

AURA

Ambulance Utilization and Routing Application

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Overview

AURA, the Ambulance Utilization and Routing Application, represents a beacon of innovation in the realm of emergency response systems. Currently in the developmental phase, AURA aims to revolutionize the way ambulance services operate within a limited radius. By amalgamating sophisticated algorithms, real-time data analysis, and intuitive user interfaces, AURA aspires to redefine the very essence of emergency service coordination.

Why support AURA?

AURA is an emergency service, more like 'Uber For Ambulances' in which we have just made the processes to be held on whatsapp,applications and the internet. AURA can use your geolocation to figure out the ambulances and hospitals closest to you so that you can get help immediately. Along with its cutting edge technology, AURA is able to solve many problems which you will learn later in this document.

How did I get this idea?

This idea, just like many other great inventions, came up as a summer project. I was about to complete watching shark tank when I came up to episode 35 which featured *Medulance*, a company focused on providing faster ambulances to people, I noticed a slight problem though, they were using call centers to answer patients and get them the nearest ambulances. I was learning about AI at that time and I wondered if I could fix the call center part and replace all the process with AI. That's how EAHS was born which was renamed to AURA in October more on the story of AURA in the Timeline section.

Where did I make AURA?

AURA was made on a laptop at my home from the start. Made using Python and VS code for the main project, and for the application I used MIT App Inventor. I sometimes used School computers to upgrade the code during my free time.

Goals

1. Minimize emergency response times.
2. Enhance user-emergency service communication.
3. Optimize ambulance routes dynamically.
4. Provide health information via AI.
5. Improve user experience and interfaces.
6. Implement predictive analytics and natural language processing.
7. Personalize assistance based on user behavior.
8. Prioritize responses based on incident severity.

Specifications

AURA is a cross-platform application developed primarily in Python. It integrates Twilio and WhatsApp APIs for communication, Firebase as the real-time database, and OpenRouteService API for mapping and dynamic route optimization. The application features an AI-powered virtual assistant, Health-GPT, for providing health information. Additional AI capabilities may include predictive analytics, natural language processing. AURA prioritizes user-friendly interfaces, robust security measures, scalability, and compliance with data privacy regulations.

Milestones Reached

I. Nearest Ambulance Routing To Patient

The project is able to virtually route several ambulance resting points to the patient and calculate which ambulance is closest to the patient's location and connect the driver to the patient by using [Open Route Service](#).

II. Nearest Hospital Routing

AURA is able to find the nearest hospital under the patient's 2km radius and then route the best path between the now reached ambulance and the nearest ambulance,The radius is limited to 2km due to ORS restrictions

III. Use faster methods of communication

AURA uses whatsapp as a communication medium due to the [Twilio](#) restrictions in India,It also uses [What3Words](#) which is a better,less complex and more accurate way to get a location,The project also has an application serving a different purpose more on that later in the document.

IV. Store and display data

Using [Firebase](#) by Google,AURA records every legal data from communication info to routing info to help improve services in the future.It also uses [folium](#) to create a map with markers and other components to simplify the whole travel data.

V. Health-GPT

The application has a feature called Health-GPT which you can consider a Chatbot that answers all your questions related to health currently by using the [Chat-GPT](#) model made by [OpenAI](#).

These are the milestones reached till now (27.10.2023).Through more R&D the project can reach the desired Milestones planned for the future.

Core Technologies

Python:

In the developmental phase, Python emerges as the project's cornerstone. Renowned for its simplicity and power, Python provides the developers with a versatile platform to prototype and refine complex algorithms. Its robust libraries enable seamless data processing, intricate algorithm implementation, and real-time analytics. As AURA evolves, Python remains the language of choice, ensuring adaptability and efficiency in the face of evolving technological challenges.

Twilio and WhatsApp APIs:

Twilio and WhatsApp APIs serve as the lifeblood of AURA's communication framework. Twilio, with its SMS and voice capabilities, ensures the delivery of critical alerts and notifications. Simultaneously, WhatsApp API provides a familiar and user-friendly interface for ambulance requests and updates. In the developmental phase, these APIs are meticulously integrated to lay the foundation for rapid, reliable, and user-friendly communication channels, which will be vital as the project progresses toward its completion.

Firebase API:

Firebase, the real-time database and authentication solution, plays a pivotal role in shaping AURA's seamless operation. Its dynamic cloud-based structure allows instant data synchronization across devices. During development, Firebase securely stores real-time location data, patient information, and emergency service provider details. Its scalability and reliability provide a robust foundation, ensuring that AURA remains responsive and efficient, even during peak demand scenarios.

OpenRouteService API:

The OpenRouteService API is essential for AURA's dynamic route optimization, considering real-time traffic and environmental factors to ensure swift ambulance navigation. Its accuracy and adaptability are crucial in the developmental phase, shaping AURA's effective response time optimization.

MIT App Inventor:

MIT App Inventor, a user-friendly platform, empowers AURA's frontend development. Its intuitive interface enables the creation of engaging and accessible user interfaces for both Android and iOS platforms, enhancing the overall user experience.

