USING DRONES, COMPUTER VISION, AND
PATHFINDING TECHNOLOGY TO FIND THE BEST
AND FASTEST ROUTES FOR EVACUATION
TEAMS TO REACH COLLAPSED BUILDINGS
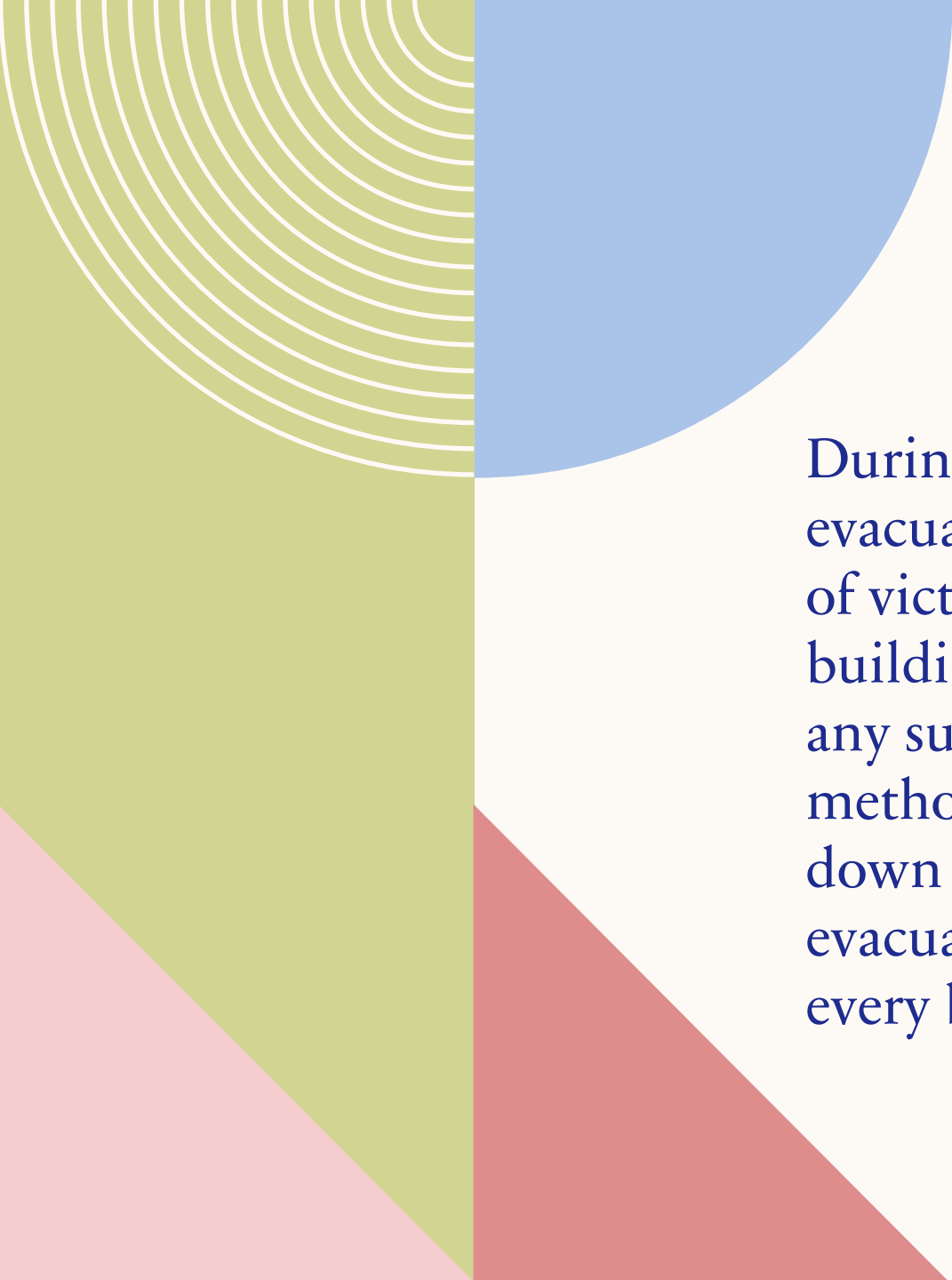WHERE THERE ARE POTENTIAL VICTIMS
UNDER THE RUBBLE.

