**Project Design Phase-II**

**Solution Requirements (Functional & Non-functional)**

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| Date | 17 October 2022 |
| Team ID | PNT2022TMID45245 |
| 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.

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| **FR No.** | **Functional Requirement (Epic)** | **Sub Requirement (Story / Sub-Task)** |
| FR-1 | Monitoring the smoke ,wind speed,CO2 and temperature using sensors | * Fire can be detected by using the amount of smoke. The **smoke sensors** are used to measure the amount of smoke from the fire, and it could be compared with a threshold value and if it is beyond that value. * The wind speed is calculated by the **wind sensor** nodes, which are manually placed in the forest. * When forest fires burn, they emit large volumes of carbon dioxide gas (CO2); you can use a network , **CO2 and temperature sensors** for forest fire detection. |
| FR-2 | Unmanned aerial vehicle(UAV) | The forest fires can bedetected by **vision-based fire detection systems which can be mounted to an unmanned aerial vehicle (UAVs)** for strategically scanning acreage of fire prone areas. |
| FR-3 | Image processing by CCTV cameras | The cameras rotate continuously, scan the countryside with color, monochrome and near-infrared detectors. A feature-based AI algorithm uses an artificial neural network to **scan the images for the telltale heat and smoke signature of wildfires**. Under the right conditions, it can see as far as 40 miles away |
| 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) | The system is used for the **forest fire detection with the help of neural network** .LIDAR is mainly used in the environmental and atmospheric studies. A lidar contains a photo detector, radiation emitter, signal receiver and signalprocessing hardware and software. |
| FR-6 | Localization of fire | It use GPS to **track their location** as they can sends these location details along with the data such as measurements of temperature to cloud (or) other cloud based server. |

**Non-functional Requirements:**

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

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| **FR No.** | **Non-Functional Requirement** | **Description** |
| NFR-1 | **Usability** | AI devices with machine learning verifies that usability is a special and important perspective to analyze user requirements, which can further improve the design quality. |
| NFR-2 | **Security** | * Powerful CCTV and HD cameras are used. * Monitors 24/7 * IR flame detectors are used * Avoid intentional acts of arson |
| NFR-3 | **Reliability** | A real-time and reliable fire detection method for an early warning system is required so that an immediate response to an incident can be made effective. |
| NFR-4 | **Performance** | The system is designed for monitor the causing factors of forest fires such as temperature, humidity , air pressure level,oxygen and Carbon dioxide on the surface of air by using sensors.  The CCTV cameras is use for image processing and detect the forest fire.  The GPS is use to track the location of forest fire. |
| NFR-5 | **Availability** | By developing to more advanced system byintegrating wireless sensors with CCTV for added protection and precision. The algorithm shows great promise in adapting to various environment. |
| NFR-6 | **Scalability** | By detect the forest fire we can reducing air pollution, landslides,soil erosion by protecting strong rooted trees,the emission of CO2 into the air during fire,No loss of life and resources. |