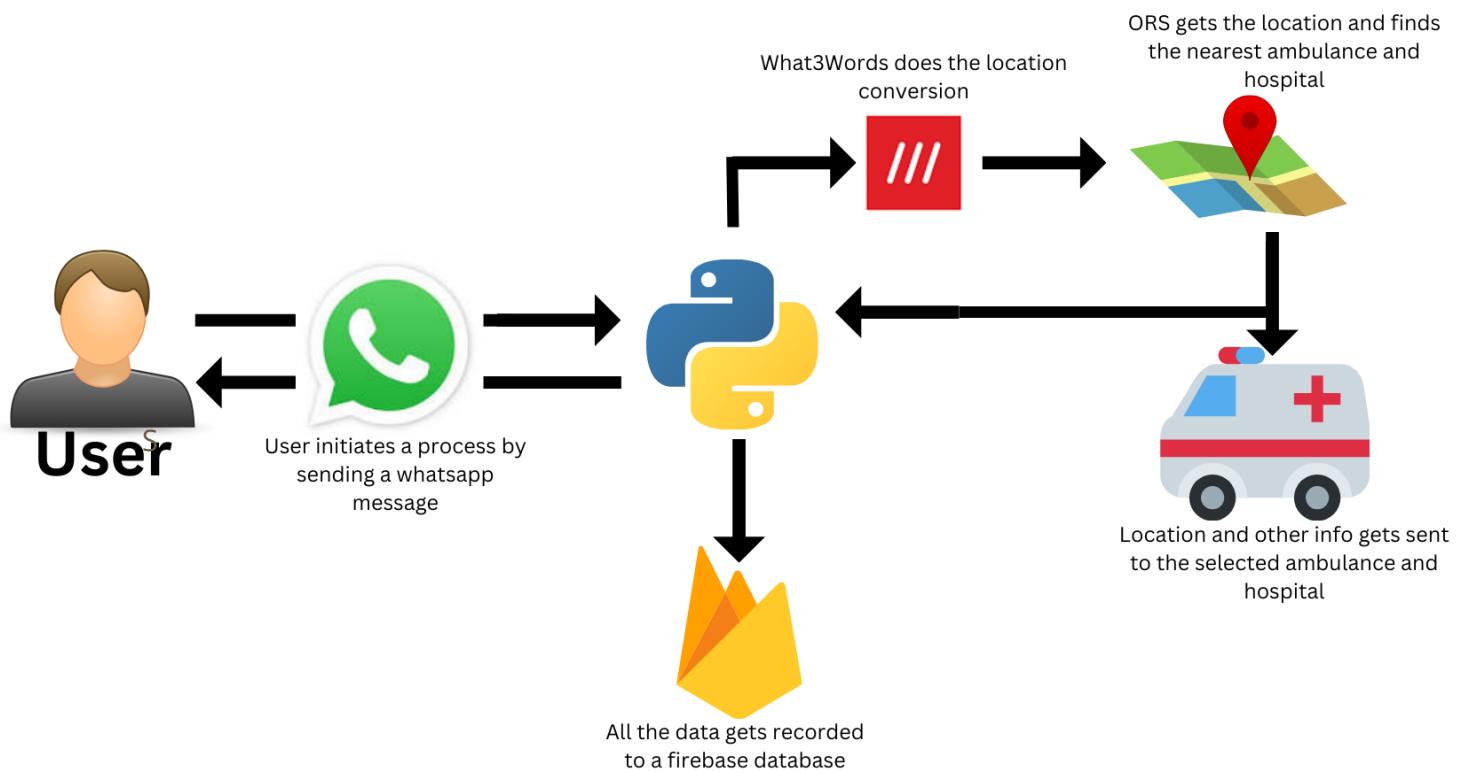
Fun fact: I want to be an MIT student one day and I'm participating in competitions like these so that I can have some experience to put in my applications!

Dynamic Route Optimization:

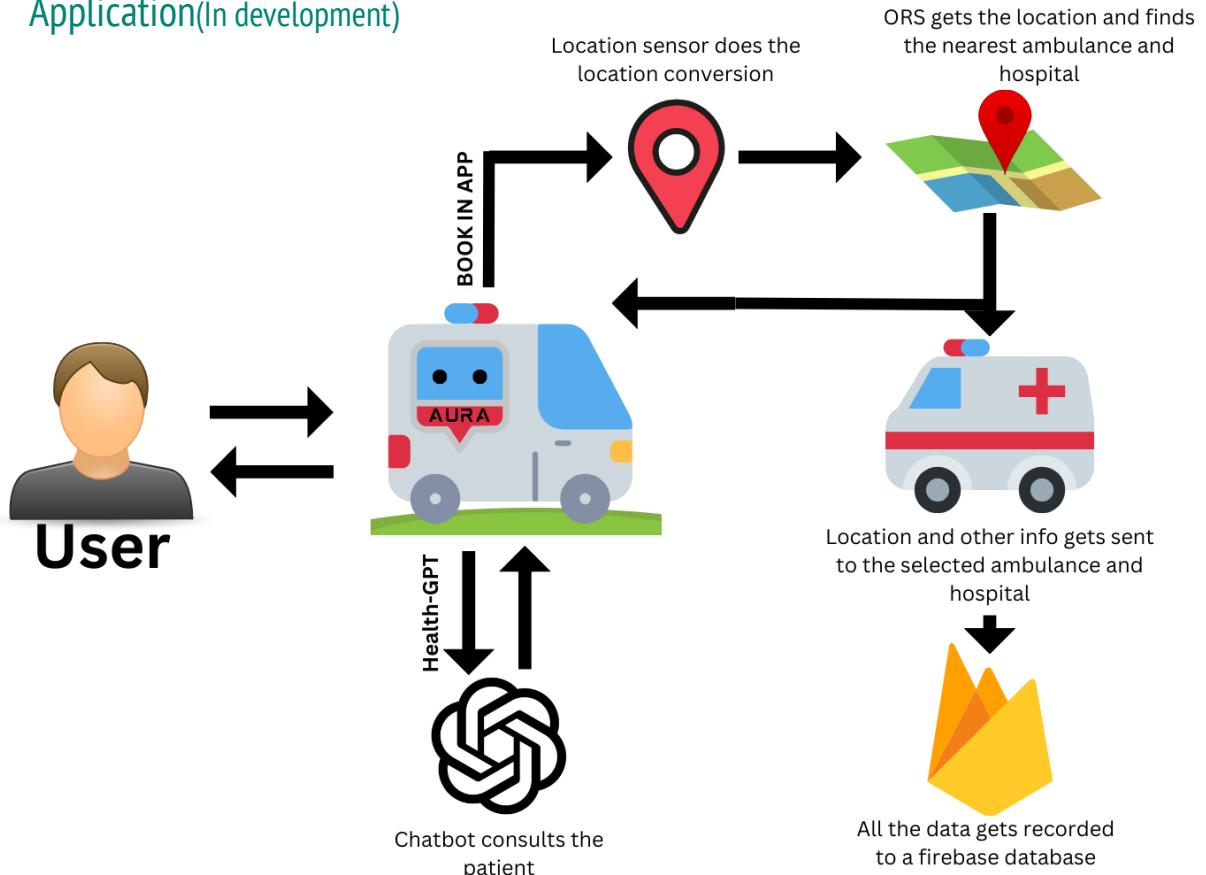
AURA's journey focuses on refining route optimization algorithms for ambulances. These algorithms dynamically adjust routes using real-time data, considering factors like traffic and live updates from emergency services. This adaptability ensures efficient responses to changing emergency scenarios, promising optimal future response times.

