

This literature review explores the use of acoustic waves in fire extinguishment, focusing on the Acoustic Extinguisher Fire Dataset. In this study, a detailed analysis was performed on a dataset containing six input features and one output feature obtained from 17,442 experiments performed on a sonic fire suppression system. The findings indicated that the extinguishing ranges of liquid fuels were 10 Hz to 50 Hz, 10 Hz to 32 Hz, and 10 Hz to 28 Hz. The effective extinguishing ranges of LPG fuel were 15 Hz to 30 Hz and 10 Hz to 45 Hz. The investigation also discovered that the temperature of the metal plate was lowered by the compression of the woofer's membrane inside the collimator. Commonly used algorithms for classification problems are artificial neural networks (ANN), k-nearest neighbors, regression (linear, logistic, polynomial), and tree algorithms. In actuality, our physical implementation makes use of a number of helpful libraries and a variety of processing techniques, such as Matplotlib, OpenCV, TensorFlow, NumPy, and Imutil. Research has been conducted to evaluate the parameters necessary for fire detection and suppression using fire characteristics. This data was obtained by using sound waves to characterize extinguishing flames. The review will explore machine learning algorithms such as artificial neural networks, k-nearest neighbour, random forest, stacking, and deep neural networks in classifying flame extinction states. The review will primarily consider peer-reviewed articles, conference papers, and technical reports published within a specific date range to ensure the inclusion of current research findings and methodologies. The model uses machine learning techniques like logistic regression, support vector machines (SVM), and artificial neural networks to classify flame stages. In addition to extinguishing experiments, fire data can also be obtained using sensors, cameras, and thermal cameras. The obtained data can be used for classification, regression, and clustering tasks using machine learning algorithms. The dataset was created through extensive experimentation to explore innovative and environmentally friendly methods for combating fires. The AI model achieved an accuracy of 90.893%, outperforming logistic regression and SVM models with 86.836% and 86.728% respectively. The application of acoustic waves to extinguish flames has primarily been studied in resonator tubes or in open spaces. Thus, current research is to find and enhance flame detection technology in the visible and infrared bands, as well as broaden the scope of acoustic technology. While computer is used as frequency source, anemometer was used to measure the airflow resulted from sound waves during the extinguishing phase of the flame, and a decibel meter to measure the sound intensity. While computer is used as frequency source, anemometer was used to measure the airflow resulted from sound waves during the extinguishing phase of the flame, and a decibel meter to measure the sound intensity. The effectiveness of sound waves in extinguishing flames is influenced by factors such as frequency, intensity level, and distance. The dataset serves as a valuable resource for analyzing flame extinguishment processes and developing decision support systems for sound wave fire-extinguishing systems. A decision support model augmented with artificial intelligence (AI) is being developed to improve the effectiveness of soundwave-based fire extinguishing devices. Liquid petroleum gas (LPG) flames, thinner liquid fuels, petrol and kerosene were all used in the experiments. For various fuel loads and screen-to-waveguide outlet distances, the sound levels needed to put out a gas hob flame were calculated. These analyzes showed that flames in the frequency range of 10–55 Hz can be effectively extinguished at a distance of 10–100 cm, and flames in the frequency range of 12–30 Hz can

be effectively extinguished. An illustration of the authors' intelligent acoustic extinguisher module for smoke and flame detection. Furthermore, research is being conducted on fire detection using image processing and fire extinguishing using sound waves. Power supply that powers the system and filter circuit ensuring that the sound frequencies are properly transmitted to the system is located within the control unit. Power supply that powers the system and filter circuit ensuring that the sound frequencies are properly transmitted to the system is located within the control unit. The values of fuel type, flame size, distance, decibel, frequency, and air flow rate are analyzed taking into account the extinguished and non-extinguished state of the flame, and the flame that is the output value is obtained. Recent research has explored the potential of sound waves as a renewable energy source for extinguishing flames. 17,442 trials with a distance range of 10 to 190 cm, 5 various flame diameters, and 54 different frequencies were carried out. (Madani et al., 2017).