

LEVERAGING TECHNOLOGY TO ADDRESS HOMELESSNESS: A MOBILE APPLICATION FOR RESOURCE ACCESSIBILITY, VOLUNTEER ENGAGEMENT, AND AI-POWERED SUPPORT IN SAN DIEGO

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ABSTRACT

The inspiration for creating this program stemmed from seeing the large number of homeless individuals in my community, leading me to design an app that could provide essential support, raise awareness, and facilitate help. Seeing the prominent number of homeless people in my community inspired me to create this program so that they can have better support, spread awareness, and make it easier for other people to help [1]. The app is aimed at assisting the homeless population in San Diego by offering immediate access to resources such as food, medical, mental health services, and shelter [2]. It also serves as a platform for donations and volunteer opportunities for people looking to help combat homelessness. The app focuses on accessibility and simplicity, ensuring it's easy for anyone to use by making it available on kiosks around San Diego and on the app store [3].

*A key feature is the AI-powered chatbot, created using OpenAI, which helps address any specific questions or concerns that users may have beyond the **standard** resources. The app uses Firestore to manage a comprehensive database of locations and organizations, including contact details, hours of operation, and descriptions, which helps users select the most suitable support services [4]. The app also includes a map feature that guides users to nearby organizations, with locations sorted by proximity.*

To ensure the app's resources are up to date, it will be refreshed every two months to incorporate any changes. The app was designed with simplicity in mind, featuring straightforward buttons and clear instructions for ease of use, with the AI chatbot providing additional help for more complex questions.

As part of the testing process, I created a usability survey with 10 questions focusing on interface, navigation, map functionality, and the chatbot's effectiveness [5]. Results showed an average score of 4.04/5, with the highest rating given to the app's potential for volunteers and donors. However, the map feature received the lowest ratings, suggesting some users might struggle with it.

Despite minor issues, the app is performing as intended, and feedback indicates it successfully meets its primary goal of encouraging people to download it, especially for those seeking to help or looking for support[6].

KEYWORDS

Homelessness Support, Mobile Application, AI Chatbot, Volunteer and Donation Platform

1. INTRODUCTION

Seeing the prominent number of homeless people in my community inspired me to create this program so that they can have better support, spread awareness, and make it easier for other people to help. I wanted to use technology to create something that could improve these people's lives by giving them the help that they need. According to the 2023 Point-in-Time Count, there are over 10,000 homeless individuals in San Diego County, and the number has been rising steadily in recent years [7]. More than half of these people are unsheltered, living on the streets, in tents, or in vehicles. San Diego has one of the largest homeless populations in the U.S., especially among veterans and seniors. Over 60% of people experiencing homelessness in San Diego are unsheltered, meaning they live on the streets, in tents, or in vehicles [8].

Only about 40% are in temporary shelters or transitional housing. Around 1,700 homeless individuals are under the age of 24. Many face unique challenges like aging out of foster care or fleeing unsafe homes. A survey by the Regional Task Force on Homelessness found that 37% of homeless individuals don't know how to access the services they need. Many people lack access to transportation, the internet, or reliable information. This problem primarily affects people experiencing poverty, including unemployed individuals, veterans, people with disabilities or mental health challenges, and families who have lost housing due to rising costs or emergencies. Many don't have the support they need and aren't aware of the resources in San Diego that can help. This problem is important for us to solve because everybody deserves a safe shelter, food, medical resources, and the support they need. Solving homelessness improves individual lives and makes communities stronger, healthier, and more compassionate.

My app aims to help the homeless community in San Diego by providing them with the resources they need. It's designed to provide homeless people with immediate access to food, medical, mental, and shelter resources [9]. My program can also be used as a volunteer and donation platform for people who also want to support and solve homelessness in San Diego. My concept is based on accessibility and simplicity. I want my app to be accessible to anyone which is achievable by placing it on kiosks in public areas around San Diego and also in the app store.

