

# Emergency services with Augmented Reality (AR)

## 1. TOPIC

I wanted to explore how augmented reality technologies can be used to improve efficiency of rescue services in city. Particularly how you can use location data of power lines, water and gas pipes in order to help rescue services in the city in a case of emergency.

## 2. WHAT

I found out innovative ways to use AR (Augmented Reality) in combination with smartphones to enhance operations of emergency services. Augmented reality (AR) is a new concept of seeing casual world, usually it duplicates a scene with additional features using computer generated applications. Now AR browsers and applications are wide-spread and commonly used in advertising, gaming and in other projects. The most useful are those mobile browsers that could locate your position with GPS, scan relevant pictures and then overlay reality with new objects. On the one hand there are multifunctional AR browsers with free, sometimes limited feature publishing like Layar and Wikitude. On the other hand we can find open sources that allows implement your own application, for example Mixare.

To complete the task, it was be helpful to understand how to implement virtual layer into necessary database and how AR technologies are currently used. Therefore I explored Mixare and its capabilities and tools for AR applications. Mixare (mix Augmented Reality Engine) is a free open source augmented reality browser that offers four general application frameworks:

1. as an autonomous application, which (for the moment) displays Wikipedia POIs of the surroundings,
2. as a link on an HTML site, whereby the data source is transferred to the application,
3. as own launcher-app, the data source is transferred to the application (see Figure 1 below),
4. as freely expandable and can even be modified into an individual application.

The Mixare app can display Wikipedia points of interest (POIs) by default, however it is possible to launch mixare with other data source. It can work as a completely autonomous application and is available as well for the development of own implementations. This extensible browser-based tool mentioned above offers similar feature sets for Android developers, notably pinning external URLs to specific latitude and longitude locations.

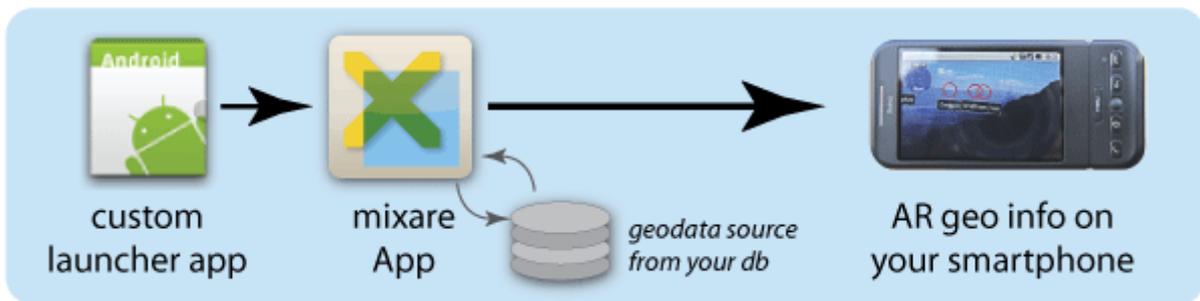


Figure 1: Mixare <http://www.mixare.org/wp-content/uploads/how-to-use-mixare-3.png>

The Mixare project wiki has an introductory guide to developing your own apps using its code, so it is enough documented. On the other hand there had been complains about lack of tutorials. For now Mixare doesn't support different data bases with geoinformation or shape files but probably is would be introduced soon.

I still would like to learn how to combine AR and geodata from different network databases in order to create a system that allows see the city in an interactive way, with virtual hot-spots for officials. For now the best platform to use is Mixare.



Figure 2: Street in Stockholm. Source: Author's photo

### 3. WHY

I have been working with AR technologies for museums and other cultural sites. After a while, I realized that AR can be used not only for enhancing entertainment or just for fun way of representing things. AR has far more opportunities in the smart city development. Apart from commercial use, AR could help people to solve security issues faster. Emergencies are a fact of life, and first responders, police and firefighters often arrive at chaotic scenes and need to make sense of the environment and navigate a place they've never been. Wouldn't it be cool if they could see a virtual map of the site or have "X-ray vision" to see underground water and power lines?

### 4. WHERE

This project is in Stockholm, Sweden.

