

# Project Synopsis: **FIRE DETECTION AND TRACKING SYSTEM**

**Introduction** Fire outbreaks cause significant loss of life, property damage, and environmental destruction. Traditional fire detection methods such as manual monitoring, smoke alarms, and CCTV surveillance are often slow, limited in coverage, and unable to provide early warning or real-time tracking. With advancements in computer vision, sensor technology, and automation, intelligent fire detection systems can now detect fire earlier, track its spread, and alert responders instantly. This project proposes a Fire Detection and Tracking System capable of automatically identifying fire occurrences using image processing and sensors, tracking fire movement, and providing real-time alerts.

**Problem Statement** Most existing fire monitoring systems rely on smoke detectors or manual observation, which can lead to delayed response. These systems do not provide detailed information such as the fire's exact location, spread direction, or severity level. There is a need for an intelligent, automated system that can detect fire accurately, track its progression, and send alerts in real time to minimize casualties and property loss.

**Objectives of the Project** **Main Objective:** To design and develop an intelligent Fire Detection and Tracking System using sensors and computer vision.

**Specific Objectives:**

- To detect fire automatically using flame sensors and camera-based image processing.
- To locate and track the movement or spread of fire in real time.
- To send instant alerts to users through sound alarms or mobile notifications.
- To store detection records in a central database for monitoring and analysis.
- To improve response time and enhance safety in fire-prone environments.

**Scope of the Project** The project focuses on identifying fire occurrences in an indoor or outdoor monitored area and tracking their movement. The system will include:

- Sensor-based or camera-based fire detection
- Fire tracking and continuous monitoring
- Notification/alert system Database storage for fire events

It does not cover automated firefighting actions such as water sprinklers, smoke detection, or integration with full emergency services beyond alerting.

**Significance of the Project** the Fire Detection and Tracking System offers:

- Early fire detection, reducing damage and increasing safety.
- Real-time tracking to observe how fire spreads.
- Improved emergency response time, potentially saving lives.
- Automation, reducing reliance on manual monitoring.
- Data analytics, helping assess fire risk patterns.

**Methodology** The project uses an Object-Oriented System Development Methodology supported by UML diagrams (use-case diagrams, class diagrams, sequence diagrams, system architecture).

Technologies: Hardware: Flame sensor, infrared sensor, camera, microcontroller

(Arduino/Raspberry Pi), buzzer Software: Python, OpenCV, Arduino IDE, MySQL, Flask/Node.js, HTML/CSS/JS

System Requirements Software: Windows/Linux OS, Python, MySQL, Arduino IDE, VS Code

Hardware: Camera, sensors, microcontroller, alarm module, PC/Laptop

**Literature Review** Recent studies show increased use of AI-based fire detection, especially camera-based systems implementing deep learning. Traditional smoke detectors often activate late and suffer from limitations. Modern systems combine sensors, IoT devices, and computer vision to improve accuracy and provide real-time monitoring. However, many still lack tracking capabilities, which this project addresses.

**Expected Output** - Working fire detection module (sensor or image-based) - Real-time tracking interface - Instant alert system - Database logs - Full documentation

**Conclusion** The Fire Detection and Tracking System provides an effective modern solution to fire monitoring challenges by integrating automation, real-time detection, and alerting. It enhances safety, improves response time, and helps prevent major damage through early detection and continuous fire movement tracking.

## **OTHER PROJECT TITLES**

1. Design and implementation of web-based system that will links farmers to buyers
2. Design and implementation of online birthrate monitory information system
3. Design and implementation of computerized livestock management information system
4. Automation of departmental course allocation and time table