

**Project Design Phase-  
IProposedSolutionTemplate**

Date	30october2022
Team ID	PNT2022TMID25599
ProjectName	EmergingMethodsForEarlyDetectionOf ForestFire
MaximumMarks	2 Marks

**ProposedSolutionTemplate:**

Projectteamshallfillthefollowinginformationinproposedsolutiontemplate.

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	It is difficult to predict and detect Forest Fire in a sparsely populated forest area and it is more difficult if the prediction is done using ground-based methods like Camera or Video-Based approach. Satellites can be an important source of data prior to and also during the Fire due to its reliability and efficiency.
2.	Idea/Solution description	The simplest of these solutions is the establishment of a network of observation posts - both cheap and easy to accomplish, but also time-consuming for the involved people. The constant evolution of the information and communication technologies has led to the introduction of a new generation of solutions for early detection and even prevention of forest fires. ICT-based networks of cameras and sensors and even satellite-based solutions were developed and used in the last decades. These solutions have greatly decreased the direct involvement of humans in the forest fire detection process, but have also proved to be expensive and hard to maintain.
3.	Novelty/Uniqueness	Optical/thermal cameras deployed on the observation towers together with the other sensors such as smoke, temperature, and humidity sensors might detect the hazards in the closed environment rather than in the open environment as these sensors need vicinity to the fire or smoke. The information obtained through these sensors is not appropriate. Distance covered by these methods could be limited, and to cover a large area, more sensors have to be deployed that might incur expenses. Through the deployment of UAV, large areas could be covered, and the images with high spatial and temporal resolutions could be captured properly. The operational cost is very low when compared with the other methods.

4.	SocialImpact/ CustomerSatisfaction	<p>Some of these events include heat waves,droughts, dust storms, floods, hurricanes, andwildfires. Wildfires have extreme consequenceson local and global ecosystems and causeserious damages to infrastructure, injuries, andlosses in human lives; therefore, fire detectionand the accurate monitoring of the disturbancetype, size, and impact over large areas isbecoming increasingly important. To this end,strong efforts have been made to avoid ormitigate such consequences by early firedetection or fire risk mapping.</p> <p>Traditionally,forest fires were mainly detected by humanobservation from fire lookout towers andinvolved only primitive tools, such as theOsborne fire Finder; however, this approach isinefficient, as it is prone to human error andfatigue. On the other hand, conventionalsensors for the detection of heat, smoke, flame,and gas typically take time for the particles toreach the point of sensors and activate them. Inaddition, the range of such sensors is relativelsmall,hence, alarge numberofsensorsneedto be installedtocoverlargeareas</p>
5.	BusinessModel(RevenueModel)	<p>This strives many researchers to pay attentionin many domains where they work in theprocessing of surveillance video streams so thatabnormal or unusual actions could be detected.The usage of UAVs is recommended in thedetection of forest fire due to the high mobilityandensurethe coverageareas atvarious altitudes andlocations atalowcost.</p>
6.	Scalabilityofthe Solution	<p>Hence, an efficient and scalable UAV is used fordetection. This work aims in developing the 3Dmodel for the captured scene. YOLOv4 tiny network is deployed to detect the fire. Theaccuracyofthedetectionrateachievedthrough this model is 91%. The proposed modeloutperforms the other existing techniques interms of detecting in the early stage. However,this model is sensitive to the forest with densefogs and clouds. This is because smoke appearsas the same as fog, and the model maymisclassify the fog as smoke. As our futureworks, focus to meet practical detection andmeet the necessity of early detection includingthegenerationofthemixedrealitymodel ofthe forest fire area that gives more information,and prevention analysis will be made easy.</p> <p>The3Dmodellingtechniquespresentedin this paper can also be extended to various naturaldisaster predictionmodels.</p>