Smart-E-Breathalyzer App with Safety Monitor

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ABSTRACT

Alcohol is the most consumed liquid after water and caffeine. Not only that excessive drinking has now become a common activity among college students leading to serious side effects such as health issues, sexual assault, road accidents, reckless behavior even leading to crime. It is a hardcore problem to stop people from drinking but we can at least take safety precautions to avoid these unexpected accidents. One potential solution in this direction is adding social features to blood alcohol content(BAC) gauging apps. We choose to work on the BACtrack app, which connects with a handy breathalyzer and has excellent API to integrate new features.

CCS CONCEPTS

Effective API Design; Android Operating System; Smart Sensing of Hardware devices;

KEYWORDS

Alcohol consumption; e-breathalyzer use; safe drinking; circles;

ACM Classification Keywords

H.5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous; See http://acm.org/about/class/1998 for the full list of ACM classifiers. This section is required.

Introduction

It is important to highlight previous work done using BACtrack API for benefit of college students by the researcher at IUB Aehong and her team with the guidance of prof. Patrick Shih. They built the prototype with features such as displaying the BAC level with thought-provoking images so that it is more easily understandable for everyone rather than typical number display. The previous prototype gave an option for the user to set custom contact list, and alert messages so that on crossing BAC level alerts are sent to these pre-set contact list along with the current location of the user. This is great especially for individuals when they are drunk as it is quick and easy to inform their friends/family and ask for help. But what if they are not in a state to even check their BAC, what if something wrong happens even before their friends come for help, and in worst case scenario none in the pre-set contact list are available, come for help. To avoid these discrepancies, we need to think of ideas that will help plan ahead on how to reach home after the party. In this report, we thoroughly discussed different design ideas and project stages we went through before we finalized our design idea.

Apps for alcohol reduction are now broadly accessible [1], though, with restricted proof for their adequacy given their potential, it is essential to comprehend the qualities of individuals who utilize the applications. Four applications to decrease liquor utilization or help patients with liquor utilize clutter and that had been assessed for their adequacy were distinguished in a best in the class survey [2]. Two applications supporting individuals recuperating from liquor utilize scatters in the US advanced self-detailed decreases in liquor utilize [3], while two applications expecting to lessen dangerous liquor use among Swedish college understudies neglected to advance self-announced decreases in liquor utilize [4].

Although, the previous works with the alcohol-related issues have inspected mediations through electronic mediums to keep individuals from over the top drinking and its issues. These mediums have numerous preferences to be embraced to use as intercessions for liquor-related issues. It is more mysterious, adaptable, intelligent, mechanized, and customized [5]. Besides, it is less expensive to actualize and utilize. Particularly, it could be more viable for youngsters to anticipate exorbitant drinking [6]. Generally, despite the fact that there are questions on the long haul adequacy of electronic mediations and flows including orderly survey and meta-analysis exploration demonstrated its viability on decreasing liquor utilize [7]. A few investigations have structured and tried electronic interventions. For instance, a telephone-based journal application was structured including capacities for drinking identification, advance input, inevitable guide, and mindset inspecting. Its model was produced and tried with a breathalyzer to self-monitor and oversee liquor utilize conduct, and it decreased their members' aggregate drinking [8]. For the most part, innovations, for example, savvy gadgets and wearable gadgets have not been concentrated a considerable measure as mediations to restrict drinking among the undergraduates.

Approach

The approach of the project we targeted to gather the assessment analysis using the survey and conducting the interviews with the various age group members.

Surveys

In the need assessment phase we conducted interviews of event manager, undergraduate group a working family, a researcher and a professor with specific questions that would give us insight about what are the typical issues after excessive drinking, what can be done to avoid them, along with that we did survey using google forms posted in a few student groups. Some of the important aspects we found through our survey and which laid to the basis for our ideas is presented in the following figures.

