Rescue Drone (An Ultimate LIFE SAVER)

Problem Statement

Humans have no control over natural calamities. Natural Calamities cause a lot of destruction and loss of life. Going into the calamity driven area directly causes lot of trouble to the rescue personnel sometimes it is very hard to detect if there is any survivor present at the site during night-time or when there is smoke all around which reduces the visibility of the surrounding, hence use of UAVs can help us to identify the survivors irrespective of the conditions(low visibility, inaccessibility etc.) and scan the entire area to give a proper path-way planning for the rescue teams to evacuate the survivors. The real power that drones provide to rescue operators is the easy access to aerial data of a large area, which gives the ability to expedite the process of finding a missing person, where every second counts. Use of rescue drones in disaster management operations would help to cover a larger area and with the use of Artificial Intelligence (Al) it would be easy to get more data about the survivors like how deep they are trapped, is there any open area for airlift etc. The Drones will be equipped with High Resolution Cameras to scan the surroundings and some image processing can be used to identify the presence of humans present in the vicinity.

Literature survey
- An autonomous drone for search and rescue in forests using airborne optical sectioning : https://www.science.org/doi/10.1126/scirobotics.abg1188

- Fully autonomous drone system for search and rescue operations at sea : https://www.inceptivemind.com/fully-autonomous-drone-system-search-rescue-operations

Existing Solutions in the Market

There has been an exponential increase in Research on the working applications of the drones in various different domains like journalism, surveyors etc. Use drones for aerial photography and terrain scanning. Active research is conducted for use of drone in express delivery systems, Indian Companies like Garuda Aerospace are working with various Surveillance, Mapping & Agriculture Drones. Lot of research is done worldwide on Rescue drones for search and rescue operations. Airborne Optical Sectioning is studied to detect human presence in different rescue operations at different flying conditions.

Proposed Solution

Creation of Drone which will increase the efficiency of the rescue teams, providing them with a better view of the affected area and guiding them in the evacuation plans. Rescue plans generally last for days and weeks creating a critical shortcoming to the affected once. One of the major challenges is to find the survivors and victims are provide them help at the earliest. Quick disaster management system by the way of UAV's is the approach towards fast resolution as delay may lead to rise in death toll. So, this is our major inspiration for our team to make sure than no human death arises by the basic reason of no help in time and disaster management teams can reach to them at the earliest. An Autonomous Drone which will give better access to the Rescue Team by providing aerial view of the calamity-struct area, identify the survivors (humans, animals etc.) trapped in the vicinity and provide the rescue team with proper pathway planning for the evacuation process. The main advantage of drones is that no matter how bad the calamity, they are free to scan the area in the sky. The Rescue Drone will comprise hardware components such as High-Resolution Camera, Global Positioning System (GPS), Thermal Cameras, Ultrasonic Sensors, Raspberry Pi (On board

Computer). Image Processing for Human Detection will be done with the help of open-source library OpenCV, and use Machine Learning for Human Detection, Software such as Robot Operating System (ROS), Gazebo and Rviz used for Drone simulation and Pathway Planning.
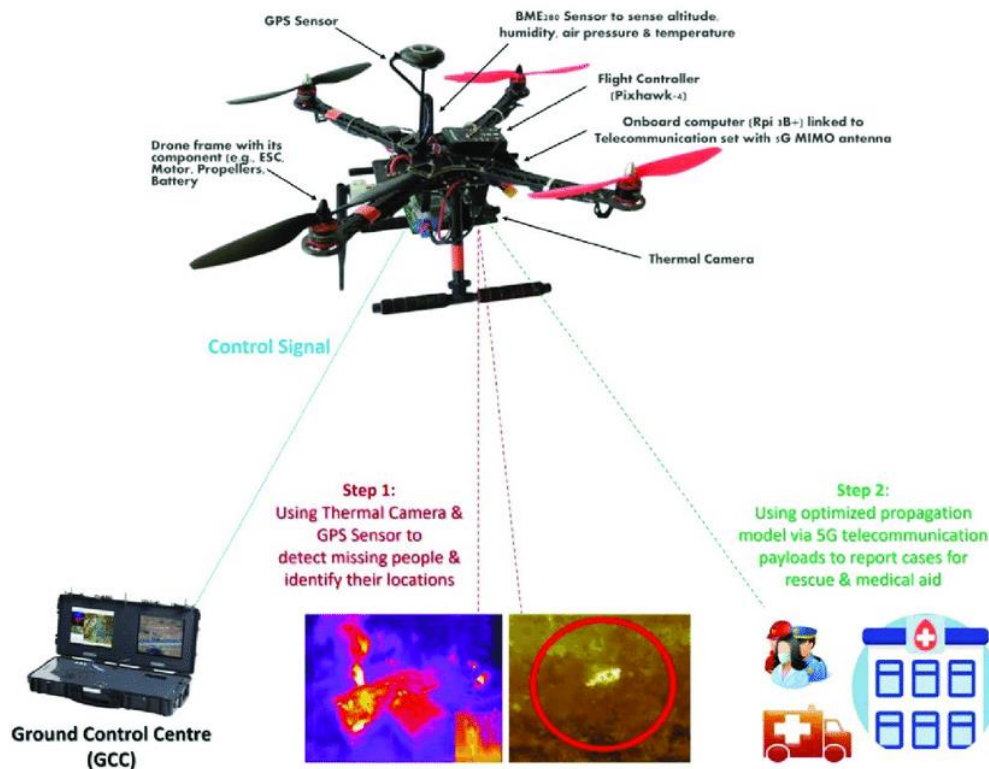
Proposed structure of a drone for use in search-and-rescue operations

Applicability of the solution

Our Rescue Drone system using Machine Learning algorithms will autonomously use path planning and by the way of precise obstacle avoidance find the affected people who need help in the target area. Whenever there is any natural calamity like earthquake, flood, heavy rainfall etc. the rescue drones can be easily being brought to use for field for actually implementation. A very easy-to -use and robust system will take less time for deployment and with large range and battery backup it can cover the affected area in-depth and till the furthest corner. Use of such rescue drones would help many rescue teams to function properly in a coordinated manner even at times of low visibility during night by using the high resolution visible light cameras or thermal cameras. The difficulties based on constraints like land obstacles, trees are superseded which is a great advantage. This rescue system will prove to be a life saver and also be an integral part of future rescue missions.