Team ID	PNT2022TMID17419
Project name	Emerging Methods for Early Detection of Forest Fires
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Abstract:

Forest fires are occurring throughout the year with an increasing intensity in the summer and autumn periods. These events are mainly caused by the actions of humans, but different nature and environmental phenomena, like lightning strikes or spontaneous combustion of dried leafs or sawdust, can also be credited for their occurrence. Regardless of the reasons for the ignition of the forest fires, they usually cause devastating damage to both nature and humans. Forest fires are also considered as a main contributor to the air pollution, due to the fact that during every fire huge amounts of gases and particle mater are released in the atmosphere.

Introduction :

Wildfires are unplanned and unwanted fires, including lightning-caused fires, unauthorized human-caused fires, and escaped prescribed fire projects. Nationwide data compiled by the National Interagency Fire Center (NIFC) indicate that the number of annual wildfires is variable but has decreased slightly over the last 30 years and that the number of acres impacted annually, while also variable, generally has increased (see Figure 1). Since 2000, an annual average of 70,685 wildfires burned an annual average of 7.1million acres. This figure is more than double the average annual acreage burned in the 1990s (3.3 million acres), although a greater number of fires occurred annually in the 1990s (78,600 on average). Utilizing RF and designed

antennae, our prototype solution would aim to reduce these statistics by assessing wildfire locations, direction, and severity in order to brief and notify the necessary fire response teams to prevent greater ecological, infrastructural, and societal damages. The Feather LoRa transceiver/receiver system would adequately be able to perform this task using its accessible frequencies in combination with the various detection sensors and modules for the Arduino microcontroller that we have shown to be quite effective at doing so. We have presented our findings and testing results in this presentation.

Conclusions & Future Work :

To limit the damage caused by forest fires and to control the start of fires and its spread, we have presented in this study a method of early detection of forest fires. This method is based on three steps: Estimate the general risk level of the forest, assess and predict in several places the existence or not of fires, and alert the necessary first responders to quell the spread of the fires. The originality of this work lies in the use of a wireless sensor and RF network distributed over the entire forest area and the deep learning methods to predict in real-time a possible origination and predicted path of the forest fire. The current system will be implemented on a large scale with multiple sensor nodes to power and augment the data set in order to improve the accuracy and collaboration of data between multiple nodes. We plan in future work to use wind direction sensors to properly estimate and locate the start of the fire, and to collaborate with SpaceX's Star Link Program to monitor rural forest areas as well.

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