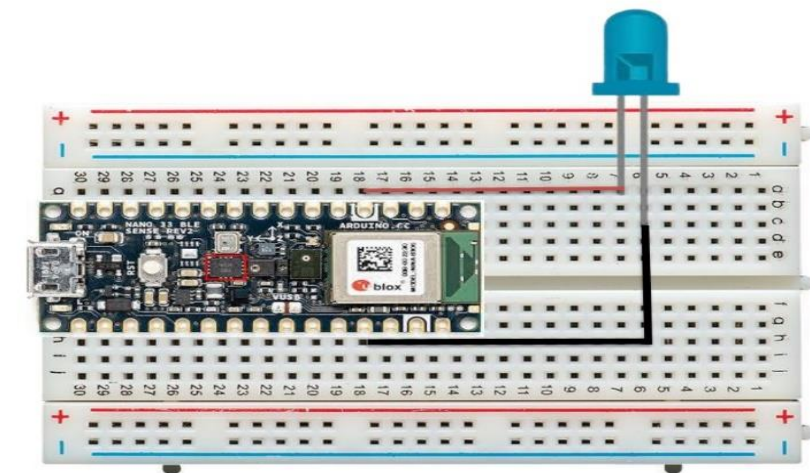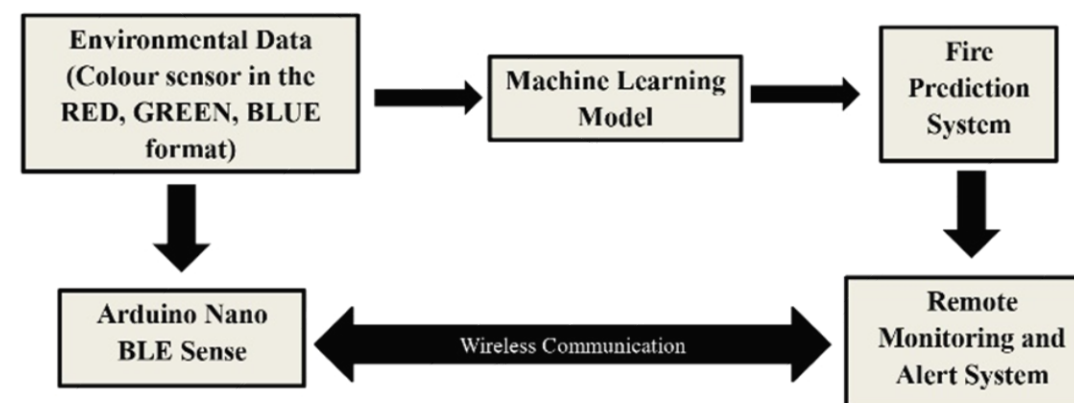# Embedded Edge ML Fire Prediction

In Nano 33 BLE SENSE AND MACHINE LEARNING

Made by

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Guided by Prof. Swarna Prabha Jena

CENTURION UNIVERSITY
*Shaping Lives...*
*Empowering Communities!*

## ABSTRACT

The "Fire Prediction using Arduino 33BLE Sense with Color Sensor" project innovates fire safety with advanced technology. It integrates Arduino 33BLE Sense and a color sensor for early fire detection and real-time monitoring. This holistic system, utilizing built-in sensors and a novel color sensor, distinguishes between environmental variations and potential fire hazards. Calibration and testing in controlled environments validate its accuracy. The wireless-enabled Arduino successfully transmits real-time data, showcasing precision in differentiating between false positives and actual fire events, promising enhanced fire safety measures.

## INTRODUCTION

It stands as a technological beacon, using Embedded Edge ML for fire prediction to fortify community safety. By processing real-time data and leveraging predictive intelligence, the system aims to minimize the impact of wildfires, protecting lives and property. This innovative technology serves as a powerful tool in advancing public safety, ensuring the preservation of communities vulnerable to fire hazards, and paving the way for a more secure and resilient society.

## CONTRIBUTION

It contributes significantly by revolutionizing fire prediction through Embedded Edge ML. By continuously analysing real-time data, the system enhances early detection, minimizing the impact of wildfires. Its predictive intelligence not only safeguards lives and property but also aids in proactive mitigation. This innovative approach ensures a prompt response to potential fire hazards, making Ignition Guard an invaluable asset in advancing public safety and protecting communities from the devastating consequences of uncontrolled wildfires.