Working Diagrams:

PMS(Panic Messaging Service)



Application(In development)



Codes:

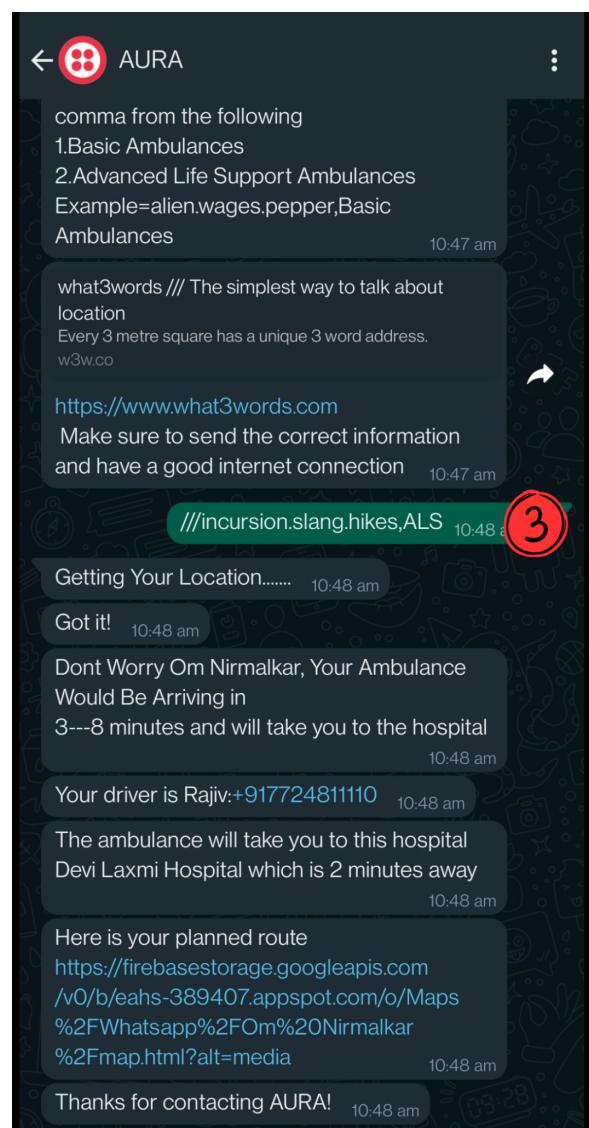
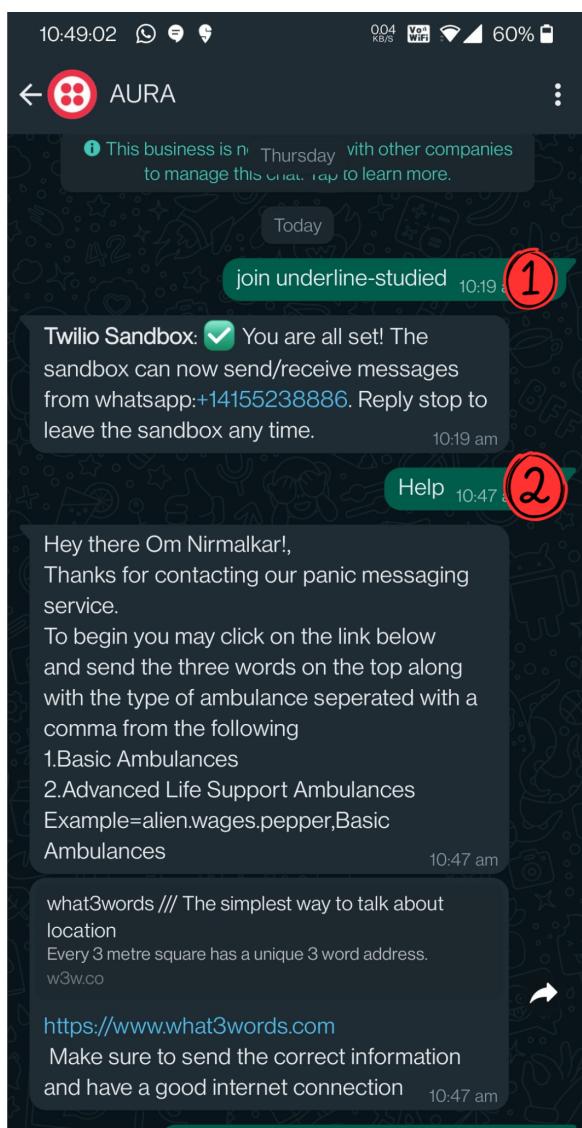
Refer to my repository <https://github.com/omthedev001/AURA> to access the codes

Working Scenario:

PMS:

Scenario: A person has witnessed a road accident and uses the PMS feature

User Phone:

