PROJECT DESIGN PHASE - 1
Solution Architecture

Project Name	Emerging Methods For Early Detection of Forest Fire

Solution

Forests are vital to life on earth for survival, the importance of forests cannot be underestimated.In such case forest fires are one such uncontrollable disaster to forest resources and the human environment conditions.

There are various techniques such as watchtowers, spotter planes, infrared, aerial patrols, and automatic detection systems to detect fire events . There is no need for the exposure of humans to perilous activities when remote sensing is deployed. Various techniques are as follows:

(i) Usage of the satellite images to observe, detect, and report fire events.

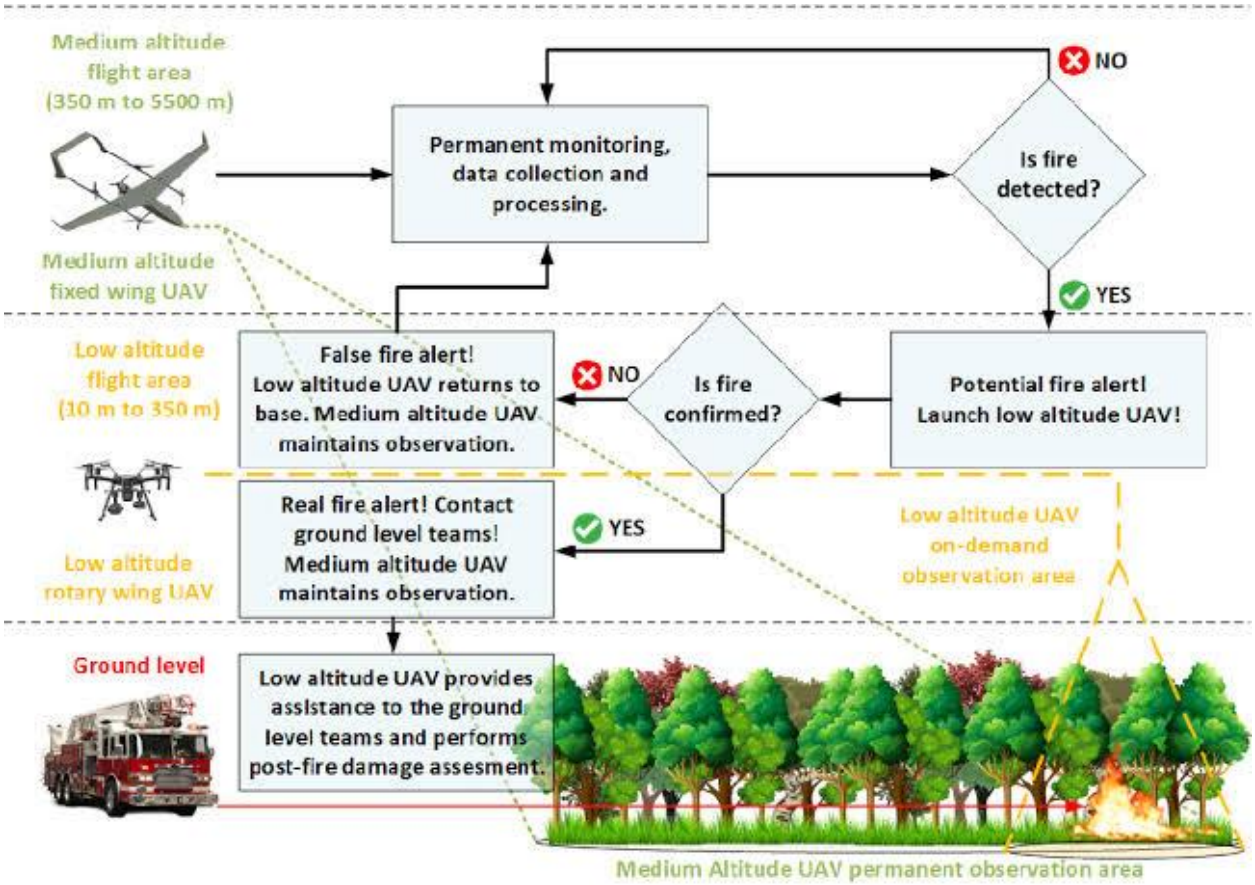
(ii)Implementation of the wireless sensor networks to observe the fire events exist in all areas.

- Detection of forest fire and smoke in wildland areas is done through remote sensing-based methods such as satellites, high-resolution static cameras fixed on the ground, and unmanned aerial vehicles (UAVs).

- Also, forest fire detection is done through the deployment of YOLOv4 to UAV-based aerial images. The initial phase of the process is that the authors developed the hardware platform and proposed the YOLOv4 algorithm.

- Forest fire monitoring by remote sensing can be achieved through the use of polar orbiting and geostationary satellites. The system detects the level of temperature, smoke using sensors.

The industrial application of wireless sensor networks are in digital transmission to monitor temperature and humidity in the forest in a more timely and precise way.


Medium altitude flight area (350 m to 5500 m)
Medium altitude fixed wing UAV
Permanent monitoring, data collection and processing.
Is fire detected?
NO
YES
Low altitude flight area (10 m to 350 m)
False fire alert! Low altitude UAV returns to base. Medium altitude UAV maintains observation.
NO
Is fire confirmed?
Potential fire alert! Launch low altitude UAV!
Low altitude rotary wing UAV
Real fire alert! Contact ground level teams! Medium altitude UAV maintains observation.
YES
Low altitude UAV on-demand observation area
Ground level
Low altitude UAV provides assistance to the ground level teams and performs post-fire damage assesment.
Medium Altitude UAV permanent observation area