For my experiment, I created a usability survey to see if the app works correctly and efficiently. I had 4-5 people use my app, and then I created 10 questions rated on a 1 -5 scale covering aspects like user interface, navigation ease, map functionality, and the AI assistant's helpfulness for the "testers" to answer [10]. My most significant finding was that people were really interested in downloading the app themselves after using it, and that many people aren't as interested in the map feature as expected. My results came out this way most likely because some people aren't good at reading maps, which can make the feature confusing, or some people believe that a map won't be effective for the app. Overall, I think my experiment was a success. I found out the possible flaws in my program, but also that the app's primary focus is well executed because people are willing to download it.

2. CHALLENGES

In order to build the project, a few challenges have been identified as follows.

2.1. Resource Database

Resource Database - A possible concern is that the locations and organizations in the database may not be up to date with new organizations, updated hours, and those that might be closing down. To prevent this, an API-driven dynamic update mechanism can be put in, or the app will be updated every 2 months to check for any changes within the resource database.

2.2. AI Chat System

Another concern might be the convenience of the app and how easy it would be to use for everyone. Not everyone understands how to properly use technology, so the app is made to be as simple as possible, with buttons only and instructions on exactly what each page is for. The system also includes an AI chat system in case anybody has more in-depth questions.

2.3. Google Maps

Another concern is the use of the internet and whether everybody is able to efficiently find the correct location for the organization that they want to go to. The entire system can run without internet access, including the Google Maps feature. Google Maps is also very easy to use and understand, even for someone who hasn't used it before. In case someone doesn't know how to use maps. The system will also put the organization in order from closest to farthest for convenience.

3. SOLUTION

The home page includes a welcoming text and two buttons leading to the application's two sections. Above each button is a short description of the use of each button so that users can easily click on the section that they need to navigate to. If the user clicks on the 'Homeless Resources' page, they will be taken to the section that includes all the resources, such as medical, food, shelter, and chat support. If the user clicks on the 'Volunteer Resources' button, they will enter the volunteer section, which includes pages for donations and organizations that are in need of volunteers.

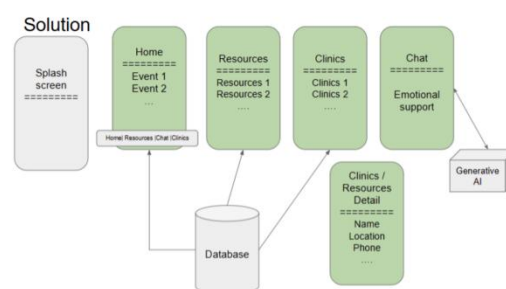


Figure 1. Overview of the solution

A key component of my application is the chatbot feature, which is created using Open AI [11]. This feature helps create a realistic conversation for the homeless community in case they have specific questions or concerns that can't be answered by the other resources provided by the app. Users with more sophisticated questions or who have a hard time navigating the app can ask direct questions to the chatbot and receive a comprehensive response within a few seconds. This component relies on the special concept of Natural Language Processing(NLP), which is a technology that enables computers to understand, interpret, and manipulate human language [12].

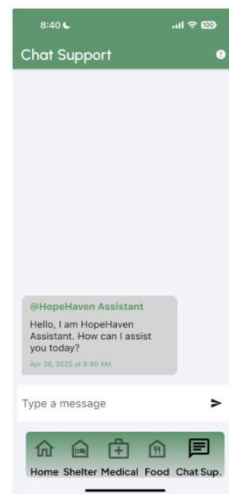


Figure 2. Screenshot of the chatbot

The second component of my program was the resources provided for the homeless community and the organizations for the volunteer section. For this component, I used Firestore to store all of my data, which includes all the locations and their addresses, hours, contacts, pictures, and descriptions [13]. This made it easier for users to choose which organization is a better fit for them.

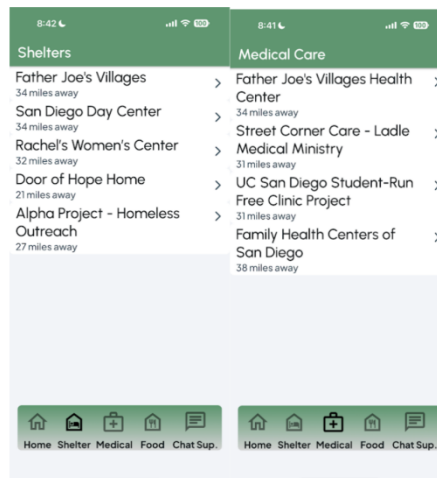


Figure 3. Screenshot of shelters and medical care

My third component is the Map feature that is provided on all resources and locations in the app [14]. The map guides the user's current location to the organization they want to reach. For users that are on a mobile phone, they can follow the directions step by step, and for users seeing the map from a kiosk, they are provided with a bird's-eye view of the map so that they can have a general direction to find the location. The lists of locations are organized from closest to farthest base /of the user's location. To create this feature, I used Google Maps.