## FUTURE SCOPE

1. Advanced Machine Learning Algorithms

2. Edge Computing Enhancements

3. Integration with IoT Devices

4. Multi-Sensor Fusion

5. Cloud Integration

6. Global Monitoring Networks

7. Autonomous Emergency Response Systems

8. AI-driven Dynamic Risk Mapping

9. Cross-Domain Applications

10. Policy and Regulatory Integration

## APPLICATION

- *Wildfire Prevention*
- *Urban Fire Safety*
- *Industrial Safety*
- *Residential Safety*
- *Environmental Conservation*
- *Emergency Services Support*

## Block Diagram



Environmental Data (Colour sensor in the RED, GREEN, BLUE format) → Machine Learning Model → Fire Prediction System → Remote Monitoring and Alert System ← Wireless Communication ← Arduino Nano BLE Sense

## Circuit Diagram



## REFERENCE

1. Pang, Y. et al. (2022) 'Forest fire occurrence prediction in China based on machine learning methods', Remote Sensing, 14(21), p. 5546. doi:10.3390/rs14215546.

2. W. Ma, Z. Feng, Z. Cheng, S. Chen, and F. Wang, "Identifying Forest Fire Driving Factors and Related Impacts in China Using Random Forest Algorithm," Forests, vol. 11, p. 507, 2020.

3. K. J. Maingi and M. C. Henry, "Factors influencing wildfire occurrence and distribution in eastern Kentucky, USA," Int. J. Wildland Fire, vol. 16, pp. 23-33, 2007.

4. K. L. Pew and C. P. S. Larsen, "GIS analysis of

## RESULT/OUTPUT
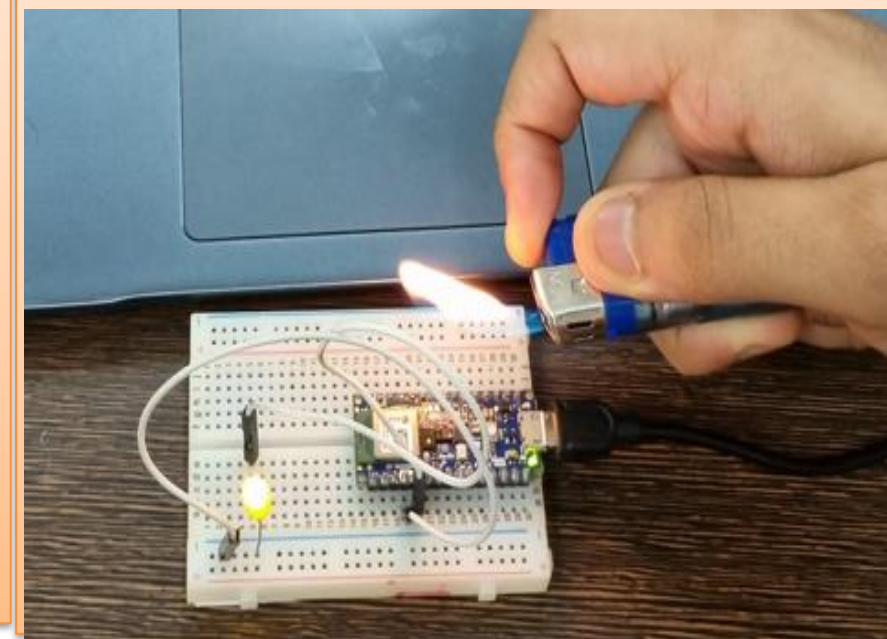


## CONCLUSION

The Fire Prediction System, utilizing Arduino 33BLE Sense and a color sensor, signifies a significant advancement in fire safety. This integrated solution enables real-time monitoring and early detection of potential fire hazards. Through rigorous testing, the system demonstrated accuracy, leveraging the Arduino's versatility and the color sensor's reliability. Cost-effective and IoT-oriented, it holds promise for widespread application in homes, offices, and industries, with Arduino's wireless connectivity enhancing remote monitoring convenience