# Forest Guard: An Integrated Sensor cum AI-based Fire-prone Area Mapping and Early Forest Fire Detection System with Real-time Fire Tracking and Prediction of the Direction of Spread through a Mobile User-app Interface

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Ever-increasing global warming, climate change & human disruptions have resulted in unprecedented frequency, spread & intensity of destructive wildfires across continents. Thus, effective systems to tackle this are the need of the hour. “Forest Guard” is an integrated dispersed multi-variable sensor network cum AI-based system that promises pre-emptive prediction of fire-prone areas & proactive detection of wildfires. Commonly available, low-cost sensors have been used to lower cost of each module to $20. Forest Guard identifies fire-prone areas of the forest. A deep learning AI model analyzes data sets received from all the sensor modules & classifies areas through pattern recognition analysis of parameters like foliage, Atm. Temp, Humidity & Soil moisture. It then plots a color encoded % risk assessment map which can be used to identify high risk areas which can be subjected to pre-emptive measures & vigilant monitoring. One of the earliest indicators of fire are the distinctive wildfire & animal distress sounds & Forest Guard detects these through analysing & differentiating sounds recorded every 2 minutes by running them through a DL model & then raises a preliminary alarm, achieving unbeatable detection time. A confirmatory fire alarm is raised only after the algorithm detects simultaneous sudden deviations w.r.t the calibrated baseline in continuously monitored parameters such as Atm. Temp, Humidity, Smoke, Soil Temp & moisture; thus reducing false alarms due to one off spikes/sensor malfunction. The device is solar/bioenergy powered & relays data through GSM-IoT, thus taking the whole system off-grid. Our system also offers real-time tracking & prediction of fire’s direction to facilitate dousing efforts & a early warning is sent to nearby users by a mobile app

**Awards Won:**