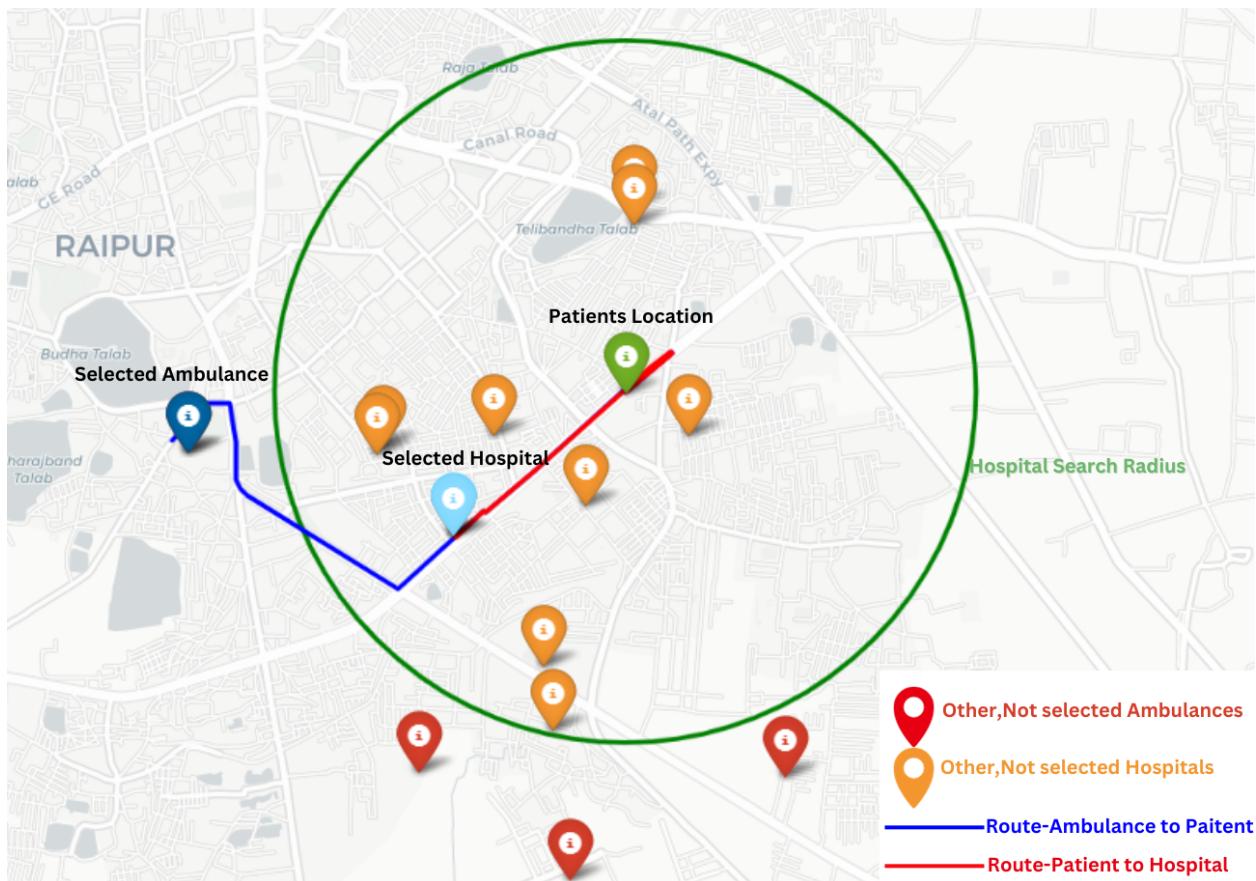


Points:

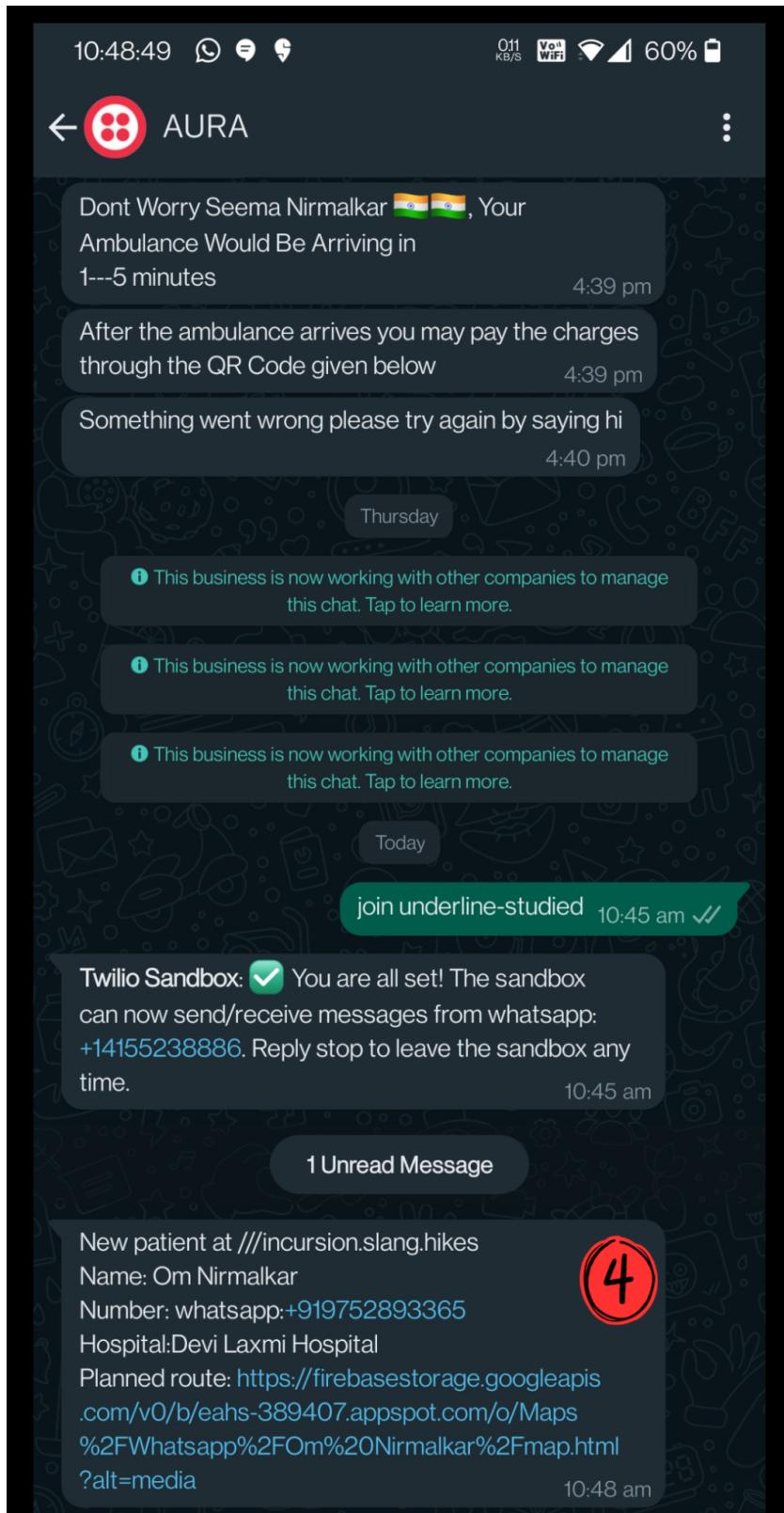
1. User sends a join code(only required when using for the first time).AURA registers user in its database
2. User sends another message which activates the process,Activation message could be any except a message similar to the what3words message.AURA gets the user data and asks the user to provide their what3words and Ambulance type.
3. User sends their what3words and choice of ambulance(choice of ambulance could be left unanswered if user is not sure).AURA converts what3words into coordinates and selects the nearest ambulance and hospital through a huge but less time taking sorting process.AURA sends the travel details like Duration,Driver name and number,Hospital name and the automatically planned route map with the user.

