Savior AI

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I. WHAT IS EARTHQUAKE?

An **earthquake** is what happens when two blocks of the earth suddenly slip past one another. The surface where they slip is called the **fault** or **fault plane**. The location below the earth's surface where the earthquake starts is called the **hypocenter** and the location directly above it on surface of the earth is called the **epicenter**. [1]

Sometimes an earthquake has **foreshocks**. These are smaller earthquakes that happen in the same place as the larger earthquake that follows. Scientists cannot tell that an earthquake is a foreshock until the larger earthquake happens. The largest, main earthquake is called the **mainshock**. Mainshocks always have **aftershocks** that follow. These are smaller earthquakes that occur afterwards in the same place as the mainshock. Depending on the size of the mainshock, aftershocks can continue for weeks, months and even years after the mainshock! [2]

II. HOW CAN WE REDUCE EARTHQUAKE DAMAGE FOR BUILDINGS?

A. Flexible Foundations

To enable the building foundation to withstand ground forces generated by earthquakes, it should be decoupled from the ground. A common procedure is to isolate the base and mount the building on flexible pads made from rubber, lead or steel. When the foundation moves, these isolating elements perform compensating counter-movements, thus ensuring that the building will keep its position. In this way, seismic waves are absorbed and prevented from traveling into the building. [3]

B. Redirection of Earthquake Energy

Contrary to the concept of counteracting forces, research is being conducted on how to redirect the energy generated by earthquakes. An innovative approach is the so-called "seismic invisibility cloak" a cloak consisting of 100 concentric plastic or concrete rings buried at least one meter below the foundation of the building. When seismic waves enter these rings, they, for ease of propagation, must pass the outer rings first and this will divert the forces from the building into the ground. [4]

III. TURKEY'S SITUATION IN THE EARTHQUAKE

It takes years for the solution methods mentioned above to be applied in Turkey. Because there are so many unplanned urbanization and the number of buildings built with the above methods are very few. That is why it is necessary to rebuild cities entirely.

Instead of rebuilding cities first, each household can be given a **safe room free of charge** by the state. It is a room which can withstand tons of weight. [5]

IV. SAFE ROOM WITH AI

While the government is giving safe rooms, we can use artificial intelligence. This AI will decide where to rebuild first and where to give safe rooms. After that AI decide the regions where the distribution will be made on the map and will record the regions where the distribution is made.

Safe rooms should also have materials to meet human's need e.g. clothes, water and food. AI should also be used to prepare these materials in accordance with people, it should also be ensured that these materials are re-supplied in accordance with the expiration date with AI.

V. DECISIONS

Well, how to make decisions?

For choosing the rebuild places and the safe rooms distribution places, we can prepare virtual earthquake simulations in accordance with fault lines and teach them to AI. So we can start rebuilding in areas AI considers risky.

What about basic necessities? We need data for each person and that means we need **Big Data**. By obtaining this information from hospitals, personal clothing and food needs can be calculated. Food choice should be as follows:

a) Have a long storage life
b) Require little or no cooking, water or refrigeration in case utilities are disrupted
c) Meet the needs of babies or other family members who are on special diets
d) Meet pets' needs
e) Are not very salty or spicy, as these foods increase the need for drinking water which may be in short supply [6]

VI. PEOPLE WHO ESCAPED UNINJURED AND PEOPLE WHO UNDER THE WRECK

A. People who escaped uninjured

AI will determine the most suitable places for those people to stay. For example, hotels, the houses of people who want to share their rooms for earthquake victims. We have to be very careful in choosing these locations and properly teach the AI how to choose these locations. We can use "Site Selection Criteria for Sheltering after Earthquakes: A Systematic Review" [7] as a reference which is a previous research for teaching.

B. People who under the wreck

AI will be used to find possible locations of safe rooms under the wreck by using **image processing** of the cameras and satellites (military satellites). AI will transmit this data to authorized institutions and employees. AI will be trained to calculate these possible locations with the simulations mentioned in the decision part. After the search and rescue operations, AI will take injured people to the most suitable hospitals and field hospitals.

REFERENCES

[1] [2]   Lisa Wald "The Science of Earthquakes" The Green Frog News.

[3] [4]   "4 Methods to Protect Buildings During Earthquakes" Ringfeder Power Transmission, 24 June 2022.

[5]   "Patentini aldı, 66 tona kadar dayanabiliyor… Önü TV ünitesi arkası deprem kabini!" Türkiye Gazetesi, 23 February 2023.

[6]   Glenda Hyde, Lynette Black, Patrick Corcoran, Lauren Kraemer, Brenda Marty-Jimenez and Catalina Sanchez-Frank "Survival Basics: Food" Oregon State University, August 2021.

"Food & Water: Preparing for a Disaster" Centers for Disease Control and Prevention, 29 January 2019.

[7]   Ahmad Soltani, Ali Ardalan, Ali Darvishi Boloorani, AliAkbar Haghdoost and Mohammad Javad Hosseinzadeh-Attar "Site Selection Criteria for Sheltering after Earthquakes: A Systematic Review" National Library of Medicine, 29 August 2014.