GeoHelp - *Help where Help is needed*
A contribution to the participatory resilience hackathon

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Abstract

The document provides basic information and arguments about the decisions and thoughts made by the team during the hackathon to facilitate the evaluation.

1 Introduction

A big part of every event is safety. Organizers of these events go to great lengths to ensure the safety of their guests. Security personnel, emergency tents, and paramedics are a crucial part of the safety measures of every event. But how can someone help you if they don't know you need help? To identify a person who needs help in a crowd of 15'000 people is very difficult. Our team connected technology and participation to create resilience.

1. You are enjoying yourself, but your friend or a stranger who dances beside you collapses.

2. You open GeoHelp and press the single emergency button to notify the organizer.

3. The organizer receives your call with your exact location on a predefined heatmap (which depending on the number of emergency calls in your area, can give the organizer a feeling for the severity of your emergency)

4. The organizer alarms all the people in a 10m radius of your location by starting a vibration on their phones (which has to be stopped manually).

5. The organizer deploys rescue measures.

2 Evaluation Criteria

2.1 Relevance

The theme of this year's hackathon was "Participatory Resilience". With GeoHelp we tried to increase the resilience of one through the participation of many. There are not many cases of people who die at a big event like a festival or a concert, right there on the spot. They often die because of insufficient help or help which arrived too late. We have built a tool where individuals can call for help and get a response in real-time. But this is not enough. Just because security personnel knows that you are having an emergency, they will not necessarily be able to assist you right away. They will have to "fight" through many people to get to you. So here comes participation into play. GeoHelp notifies the people around you with your help and their location. Through that, the people around you are aware of your emergency and can assist actively in your rescue or by just making room for the safety staff. Through this process, we not only secure resilience, but we do it by utilizing participation and technology.

2.2 Social impact potential

The resilience we tried to enable with this app is less focused on significant social impacts but more on a small scale. Its sophisticated design prevents thoughts of hiding behind the mass by thinking someone other is reporting the emergency. With mass participation and the reactive heatmap, the more people report an emergency, the more visible the urgency.

A big part of society is afraid of taking responsibility when it comes to emergencies or helping when they pass by. GeoHelp solves this problem by providing anonymity and a way to help by simply pushing one single button. Thus, using this

simple workflow, we predict that the participation rate should increase enormously in real situations.

2.3 Accessibility

GeoHelp achieves accessibility in different ways. One factor is that it does not require expensive hardware to use. The whole project was, from the beginning, focused on being open source. The most significant factor is design. We used three key principles for the design: simplicity, intuitivity, and inclusivity. The user- as well as the organizer interface have very little inputs or information on them. Their design is simple, a few forms and some buttons, no distracting colors or themes. Through that, we simultaneously make our program more intuitive. For example, you don't have to put in the coordinates of your event, you can simply draw a rectangle on a map. GeoHelp will, with the help of OpenStreetMap, extract the needed coordinates. We minimized the inputs and required actions from the organizer or the user, which helps accessibility. But we also looked at the accessibility from the side of people with disabilities. We found a helpful site that allowed us to test our chosen color palettes and see how colorblind people would experience our color theme. Through this, we could guarantee visibility for all users. Regarding the user app, by replacing most of the text with intuitive and meaningful icons, we not only simplified the design even more, but we made it possible for children, intoxicated people, or people with reading disabilities to call for help. By creating a user interface without text, the app does not even need to be translated - which makes it multilingual.

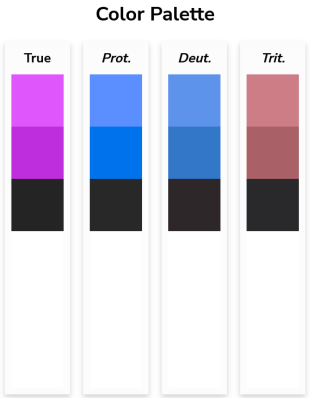

Figure 1: Color-palette as seen be colorblind people (https://davidmathlogic.com/colorblind/)

2.4 Reproducibility

The project was realized through multiple repositories and, at the end of the week, merged into a single repository containing all of the stuff made for the hackathon. The documentation of the technical parts is found in the corresponding folders of the sub-projects, and the user documentation can be found at the end of this document. As the user app is the sub-project that requires the most distribution, we provided an `.apk` file to enable easy installation. This file can also be uploaded to the play store after a more sophisticated testing stage.

