in participants, however, this type of system could be extended to research all kinds of behavioral data. The system could be altered to ask different questions and provide different interventions depending on the behavior being studied.