

Real-time Wildfire Suppression with Autonomous Drones

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01. Introduction

All over the world wildfires wreak havoc, causing massive amounts of destruction. Ecological disruption, loss of life and economic damage are just a few of the side effects. XPrize have launched a challenge: "In a 1000km² area, you have 10 minutes to detect and eliminate a wildfire, whilst ignoring all decoy fires."

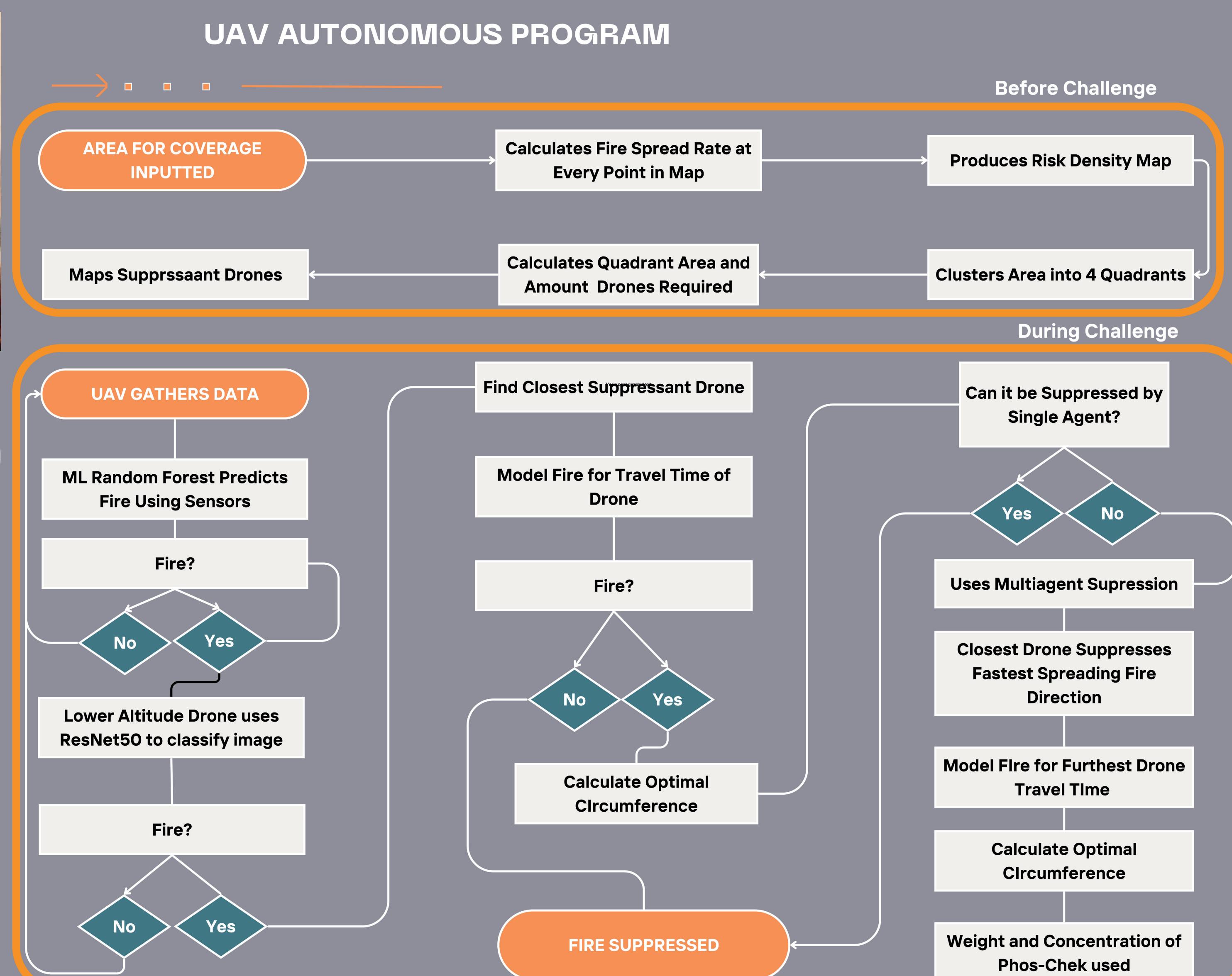
If we're able to complete this challenge, then we could potentially limit the impact that wildfires have.



03. How we do it

We use a self-coordinating drone swarm to complete this challenge.

