

SaveIT



A smart fire detection system based on artificial intelligence technologies that ensures an early detection and sends a quick alert to the nearest firefighting department.

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Key problem

In the latest seasons, many countries around the world have been suffering from a tragic natural disaster – wildfires. A greater number of more intense fires have destroyed vital ecosystems, impacted economies and people, threatened property and livelihoods and caused severe long-term damage to millions of hectares of natural resources. In recent years, be it intentional or otherwise, 75% of all bushfires are directly linked to human actions. Preventing fires before they occur is paramount, however, 50% of them have unknown starting conditions, which complicates the prediction process. Furthermore, the classical firefighting strategies are not enough to stop the fast spread of fires. Therefore, finding new methodologies is becoming essential to overcome the devastating effects of these disasters.

Solution

SaveIT is an innovative solution for the early detection of fire. It is designed to fit large Areas of forests and green lands in order to manage the wildfire spread. It is based on two main components which are cameras and drones:

- **Cameras - fixed eye -:** are placed in high places along the given area to detect smoke and fire during the day and the night. In case of fire, it sends a quick alert to the nearest firefighting center
- **Drones - flying eye -:** interfere in case of fire in order to confirm the exact localization of the danger zone, detect humans around, and control the fire by sending instant updates to the firefighting department.

When the fire/smoke is detected, the camera will send an SMS message that contains its location and more details about the fire detected to the nearest firefighting department by alerting the CENAC and CCO centers. Meanwhile, it notifies the drone and gives the approximate location of the fire in order to fly directly and confirm the fire incident by sending a confirmation SMS to the same center. The drones are able to detect the fire and humans which will help to give further information about the incident's causes and the number of people who might be in danger. This process will help the firefighters to act at the right time.

Facts about wildfires in Algeria and Tunisia

Algeria has been classified as one of the most affected countries by forest fires in Africa, with 3526 alerts and 320 ha of burned land in 2021.

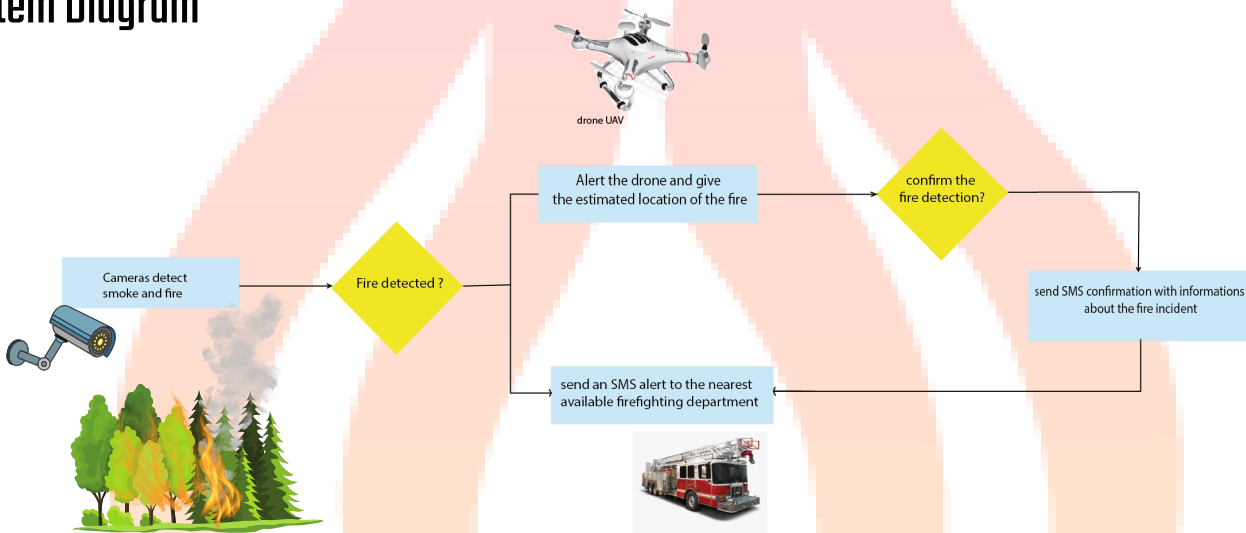
In Tunisia, the peak fire season typically begins in early July and lasts around 11 weeks. There were 278 VIIRS fire alerts reported between the 26th of July 2021 and the 18th of July 2022 considering high confidence alerts only.



Values

- **Accessibility:** The cameras will be installed on any accessible high rise towers, this will ensure the right supervision to the fire location. Whereas the drones will fly to the isolated areas that are hard to access by the firefighters.
- **Speed:** Recognition of the smoke/flame at their very first stage of development (a span of 10 minutes approximately), and immediate transmission of the alert to the fire department, which leads to a faster intervention. When the drones arrive earlier to control the wildfire, the firemen can put out the fire with a reasonable amount of effort.
- **Safety:** Our product doesn't only protect forests, but it also protects humans and animals. A part of the drone's task is to verify if any human beings are near to the fire, guide people to escape and deploy sounds of particular frequencies to keep animals away from the fire region.
- **Novelty:** Including the latest technologies and in solving the wildfire problem.
- **Flexibility:** According to the land and user.
- **Wide coverage:** Support for fire detection up to 8km away, effectively helping users find fires farther away, while reducing construction costs.

System Diagram



User Experience

In order to fit different categories of customers' needs and be more flexible, SaveIT targets 3 types of users who are :

- Simple farmer (land owner)
- Companies and big farms
- State and authorities

therefore we have invented 3 packs of SaveIT products:

- **Simple pack:** Cameras, SMS alert, Annual subscription
- **Medium pack:** Cameras, Drones, SMS alert, Annual subscription
- **Large pack:** Cameras, drones, SMS alert, Data restoration, annual subscription

Sent from your Twilio trial account - Smoke detected with confidence 0.59033203125

Sent from your Twilio trial account - Smoke detected with confidence 0.65771484375

Sent from your Twilio trial account - Smoke detected with confidence 0.61767578125

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Envoyer un messag...

Conclusion

We believe that our solution is performant in its software, due to the combination of three deep learning models approach, which has delivered good and accurate results during the testing process. The new approach of Artificial Intelligence that we introduced in fire detection is : Integrating an object detection model with a classification model for night surveillance. This was done through the following steps :

1. Feeding the output of the first model to the second model
2. We worked on a decision strategy that depends on two entities (bounding boxes and confidence level). This strategy is to select the most confident bounding boxes and feed them to the final model.

The other feature of our product is the ability to toggle from fire detection to night to smoke detection during the day by changing the model.



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fire