2.5 Novelty

Extensive research on similar applications or projects was not possible because of the short time we had at our disposal. In the time we invested in looking for similar projects, we were not able to find any. A factor in our favor concerning novelty is the fact that it is a very current problem. More and more artists are becoming more aware during an event and trying to notice people in danger. Despise this fact, we did not find any similar projects.

2.6 Functionality

How the applications work in theory becomes clear by reading either this document or the provided documentation. But the functionality of the applications is best shown in a live demo. We were informed that the demos of the projects would be recorded. We're assuming that the recording will be uploaded together with all the project information.

2.7 Adherence to the planned objective by the team

To achieve maximal parallelity, we oriented ourselves on a concept we learned in the parallel programming lecture we enjoyed in the past semester. We took the ForkJoin-concept, where a big task gets split into smaller tasks, which can be solved parallel and independently of each other. After that, the completed tasks get joined together to solve the big task one started with. As soon as we decided on an idea, we planned the project in detail. We defined the required objectives that would have to be implemented by the end of the week and made sure to be realistic. We not only defined the required objectives but also created a clear design concept for the project and ensured that every team member was on the same page.

With this, we just had to ensure that every subtask, no matter how small, was built on simplicity, intuitivity, and inclusivity, which were very easy to keep in mind. We also put a lot of effort into keeping each other up to date. For this, we used Trello (an online KanBan Board), we also did daily update talks where we showed each other the results of the tasks we were working on, and at the same time, we would check each other's work to make sure we would not lose sight of the end goal. In conclusion, we can say that we achieved all the planned objectives and even extended most of them. We accomplished this by precise, rigorous, and realistic planning of the workload, clear and simple design principles, and defining challenging and achievable objectives.

3 Impact of Keynotes

Surely all of the presentations and talks had a lot of impact on our final product. Thus this chapter focuses on the three most impacting inputs for GeoHelp.

3.1 Javier Argota - 3 cases of data integration

As GeoHelp does not use sensors except GPS, the data was quickly explored, and the common points were found without interruption. We used basic vector math to implement our use cases with the positions. Data transformation was unnecessary since we used predefined area widths instead of single points to fire an alarm on the phones. At the beginning of the project, in the planning phase, all pipelines and visual ideas were discussed and documented. Thus we had a fixed target set to reach by the end of the week. In Javier's talk, we realized how vital and impactful visualization and data representation is. We used a heatmap to visualize the emergencies for the organizer.

3.2 Lilian Blaser - Resilient analysis for the City of Zurich

Even though the title of the hackathon has the word resilience in it, we did not understand the meaning of this word. Mostly because we did not analyze it properly and did not realize how important it is. People like Lilian are working daily on the goal of making things more resilient. Her talk was concentrated on the resilience of a city which is a much bigger picture. But it was interesting to hear about the concepts used to realize the resiliency goals. We were blown away by the number of thoughts we did not have—for example, electric cars. The plan to become carbon neutral makes sense for all of us. But as Lilian mentioned, many people forget that if the police or other institutions responsible for our security switched to electric-powered cars, we would become highly vulnerable in a case of a big electric blackout. Through the hackathon and this talk especially, we started thinking much more about resilience and started seeing resilience as a significant factor in decision-making.

3.3 Computational Diplomacy - Thomas Maillart

This talk was, for all of us, extremely interesting. Thomas gave us great insights into the world of international cooperation. He showed us the possibilities and results but also pointed out difficulties and challenges. Through this talk, we did not get new ideas for our project, but it gave us a better understanding of what we were doing. Without knowing it, we practiced a form of peer production defined by Yochai Benkler. Through the understanding we got and by actively implementing the concepts, we enhanced our team's performance.