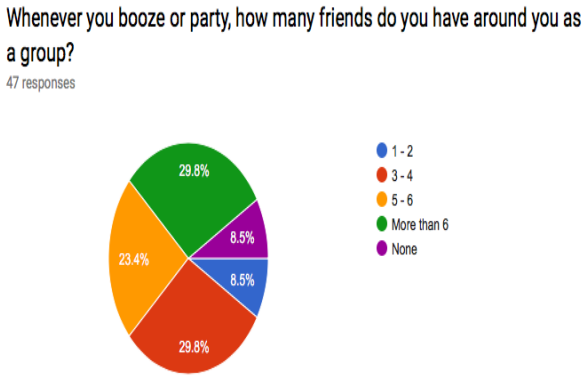


Figure 1: Survey Question 1

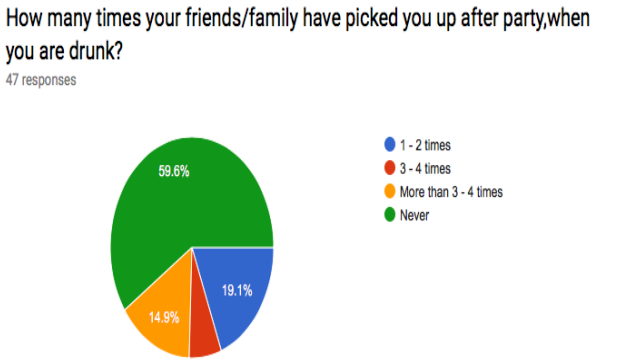


Figure 2: Survey Question 2

From this, we can clearly see that in most cases people go to a party in groups. But the main concern is after party they tend to disperse on their way back home, they usually take public transport like bus, book cab or walk. The general reason why they don't want to inform to their family members or friends could be: don't want to disturb others, to hide the fact that they are partying, not in a state to ask for help. This has been very useful for us to understand our target users, for instance here we present two personas for our app.

Interviews

In the context of the Application specific scopes, we conducted four interviews targeting the four kinds of users. We interviewed the Event Manager; the event manager is 28 years old and has been working with the event services at Indiana University. We tried to relate the specific questions that would help us get the insights related to building the application. The next interview we conducted was with the undergraduate group, who were legally

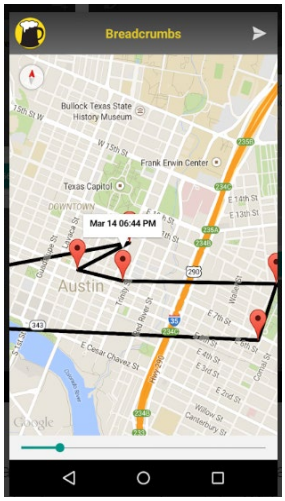
eligible to drink. The undergraduate group extremely enjoyed and drank without concerning their safety. The group agreed that they specifically didn't care about the safety of themselves when they booze or party. We also visited one of the couples to differentiate from the normal users and asked them the questions relevant to our research area after taking the appropriate permissions from them. The couple also agreed that they have been careless after consuming the unsafe levels of alcohol. Apart from these interviews, we found one thing common that most of the people who booze or party and consume the unsafe level of alcohol have driven home themselves and they are the main target for our app.

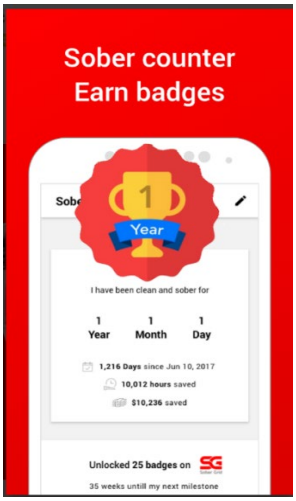
Design

High-Level Primary Design

After analyzing our need/requirement assessment report, and understanding target users, we came up with varied different ideas. we had to brainstorm on how to put all of the details together and refine our ideas so that our final design is novel, easy to use, interesting and useful for our target user.

As a part of our research, we started checking existing apps that are similar or at least close to our big picture to build supportive tools for people who drink alcohol. We came across a few apps which are directly or indirectly related and popular in categories such as alcohol, social, party, anti-alcohol. For Instance, Untapped, PartyWith, Sobergrid, DrunkMode.