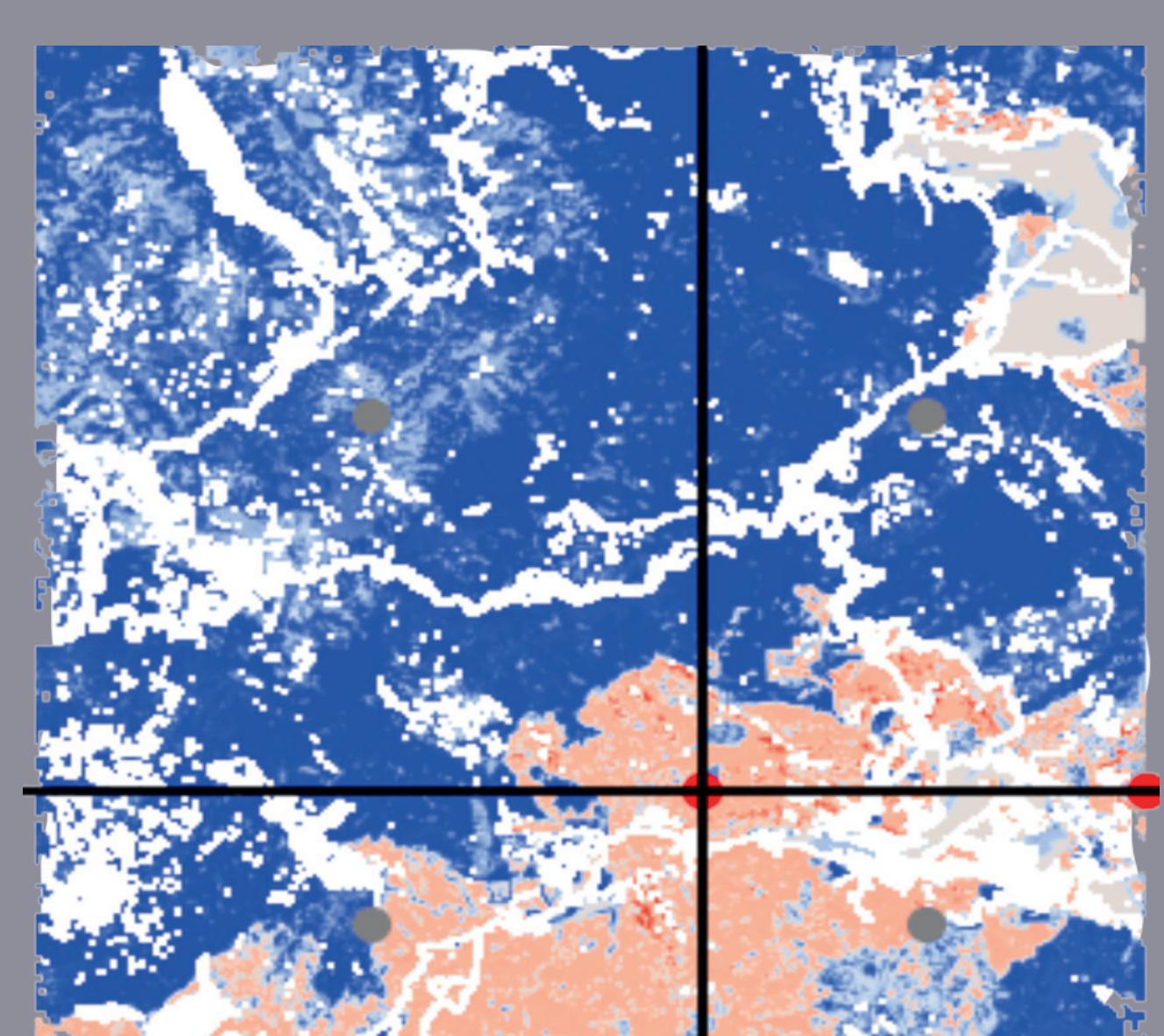
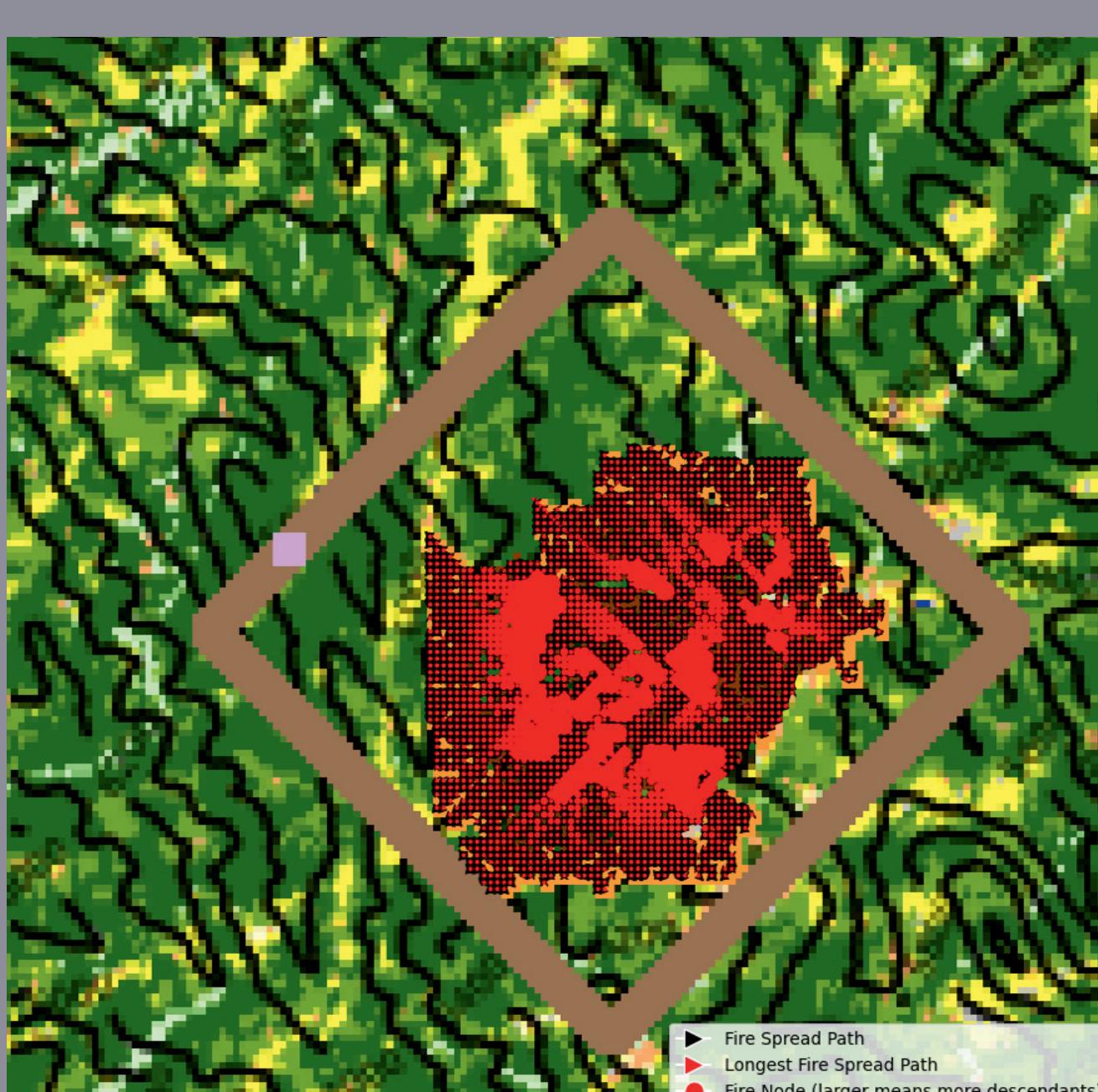
There are detection drones that search the area to detect and classify potential fires at different altitudes to optimise the speed of detection and suppressant drones that carry a payload of a substance used to prevent the spread of fire.



"This overall system reliably prioritises the highest risk area and provides a robust, fully autonomous control scheme for the swarm."

02. Objective

The system is fully deployed in a simulation suite. We have provided additional features beyond the XPRIZE challenge for wildfire-fighting. An example is Practice Tool Arena, which is based on SimFire [2], a fire simulator. The arena allows to manually control a suppressant drone to fight a growing fire in real-time and non-real time. This enables the users to optimise their strategies and drones' allocations. All data can be then exported for future reference.



[1] Lautenberger, Chris. (2013). Wildland fire modeling with an Eulerian level set method and automated calibration. *Fire Safety Journal*. 62. 10.1016/j.firesaf.2013.08.014.

[2] Doyle, M., Threet, M., Dotter, M., Kempis, C., Tapley, A., and Welsh, T. (2024). SimFire. Lautenberger, C. (2013). Wildland fire modeling with an eulerian level set method and automated calibration. *Fire Safety Journal*, 62:289–298.

[3] <https://www.aglongroup.com/>