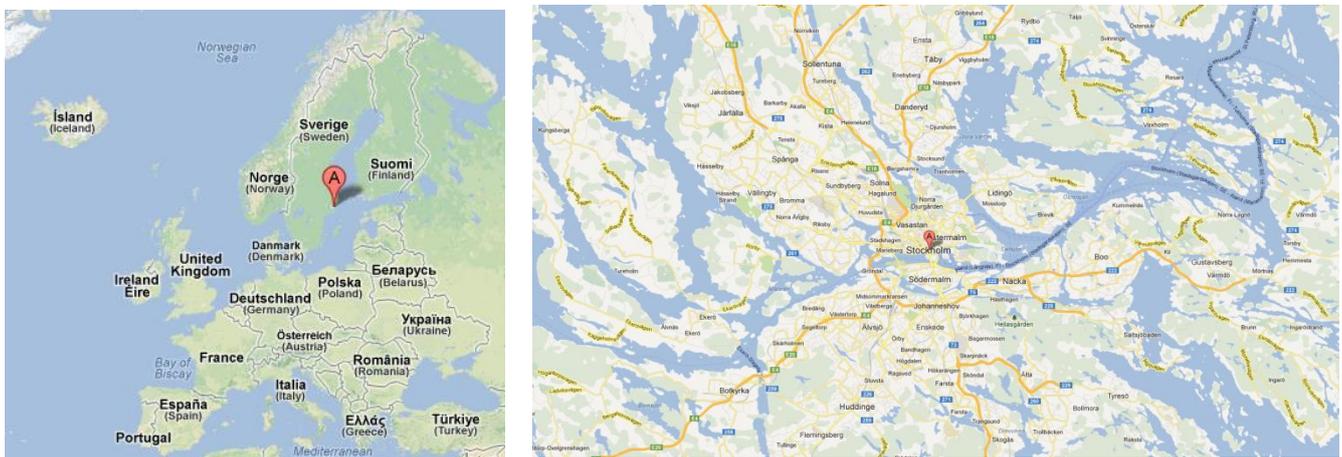


Figure 3: Location of Stockholm. Screenshots from <https://maps.google.com/>

### 5. WHO

Project will be aimed to emergency and rescue services which ensure public safety and health by addressing different emergencies, mainly police, fire department, emergency medical service.

### 6. ENGAGE

I got feedback from other course participants and improved project depending on their opinion.

- *More specific details about technology.*

AR technology is explained in Part 2

- *What a great idea! I understand you would like to use AR to help visualize routes and even emergency scenes for emergency service personnel, which would help improve a city's crisis management system a lot. I am a little unclear what the actual final product will be. I understand it would be an app, but how will it actually display augmented reality?*

Yes, it will be app which would show different city data layers. For detailed information, see the poster of the project.

- *Also, if the app will show the closest endangered person, how does this person in danger actually alert himself to the rescue team. This is also something I wasn't very clear about. Otherwise, great idea and definitely a great example of how technology can improve city life.*

The app won't show the closest endangered person, it would depict any lacking data for emergency services, like water tubes.

- *This is an interesting proposal. The idea of being able to buried services and utilities would no doubt be useful, but I do wonder though how the resolution of the AR would compare with the resolution of the GPS systems currently in use by the emergency services.*

Currently emergency services are using GPS for address tracking not for utilities. Also this system is used just in cars for navigation purposes, but project involves smartphone or tablet application that could be uses anywhere without depending on environmental conditions.

- *I like the project, if well implemented it will surely improve the quality of emergency services. As you already noted, the availability of data may be critical. Not only the location of underground cables and pipes, at least in my city, is usually unknown to companies who work there. The data of emergency services are poor structured and difficult to analyze. Finally, some of the end users could find the new technology really hard and adverse it. I wish you the best success.*

Yes, this is one of the biggest threat what impact whole project. But I am sure that in future city would have all necessary data from different companies and they would be structured in one data base.

- *This is spectacular idea in my opinion! The student appears really committed in their research.*
- *I think this project is a really good idea, it is real, and it could be implemented in all cities*
- *Good job, you and your friend chose a great theme. Explore it and will be very useful for new models of cities. Congratulations!*

## 7. HOW

- **Data Analysis:** I will analyze available open source data. Unfortunately, mainly other data regarding to rescuing services, like water source, electricity or gas lines are not available to public.
- **Design:** I would like to design a mobile application that would allow officials to see closest endangered place/person and show the distance to the nearest necessary tools for rescuing operation. Details about the app are available in the poster.
- **Challenge:** I used idea of AR in 'Google Street View stitching' assignment

I chose area where I live and walking by it every day and therefore I saw some improvements to be considered. Also I know a lot of people from neighborhood who are experiencing problems centered in the area and they suggested their possible solutions.

How would you enhance this area through the use of technology?

I want to use augmented reality application for smartphones, like in the figure 4 below, to help rescue services to navigate in the area. In fact you can see that all buildings in that quarter are almost the same. It is hard to distinguish buildings or navigate, if you are there for the first time. Imagine if it is matter of live and death and ambulance is searching for the right address for 10

min? Emergencies are a fact of life, and first responders, police and firefighters often arrive at chaotic scenes and need to make sense of the environment and navigate a place they've never been. That is the main reason of using and implementing augmented reality technologies.

