

## ***ABSTRACT***

Fire is one of the disasters that can cause losses both materially and in terms of human safety, making early detection crucial for mitigation. This study proposes a fire hazard classification system by implementing a fusion sensor that combines cameras and gas sensors using an Artificial Neural Network (ANN). The system is designed to classify fire hazard levels based on three main parameters: fire size, fire count, and gas concentration. YOLO (You Only Look Once) is utilized to detect fire visually and in real-time, while the gas sensor measures the gas concentration in the air as one of the combustible materials. The training data were collected from various sources and processed using ANN to recognize fire hazard patterns. The fire detection test results using YOLO achieved a high accuracy rate of over 80%, while the ANN model achieved a validation accuracy above 85% with a loss value below 0.2%, indicating that the system can effectively detect and classify fire hazard levels. With the fusion sensor approach, the developed system offers a more accurate and responsive solution compared to similar systems that rely solely on a single type of sensor.

***Keywords:*** *Fire, Fusion Sensor, Artificial Neural Network (ANN), YOLO.*