Map:

<https://firebasestorage.googleapis.com/v0/b/eahs-389407.appspot.com/o/Maps%2FWhats%2FOm%20Nirmalkar%2Fmap.html?alt=media>



Driver Phone:



4. The driver receives the user data along with other data as shown above

App Working Scenario:

Application completed till now



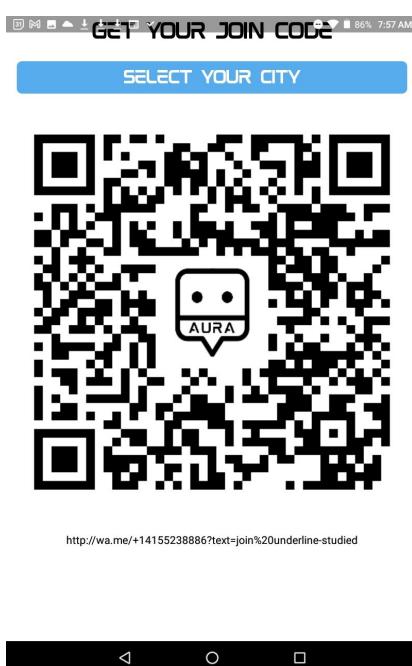
Main Screen



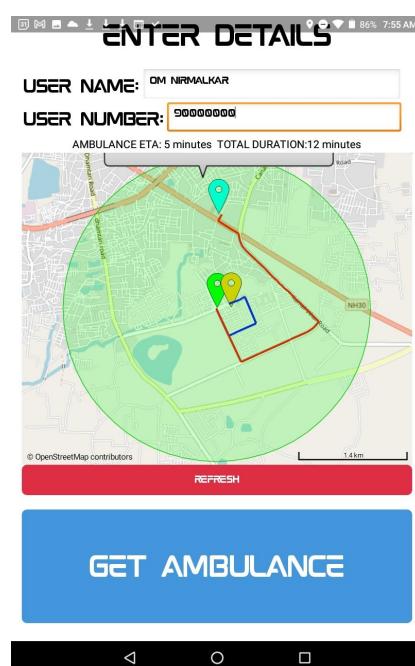
Health-GPT



Book-in-app



Get-Your-Code



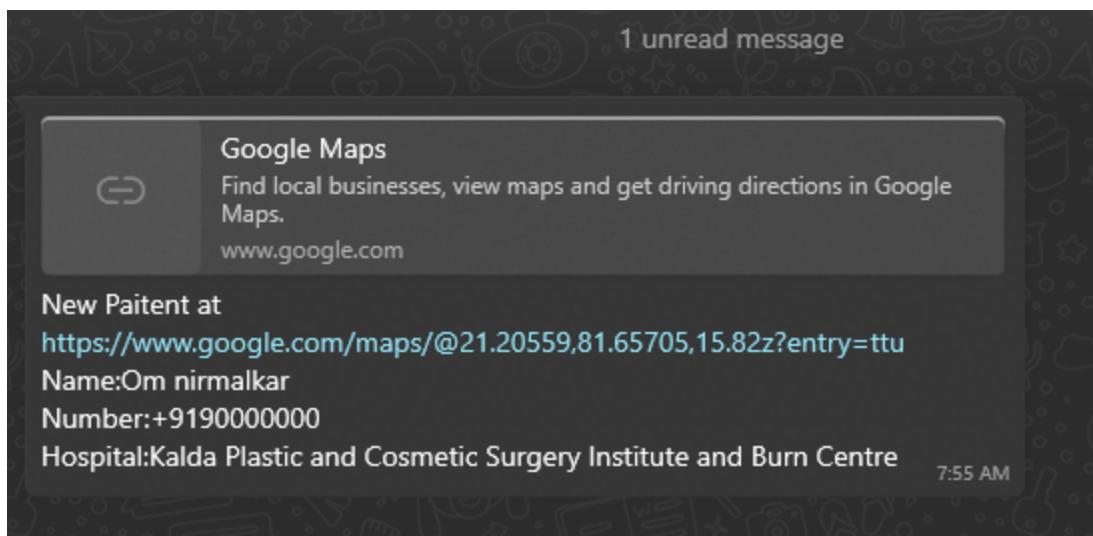
Book-in-app

Main Screen : The screen to access all the features