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GLOBAL AI HUB
AI BOOTCAMP PROJECT

MAIN PROBLEM

After an earthquake, evacuation of victims buried under collapsed buildings must be carried out immediately to save human lives. The difficulty that the evacuation team might face is finding and determining which earthquake-affected areas have the most potential for the number of victims of rubble. In addition, the difficulty of access to certain locations is another obstacle.
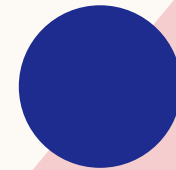
During the process of rescuing buried victims, the evacuation team usually only relied on the voices of victims. The evacuation team gather around the building collapsed and shouted whether there were any survivors buried under it. However, this method is considered inefficient because it slows down the evacuation process and makes the evacuation team exhausted if they have to inspect every building.

As a solution, we can use drones that are attached to sensors that can detect the human presence (buried victims) and send signals to the evacuation team. But there will be several other problems that may arise later. How is the access of the evacuation team to the location signaled by the drone? What if the road to the location marked by the drone turns out to have problems such as damaged roads that cannot be passed by vehicles, or roads blocked by collapsed buildings?

PRIMARY GOALS

The main point of this idea is to find the best, fastest and safest route for the evacuation team to reach the location where there are potentially many victims buried under the rubble. This method uses drones that fly autonomously and scan the path from the evacuation team's location to the location where a large number of people are detected buried. With this, the process of evacuating victims buried under rubble will be more efficient because it saves time and makes it easier to take routes.

OTHER RESEARCH

Several methods and ways for evacuating disaster victims have been widely studied. For examples: using robots to evacuate areas that cannot be reached by humans, using drones to analyze damage caused by earthquakes, using drones that can find humans buried under collapsed buildings, etc.

SOURCE RESEARCH

1. R. Tariq, M. Rahim, N. Aslam, N. Bawany, U. Faseeha, "DroneAID A Smart Human Detection Drone for Rescue" : A method of finding people trapped under debris using an infrared sensor.

2. A. Al-Naji, A. G. Perera, S. L. Mohammed, J. Chahl, "Life Signs Detector Using a Drone in Disaster Zones" : Found a new method of using the human cardiopulmonary system to detect living under the debris.

3. S. Ahmed, A. Joret, N. Katiran, M. S. Sulong, "Human Detection Techniques for Search and Rescue of Trapped Victims Under Debris: A Review": Offers a variety of methods to find people trapped under the rubble.

4. L. Reyes-Rubiano, J. Voegl, P. Hirsch, "An Online Algorithm for Routing an Unmanned Aerial Vehicle for Road Network Exploration Operations after Disasters under Different Refueling Strategies" : It aims to extract accurate information to assess the damage to infrastructure and road accessibility of affected areas following a disaster.

OFFERED SOLUTION

A drone attached to sensors that can detect humans is used. Drones fly through the earthquake-affected areas and look for the victims that are still alive under the debris. Then the drone calculates the distance of the location from the rescue team. Drones that use computer vision and pathfinder detect the best, fastest and safeset path that rescuers can take to that location. The rescue team found the best route calculated by the drone.

METHOD

The drone is equipped with a device that can detect humans buried under rubble. Drones explore areas affected by earthquakes.

During tracing the drone saves the route traveled and scans the path using computer vision. The drone also detects paths and marks paths that are blocked by collapsed buildings or damaged paths.

Picture 1. Drones
Image by macrovector on Freepik

METHOD

When the drone finds a victim buried under the rubble, the drone will send a signal to the evacuation team and calculate the closest and fastest path that the evacuation team can take. With computer vision and image processing, the drone determines which roads are unobstructed by debris and which are undamaged roads that are impassable for vehicles. Using pathfinding machine learning, The drone will provide a fast and safe route for the evacuation team to get to the location signaled by the drone.

Picture 2. Earthquake Zone
Image by haberturk.com

Picture 3. Earthquake Zone
Image by bolgegundem.com

THANK YOU TEŞEKKÜRLER

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