4 End Product

The final product is an interconnected software model consisting of a user application for event attendees, an event organizer app, and a backend to connect the two.

As already discussed, the user app should be as easy to use as possible. It leads to a decision to hide all technical features and minimize the usability of single binary inputs by the user. Either he wants to do a single thing (e.g., report an emergency) or not. If the app detects changes in the situation, it automatically adapts the user interface.

On the other side, the organizer should have a more manipulative view of his organized events. The creation of reactive maps and inputs allows the organizer to have a minimum amount of work to create and manage his event. The user interface was designed to be specifically self-explanatory.

The backend was realized with a REST API. Storage and event handling is provided and done by the runtime. All the data is currently not stored persistently.

4.1 Technical Details

All technical descriptions (including the installation instructions) are written in the corresponding

`README.md` files of the individual app repositories (folders). The created class diagrams, mockups, and various diagrams are in the `Documentation` folder at the repository's root.

4.2 User Handbook

4.2.1 GeoHelp-User-App

1. Download and install GeoHelp_v2.x.apk

2. Run GeoHelp application

3. The app automatically checks if it has the needed permissions. If there are permissions missing it asks the user to grant access to the required resources. You have to select grant access **always** for the app fully functioning.

4. At this point you will see the HomePage

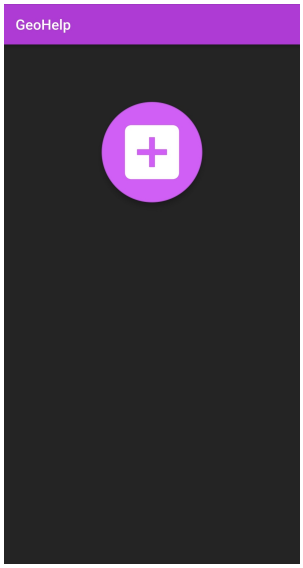

Figure 2: Home Page

5. Now you can click the add button to start the QR Code scanner

6. Scan a EventQrCode displayed by the **Organizer-App**

7. After scanning the QR Code you see your added events listed above the add button.

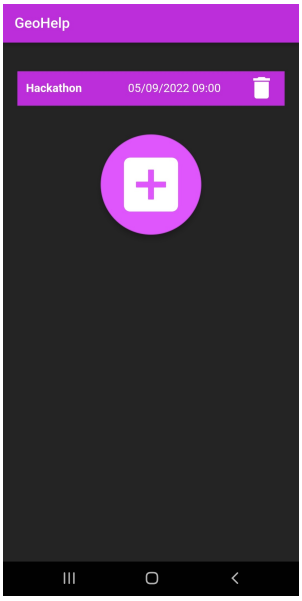

Figure 3: Home Page with added event

8. When the event start time is reached the app switches in the event mode

Figure 4: Home Page with added event

9. Now you can either alarm others in the immediate vicinity or get alarmed by others.

   (a) Send new alert:
   Click the alert button, then your emergency request will be sent to the organizer for approval.

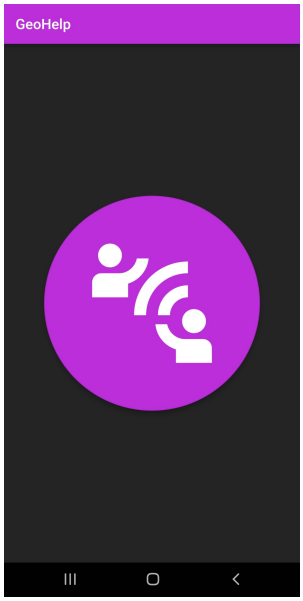

Figure 5: Waiting for organizer approval

(b) Get alerted:
If there is an approved emergency the immediate vicinity, your phone will show the alarm page and start vibrating. The app checks every 5 seconds if there are new emergencies.