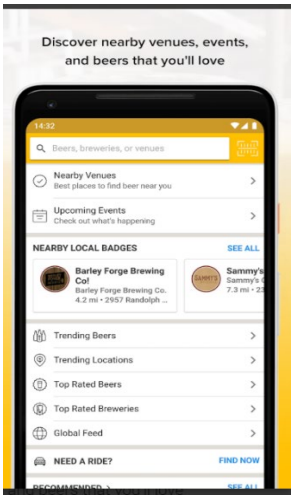


Figure 3: Presenting screenshots of mobile apps. From left to right: Drunkmode, PartyWith, Sober Grid, Untapped

The interaction, design, and features gaining more users for these and many other relevant apps helped us while designing our final idea. After mapping the design ideas with user needs we noticed that typically individuals with a group of friends will in most cases reach home safely and a high chance of checking their BAC level if their friends can keep an eye on one another. But this is an optimistic way of thinking that friends in groups are completely safe because what if all of them are drunk then there is a high chance of risk if all of them are in trouble.

In order to avoid taking the risk, we came up with Volunteer option. If an individual in a group of friends volunteers to support other friends in the group then he/she needs to drop everyone home safely, check each one of the group members BAC level and of course he must not cross BAC level or should have 0 BAC level. In order to encourage this, we came up with rewards for successful volunteering in form badges or coupons that would benefit him. We choose this as our final idea because this encompasses our main aspects social, safety, health as well as user needs to check BAC level, support acquired and safely reach home.

Architecture

The design is broken down into 4 major modules and the modules are highlighted as follows.

1. User
2. Circles (User groups)
3. Breathalyzer

4. Android Application

Figure 3 describes the high-level design of the system. The user will be the end client that will be using the breathalyzer hardware device to sense the BAC level. The android application serves as the interaction module between the user and the breathalyzer, it forms the major component of the system. The user group is the abstract module that is formed by the users over the network and forms the basis to serve the functionalities of the Android application. Figure 6 highlights the basic features of our proposed design of the application.

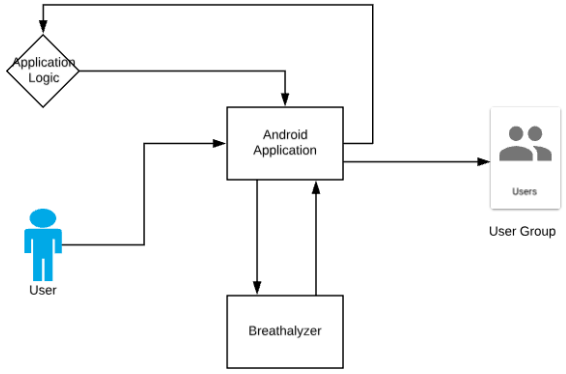


Figure4:Design of the System

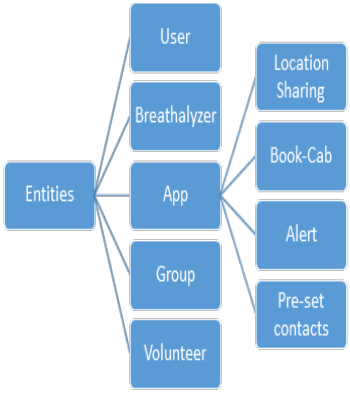


Figure 5: Application Components

Highlights/ Main Features

1. Join Group as a User/ Volunteer

The user interacts through the app module to join the user group and receives the group accepts/ reject message accordingly. The app will interact with the user group module and if two or more of the group members approve then the user will be notified if he has been accepted into the group as a volunteer.

2. Pre-Set Contact List

The user requests the pre-set module that updates the pre-set contact list as set by the user and gives the confirmation to the user.

3. Monitor BAC

This is the main activity that is set as the major goal of the project. The activity begins when the user tests for the BAC level using the breathalyzer. The breathalyzer interacts with the app and the app triggers the alert module of the threshold of the BAC level set is crossed. The alert module sends the notification to the group. The volunteer is also notified. The volunteer takes appropriate action and initiates the CAB booking via book cab module. The cab being booked is notified to the user. In the sequence of actions, the pre-set contact list is shared with the user's location via the Location sharing module.