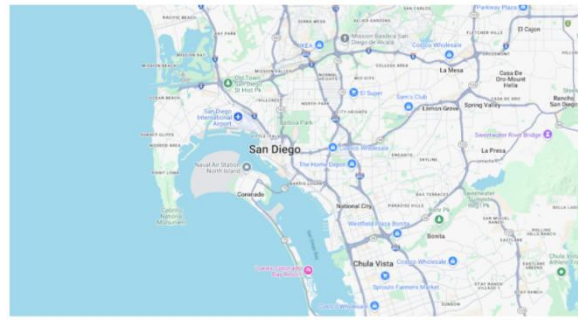


Figure 4. Screenshot of map

4. EXPERIMENT

I want to test out how well this program would fit with the general audience, which includes both the unhoused communities in San Diego and also individuals who are interested in volunteering and donating. I plan to put my app on kiosks around San Diego so that they are accessible to anybody. My app is also in the App Store so that people with phone access can download it. This experiment is important because it allows me to identify potential usability issues before wider deployment.

For this experiment, I created a set of 10 survey questions related to different sections of the application with responses rated on a scale of 1-5 (1 being strongly disagree, 5 being strongly agree). Five users of different ages and with varying levels of technology experience tested the application. Users were given access to the application and navigated all areas of it, and rated each question based on how they experienced it:

The program is easy to navigate

The chatbot feature is effective for its intended purpose and its responses accurate to your questions.

The resource pages are easy to navigate.

The map feature is helpful

The design is clear and accessible

The organizations and locations are up to date.

I would recommend this app to someone who is experiencing homelessness.

Would you consider downloading this app if I was interested in donating or volunteering?

The AI chatbot gives helpful information.

Would you feel comfortable using this app in public?

Question	Respondent 1	Respondent 2	Respondent 3	Respondent 4	Respondent 5
The program is easy to navigate.	5	2	4	4	5 4/5
The chatbot feature effective for its intended purpose and its responses accurate to your questions.	4	2	4	5	5
The resource pages is easy to navigate.	4	5	5	3	4
The map feature is helpful	4	2	5	3	3
The design is clear and accessible	4	4	5	3	3
The organizations and locations are up to date.	5	3	5	4	4
I would recommend this app to someone who is experiencing homelessness.	2	4	4	5	3
I would consider downloading this app if I were interested in donating or volunteering	5	5	4	4	4
The AI chatbot gives helpful information.	3	4	4	5	5
Would you feel comfortable using this app in public?	4	4	4	3	5

Figure 5. Table of experiment

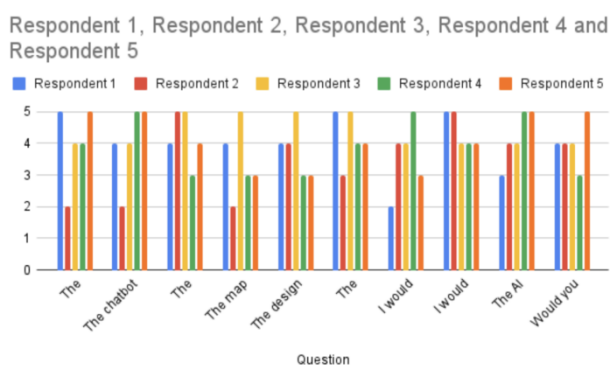


Figure 6. Figure of experiment

Question 1: 4/5 Question 2: 4/5 Question 3: 4.2/5 Question 4: 3.4/5 Question 5: 3.8/5 Question 6: 4.2/5 Question 7: 4/5 Question 8: 4.4/5 Question 9: 4.2/5 Question 10: 4/5

The average score for each question asked is 4.04/5

The question with the best response is question 8: I would consider downloading this app if I were interested in donating or volunteering. The responses to the question demonstrate that the application is easy to understand and aligns with the goals of many users in helping resolve homelessness. This shows that the app's primary focus is well executed because people are willing to download it.