Figure 6: Alarm Page

If the phone is vibrating you can stop the vibration by clicking the mute button. The mute button should change its color to a darker pink to show that the alarm is stopped.

4.2.2 GeoHelp-Organizer-App

The GeoHelp-Organizer-App is a web application witch allows to create new events and monitor them. The web application consists of 4 different views

1. Dashboard
2. Event-Registration
3. Event-Overview
4. Event-Monitoring

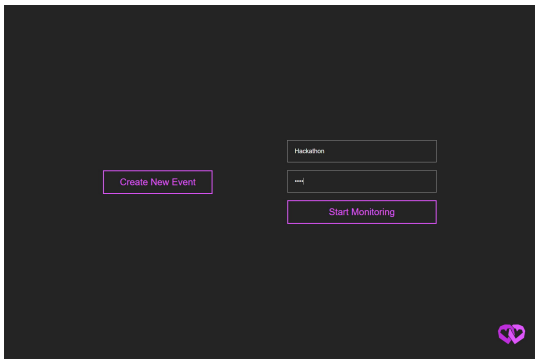

Figure 7: Dashboard

In the Dashboard the organizer can either register a new event, or login to monitor a already registered event.

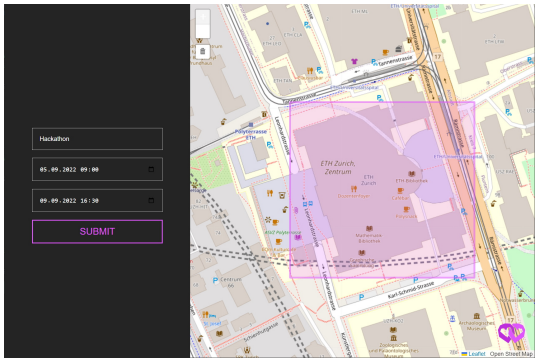

Figure 8: Event-Registration

To register a new event, the organizer has to provide a event name, start and end date-time and a location where the event will take place. The location can be selected on the map by using the rectangular selection tool. Submitting the event registration will port the organizer to the Event-Overview.

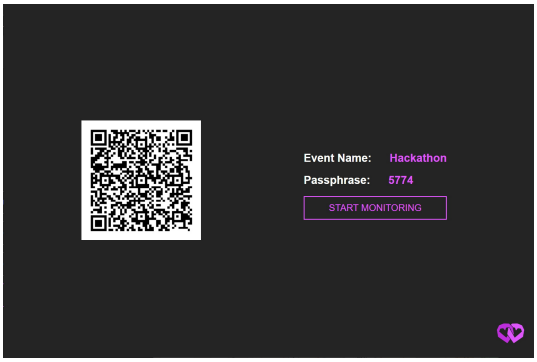

Figure 9: Event-Overview

The Event-Overview provides some necessary information. On one hand it gives the organizer the passphrase, which is required to monitor the event, on the other hand the QR-Code will be shown, which has to be distributed to the visitors.

The organizer can choose to start monitoring the event, or he can return later to the dashboard and login with the event name and passphrase to get to the Monitoring-View, which shows a map.

Figure 10: Event-Monitoring

Once a emergency was triggered by a visitor, a indication will be shown on the map.

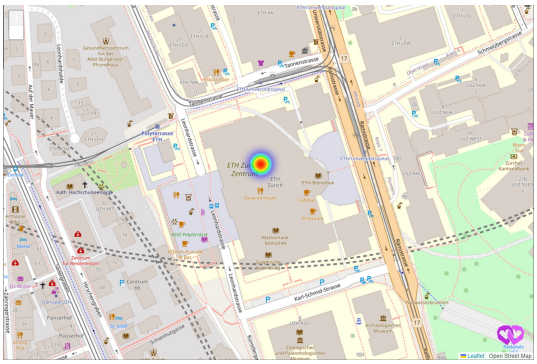

Figure 11: Event-Monitoring Emergency

By clicking on the indication the organizer can approve the emergency and visitors nearby will be informed that there is an emergency.