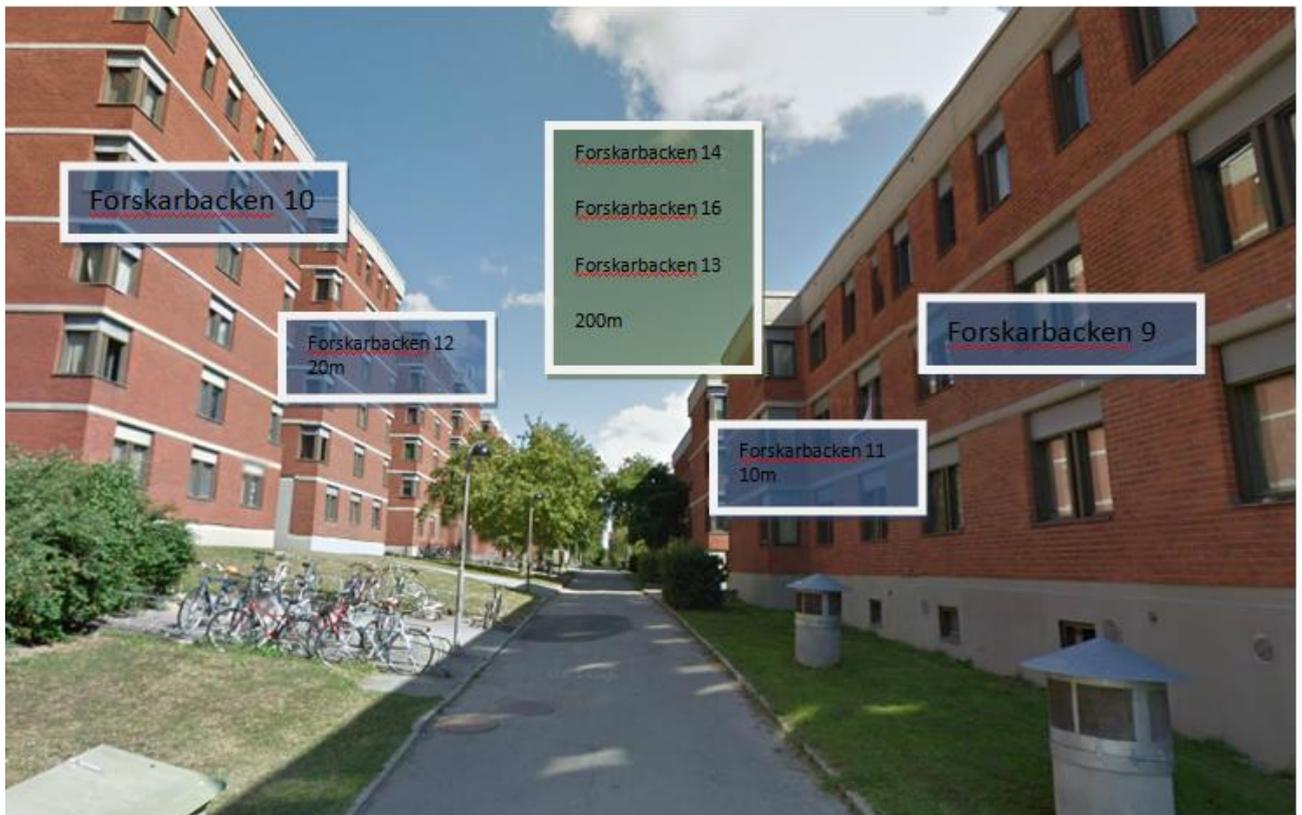


Figure 4: AR addresses in street in Stockholm. Screenshot from <https://maps.google.com/>

## 8. FINAL PRODUCT

Based on feedbacks and data/information analyses, I will then provide a written description, along with some drawings of what the app would look like. The final product is expected to be a poster that includes general preview of the apps layers and its usage of data. Currently, two posters are made and they preview AR system with water pipes and power lines. We could also understand that those two cases can be two layers on the AR map.

Before starting the project, a proper and deeper technology evaluation is needed. AR technologies only now are expanding and people are getting familiar with them. Nevertheless this is the right moment for creating innovative and breath taking applications like underworld AR system. Only limitation in this project is the lack of knowledge and experience in AR technology implementation.



Figure 5: Augmented reality in the city. Source: [http://www.keiichimatsuda.com/kmatsuda\\_domestic-city.pdf](http://www.keiichimatsuda.com/kmatsuda_domestic-city.pdf)

## 9. WITH WHO

I worked with Liene Some.