Prototype

In this prototype, we integrated the BACtrack SDK App, which is officially available on the BACtrack website for developers to build features, analyze data collected by the App. The app works in real time with smart-e-breathalyzer, a BACtrack product. The official App comes with simple features to check current BAC level and past BAC measures. Our contribution is mainly focused on to develop an interactive, user-friendly feature to monitor and join as discussed above.

The backend for this prototype is firebase real-time database with models for user profile, circles and keeping track of members in each circle. The database is no-sql based, with easy to add, delete and change fucntions. The model structure and other main screens are presented in figure 6. As presented below, the main screens for our prototype are:

Ask Circles: This screens is confirm whether user is interested to join/add circles or would like to just check BAC.

View Circles: This screen lists existing circles sorted based on date of the event for which circle is formed.

Existing Circle: It is the main screen which has all details of Circle, the list of member, date, location, option to join, share location, book cab and notify option to send alert to other member that help is need.

Check BAC: The check BAC screen is integrated to our prototype and works with latest and previous BACtrack Breathalyzer.

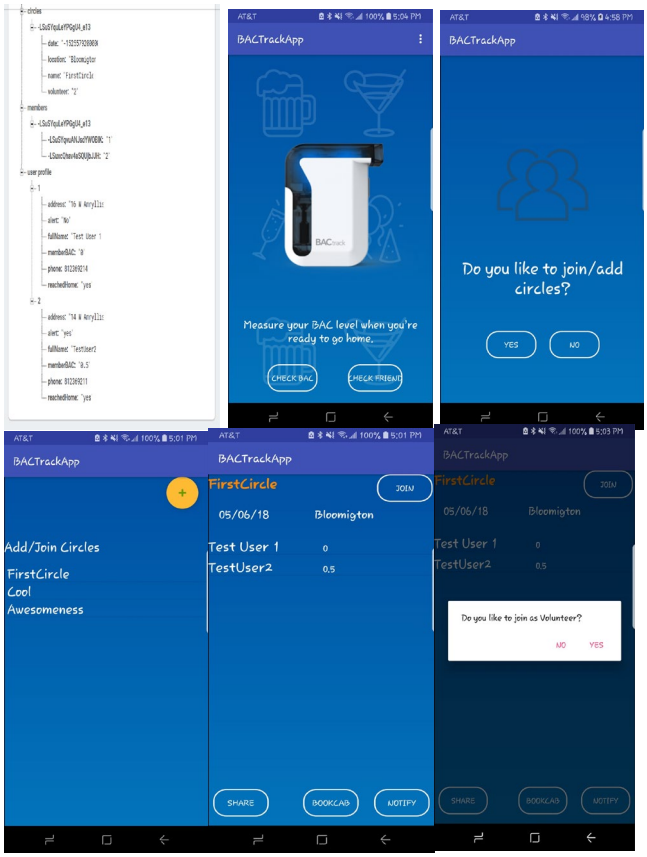


Figure 6: Presenting screenshots of prototype. From left to right: Firebase Database Structure, Check BAC Screen, Ask Circles, View Circles, Existing Circle, Ask Volunteer

Future Work

The joining/creating circles, real-time monitoring of user location, BAC-level are some of the important features we proposed in our design and prototype, however, there is lot of scope for interesting additions like features to encourage users to volunteer, a resource center that can provide on-click awareness about alcohols, BAC levels, rules, health issues, testing and improving the current features.

Conclusion

As mentioned earlier in the paper, there are mobile-apps related to alcohol consumption like alcohol tracking, drinking-game apps, apps for sobriety, and so on but the apps focused on safety monitoring features which is higher priority in this category, are very few and unknown. This is the primary reason we contributed to design user-friendly breathalyzer app with monitoring and social features. In near future, the use of Smart-e-breathalyzers is going to increase especially by college students and we believe application of this kind would benefit individuals in many ways.

ACKNOWLEDGMENTS

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