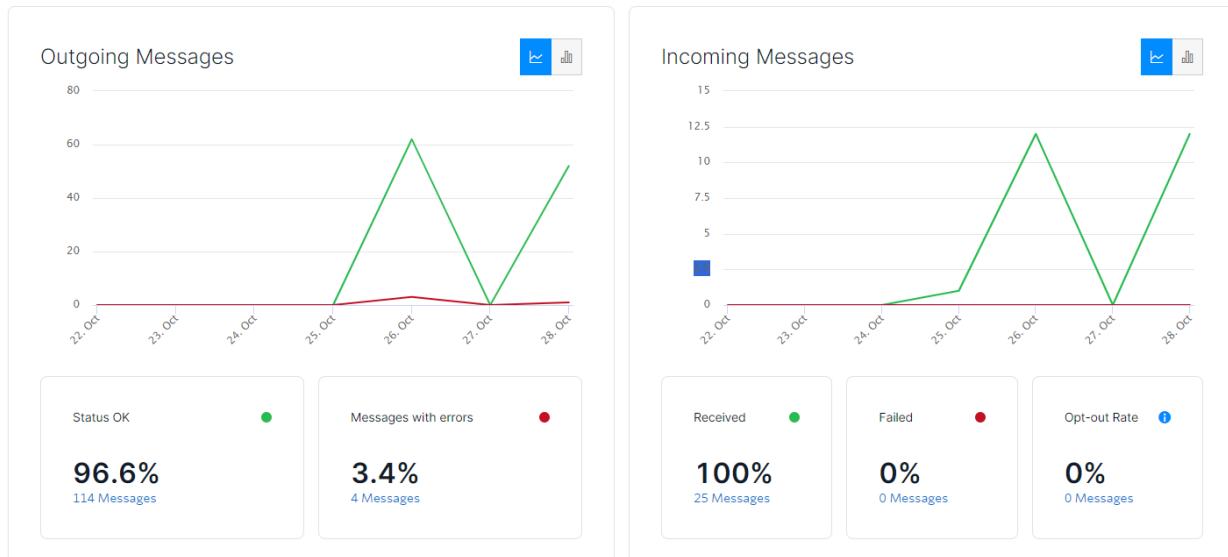
Health-GPT: The AI chatbot to answer all health related questions,right now it can answer user inputs and give outputs as text.

Get-Your-Code: The screen to get your regional join code and PMS number

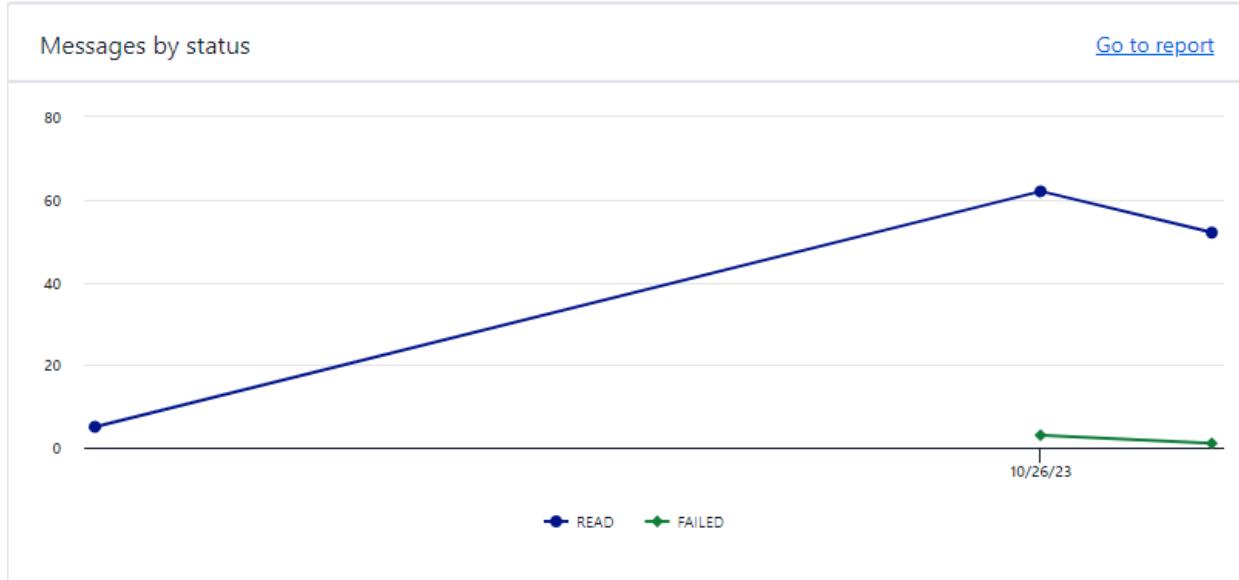
Book-in-app: The main feature to book an ambulance through application,right now it can perform routing services but does not include real time traffic data.The data and other details are sent to the driver like this



Important data:



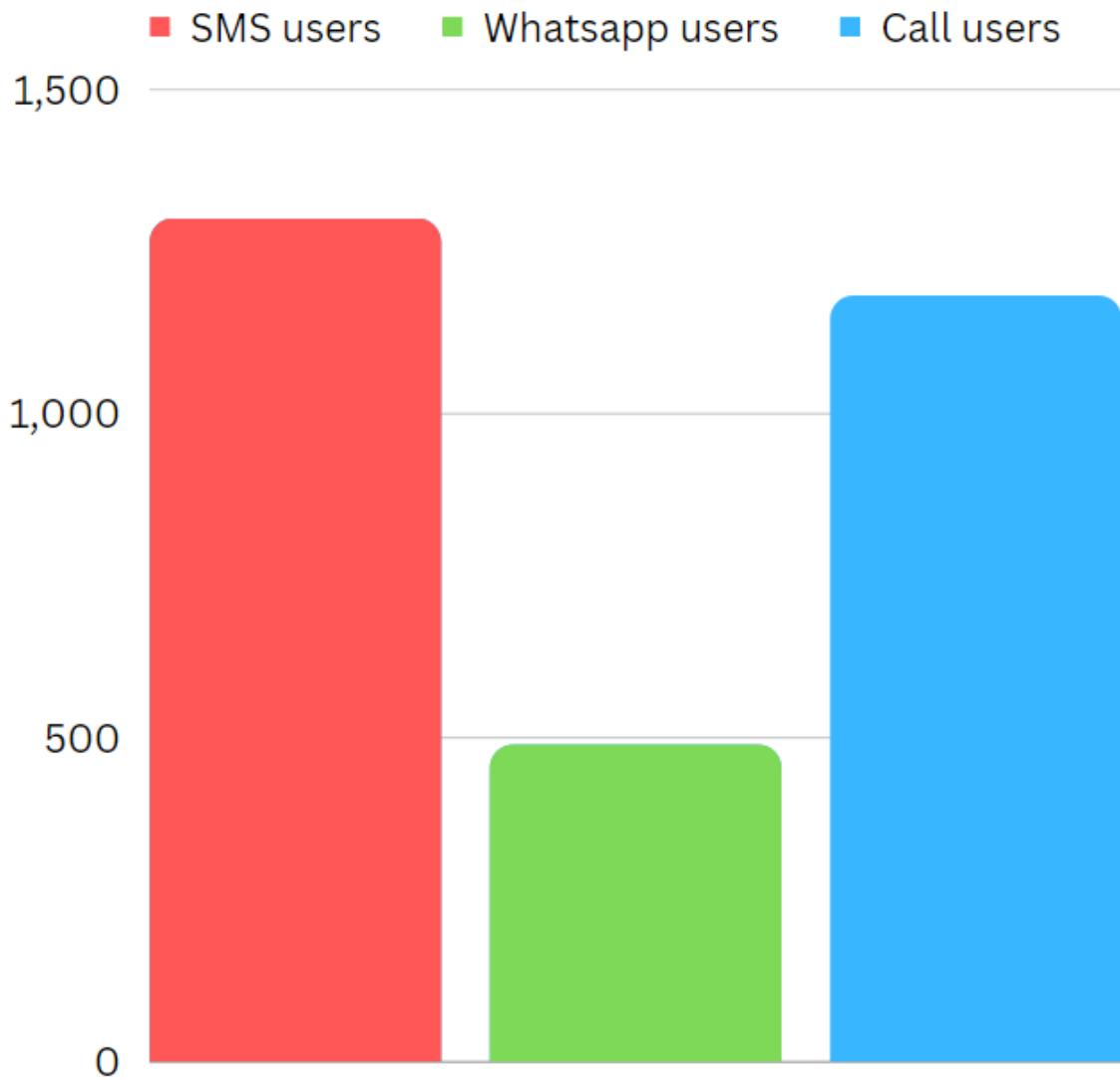
1. This data shows the amount of successful and unsuccessful messages received and sent by AURA.



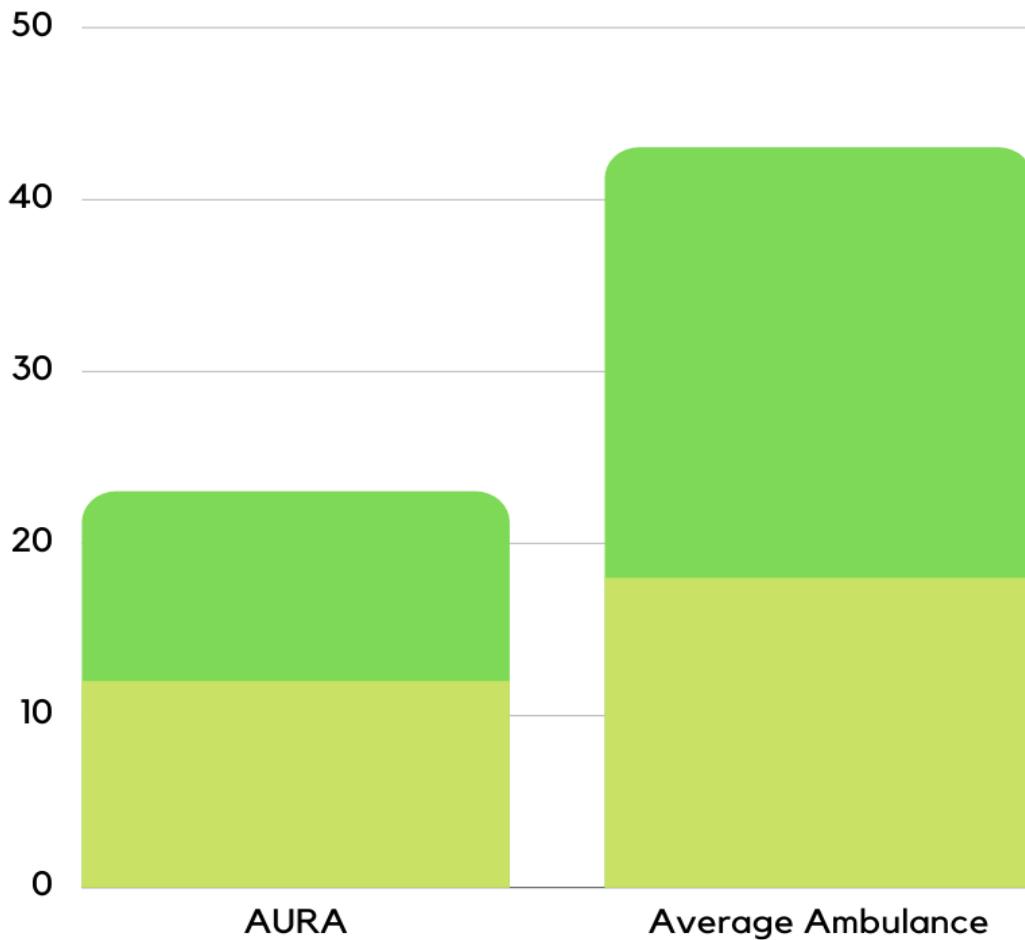
2. This Graph shows the Message status ,due to ngrok server errors messages are not delivered sometimes.