The question with the worst response is question 4: The map feature is helpful. This question received the worst responses, likely because some people may have different opinions about whether a map is helpful or not, or some people may struggle with using a map. Users who are more familiar with technology may find the map useful or already have preinstalled map applications that they prefer. Users who are less familiar with technology may find mobile maps to be confusing and would rather use traditional navigation methods.

5. CONCLUSIONS

I think a limitation in my project is the contact feature because it only gives contact information for the organization; however, in case someone wants to make a call and not have access to a phone this could be challenging. If I had more time for development, I would try to find a feature in addition to the contact section so that the unhoused community can easily contact organizations by themselves if they have any questions. Another limitation is access to the internet for the AI chat feature, which I would also like to resolve if possible [15]. To expand my program in the future, I would like to add more locations and maybe even expand into nearby cities rather than just in San Diego.

REFERENCES

- [1] Wright, Nat MJ, and Charlotte NE Tompkins. "How can health services effectively meet the health needs of homeless people?." *The British Journal of General Practice* 56.525 (2006): 286.
- [2] Gilmer, Todd P., Willard G. Manning, and Susan L. Ettner. "A cost analysis of San Diego County's REACH program for homeless persons." *Psychiatric Services* 60.4 (2009): 445-450.
- [3] Aydın, Ömer, and Enis Karaarslan. "OpenAI ChatGPT generated literature review: Digital twin in healthcare." Aydın, Ö., Karaarslan, E.(2022). OpenAI ChatGPT Generated Literature Review: Digital Twin in Healthcare. In Ö. Aydın (Ed.), *Emerging Computer Technologies 2* (2022): 22-31.
- [4] Kesavan, Ram, et al. "Firestore: The nosql serverless database for the application developer." 2023 IEEE 39th International Conference on Data Engineering (ICDE). IEEE, 2023.
- [5] Reiter, Raymond. "What should a database know?." *Proceedings of the seventh ACM SIGACT-SIGMOD-SIGART symposium on Principles of database systems*. 1988.
- [6] Ahmed, Arfan, et al. "Chatbot features for anxiety and depression: a scoping review." *Health informatics journal* 29.1 (2023): 146045822211467.
- [7] Mitchell, Don, and Lynn A. Staeheli. "Clean and safe? Property redevelopment, public space, and homelessness in downtown San Diego." *The politics of public space*. Routledge, 2013. 143-175.
- [8] Phelan, Jo C., and Bruce G. Link. "Who are" the homeless"? Reconsidering the stability and composition of the homeless population." *American Journal of Public Health* 89.9 (1999): 1334-1338.
- [9] Meyer, Bruce D., Angela Wyse, and Ilina Logani. "Life and death at the margins of society: the mortality of the US homeless population." *Review of Economics and Statistics* (2025): 1-46.
- [10] Felix, Shubham Melvin, Sumer Kumar, and A. Veeramuthu. "A smart personal AI assistant for visually impaired people." 2018 2nd international conference on trends in electronics and informatics (ICOEI). IEEE, 2018.
- [11] Widder, David Gray, Meredith Whittaker, and Sarah Myers West. "Why 'open' AI systems are actually closed, and why this matters." *Nature* 635.8040 (2024): 827-833.
- [12] Chowdhary, KR1442. "Natural language processing." *Fundamentals of artificial intelligence* (2020): 603-649.

- [13] Davisson, Ed, et al. "Transparent Migration from Datastore to Firestore." Proceedings of the VLDB Endowment 17.12 (2024): 3960-3972.
- [14] Heidenreich, Florian, Jan Kopcsek, and Christian Wende. "FeatureMapper: Mapping features to models." Companion of the 30th international conference on Software engineering. 2008.
- [15] Mahadeo, Resham N. "Artificial Intelligence Chat." A Master's Paper in Computer Science, The Pennsylvania State University, The Graduate School Capital College (2004).