Project Design Phase-II
Solution Requirements (Functional & Non-functional)

Date	1 November 2022
Team ID	PNT2022TMID52343
Project Name	Project - Emerging method for early detection of forest fire
Maximum Marks	4 Marks

Functional Requirements:

Following are the functional requirements of the proposed solution.

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	Employing sensors to keep track of the smoke, wind speed, CO2, and temperature	✔ The quantity of smoke can be used to find a fire. The amount of smoke from the fire is measured using smoke sensors, and if it exceeds a threshold value, that value may be compared. ✔ The wind sensor nodes, which are manually positioned in the forest, determine the wind speed ✔ The massive amounts of carbon dioxide gas (CO2) that are released during a forest fire can be detected using a network of CO2 and temperature sensors.
FR-2	Unmanned aerial vehicle(UAV)	Vision-based fire detection systems that can be mounted to unmanned aerial vehicles (UAVs) for systematically monitoring acres of fire-prone areas can detect forest fires.
FR-3	Image processing by CCTV cameras	The cameras continuously revolve while using colour, monochrome, and near-infrared detectors to examine the surrounding area. A feature-based AI programme scans the photographs for the distinctive heat and smoke signature of wildfires using an artificial neural network. When conditions are good, it can see up to 40 miles distant
FR-4	Data processing using Real time algorithm	The algorithm processes the data in real time on dedicated servers on site.It uses a cloud-based deep learning AI to detect and verify wildfire events in real time, drawing from satellite imagery and historical data.

FR-5	Light detection and ranging (LIDAR)	With the use of a neural network, the technology is utilised to identify forest fires. The primary applications of LIDAR are in environmental and atmospheric research. A lidar is made up of a photo detector, radiation emitter, signal receiver, and hardware and software for signal processing.

FR-6	Localization of fire	It uses GPS to determine their location and can send location information, along with data like temperature measurements, to the cloud or another cloud-based server.

Non-functional Requirements:

Following are the non-functional requirements of the proposed solution.

FR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	Usability is a unique and significant perspective to examine user requirements, which can further improve the design quality, according to AI devices with machine learning.
NFR-2	**Security**	✔ Powerful HD and CCTV cameras are employed. ✔ Monitors 24/7 ✔ IR flame detectors are used ✔ Avoid intentional acts of arson
NFR-3	**Reliability**	In order to make an immediate response to an incident successful, an early warning system needs to have a real-time and reliable fire detection method.
NFR-4	**Performance**	The system is made to use sensors to track the variables that contribute to forest fires, such as temperature, humidity, air pressure, oxygen, and carbon dioxide on the surface of the air.. The CCTV cameras are used to detect forest fires and process images. The GPS system is used to locate forest fires.

NFR-5	**Availability**	By creating a more sophisticated system and adding wireless sensors to CCTV for increased protection and accuracy. The algorithm has significant potential for adjusting to different environments.
NFR-6	**Scalability**	By detecting forest fires, we can prevent loss of life and resources and reduce air pollution, landslides, soil erosion, and CO2 emissions into the atmosphere while conserving deeply rooted trees.