3. The following graph shows the programmable messaging cost in India offered by many companies. The sms costs are around 46.0 Rs.-56.0 Rs but the whatsapp costs are way low ranging about 0.39 Rs - 0.42 Rs .Even though this is a huge difference,many people in India still use SMS



4. This graph shows the current user number in India in millions and it clearly shows how necessary SMS and call services would be in AURA.



5. Following graph shows the time taken by several ambulances to reach several destinations in major and small cities in minutes after lots of data collection and virtual testing. AURA takes less time to provide an ambulance, specifically **33% less** time in major cities (denoted by light green) and **56% less** time in small cities (denoted by green).

Future Development:

- I. Satellite Technology: As internet and cellular connection is not available everywhere, satellite technology is the best solution as it can receive data from any point of the world
- II. Increased Hospital Search Radius: AURA is currently able to search for hospitals in a 2km radius. This can create problems for people using aura at highways, rural areas or less populated areas.
- III. Use of Google Maps API: AURA currently uses ORS API which is great for small projects focused in the US but not in India. The routing services are sometimes inaccurate due to poor surveillance of small cities which can create problems for users giving them inaccurate directions. Google maps is more accurate in these situations
- IV. Use of SMS and Calling Services: Whatsapp communication is good in its own way but lacks the popularity. SMS and call services have as discussed in the Important Data section
- V. Realtime Ambulance Data: Right now AURA is only able to track ambulances at a given list of coordinates which may get changed to real time tracking of ambulances for better travel timings
- VI. Better Application: The application of AURA is not as good compared to other applications according to its UI and processes mainly because of it being made in MIT app inventor making it less powerful
- VII. Include More Features: The features in AURA are easy to use making it less complicated but are simple compared to businesses which use buttons in whatsapp to communicate with their clients. It may get upgraded in future, who knows?
- VIII. Better Server: For instance, AURA runs on a laptop whose local ip is converted into a usable server made possible by ngrok. The server however is not suitable for multiple inbound and outbound messages and crashes or causes problems when being used continuously as discussed in the Important Data section.

- IX. Add different languages: Not everyone communicates in English, many people in India have phones set their language to Hindi for better usage. Different language supports in AURA can help reduce language barriers.

Costs:

Costs to operate AURA depends on the number of activations. The number of messages depends on how long the message is. The price of routing services also depend on the number of uses per minute. The server can be operated at different costs. In conclusion AURA can operate for 1 use per 4 minutes for 3 days straight at only 20\$ (*1668.27 Rs. in the current rate of conversion*). Which is cheap compared to having a call center and hiring humans to operate there.

Conclusion:

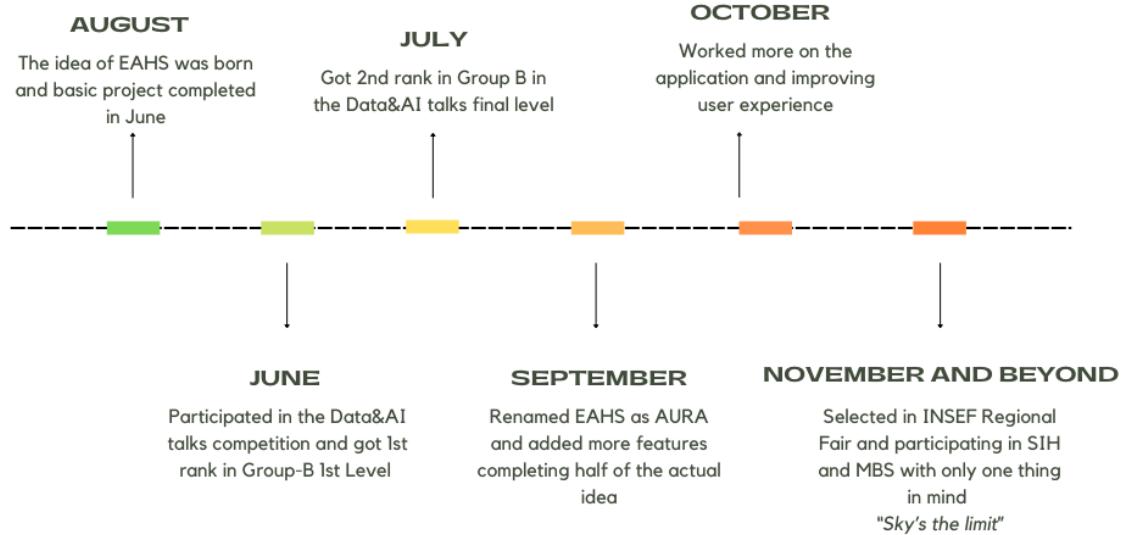
In conclusion, AURA's developmental phase represents a pivotal juncture in the realm of emergency response systems. As it navigates the intricate pathways of development, AURA stands as a testament to the ingenuity and dedication of its creators. The synergistic integration of Python and the meticulous incorporation of Twilio, WhatsApp, Firebase, and OpenRouteService APIs foreshadow a future where AURA will redefine the very essence of emergency services.

The journey ahead is one of continuous growth, marked by innovation, resilience, and an unwavering commitment to saving lives. AURA's developmental phase is not merely a prelude but a promise—a promise of a future where communities are safer, response times are swifter, and lives are safeguarded with unprecedented efficiency. As AURA evolves, it remains poised to usher in a new era of emergency response, illuminating the path toward a safer and more secure world.

Timeline:

AURA TIMELINE

2023



Thank You!

For reading this document,hope you like my project and would support me in its development



X

