Envision | Issue Statement Paper

Group Name
Fire Flighters

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Issue and Topic
Drones

Problem Statement

In an age where technology is advancing at a rapid pace, we are presented with new challenges in modern day architecture. We are expanding; infrastructure is becoming more advanced, buildings are taller than ever before, and urban centers are becoming rapidly populated. With expansion on such a scale as this, special attention must be paid to ensure fire safety protocols are being implemented quickly, safely, and effectively, particularly in high rise buildings. Fires in high rise buildings are now becoming commonplace, and it is an issue we must address.

The problem is simple. First and foremost, firefighters are having difficulty reaching the affected floors in high rise buildings during the event of a fire. Elevators are not a feasible option and oftentimes there are too many flights of stairs to tread through in order to reach victims in a timely manner. Complex architecture makes navigation through such buildings difficult and tight spaces restrict movement. As a result, supplies cannot be delivered in an effective and safe manner. Ground fire equipment has a maximum reach of approximately ten floors and fire hoses do not extend far enough to reach floors which are further up than their limited lengths. In a situation where every second is crucial to survival, supplies such as masks cannot be delivered in time which can be the difference between life and death. High rise fires are a particular case which require a specified solution. Anyone can be a victim, but the focus is particularly on people who reside in urban areas. Many reside in high rise buildings; others hold jobs there and are at risk due to their continuous presence. Multi-family housing, hotels, dormitories, facilities that care for the sick, and office buildings account for nearly three quarters of high rise fires. Largely permanent residence structures seem to be most

affected. This is not limited to the US. Many urban population centers are experiencing the same problems with combatting fires in high rise buildings. Skyscrapers and towering buildings are often found in urban areas and cities which are densely populated, only further emphasizing the threat of civilians in danger. For example, a week ago on January 12th in Tehran, 200 firefighters were sent into a high rise tower. Due to a lack of quick delivery, 20 firefighters died and 70 people were left severely injured. Between 2009 and 2013, the US Fire Department had 14,500 reported structural fires per year. As shown, this is a commonplace occurrence. High-rise building fires result in an average annual total of more than 40 civilian fire deaths, 520 civilian fire injuries, and over $154 million in direct property damage. Such a situation requires a multifaceted solution, one with ingenuity, one which takes advantage of possibly already existing technologies.

Solution

The solution? Drones. Drones are mobile, small, unmanned, and fast, all qualities which we can take full advantage of in such a scenario. We suggest investing in new drone technology-one which will effectively be able to deliver essential supplies in times of crises. We suggest the usage of drones fitted with ventilation systems to be flown into problematic areas. They can be fitted with small-scale fans or other ventilating technologies. Three times more deaths occur from smoke inhalation as opposed to burns. Furthermore, drones can deliver a limited supply of water quickly to areas which need immediate relief, possibly preventing the proliferation of the fire and minimizing its impacts. Even in large scale fire scenarios, multiple drones equipped with hoses or small water supply tanks can be deployed to begin relief. This is by no means a replacement for firefighters, nor is it an effort to substitute technology for meaningful jobs. Drones will simply allow for easier implementation of the various tasks and protocols, making it safer for both affected civilians and firefighters themselves. Furthermore, drones can deliver oxygen masks or other essential equipment which may even aid their evacuation. They can even be fitted with thermal-imaging technology which can allow for easier navigation once they enter the building. Drones are a solution which minimize injuries and casualties at all levels.

Possible challenges include the development of such technologies. We would need investors to take on a project to upgrade drone technologies and integrate new systems. The cost of such a project may be extensive considering the different parts. The use of fire-resistant materials, which are lightweight and effective, may prove problematic. We may have to compromise the small, agile size of drones to adapt to the needed technologies. We would need to collaborate with the American Association of Engineering Societies to compile and apply research for these new types of drones. A reasonable time frame to develop new drone technology such as this would be a few months to a year. Furthermore, we would require mass production on a fairly large scale. Next, in order to make the technology effective on a large scale basis, we would require mass distribution which may take another few months. We request that companies willing to take on such a massive project be subsidized in an attempt to make production and distribution rapidly implemented. If not a feasible option, we would

like to urge companies to work in junction with each other and possibly make use of NGO's or other governmental organizations. Furthermore, we would like to see outreach to local, state, and even regional fire departments to encourage implementation of the solution.