ABSTRACT

Internet of Things (IoT) is a network that connects various objects ranging from hardware to software that are integrated with each other. One application or application of the Internet of Things (IoT) itself is a home fire detection system. In Indonesia, fires have become a very frequent disaster, starting from forest fires, houses and buildings. Therefore, with the development of the era of IoT application, it can be a solution to prevent more severe fires from occurring so as to minimize the occurrence of losses, both material losses and also fatalities. In this study, the author aims to utilize the Internet of Things (IoT) technology itself to minimize the occurrence of fires, especially fires in homes by using the K-Nearest Neighbor (KNN) algorithm and the Support Vector Machine (SVM) algorithm.

The algorithm is connected to the ESP32 microcontroller for classification and data processing. The sensors used include DHT11 to detect the temperature and humidity of the air around the room, flame sensor to detect fire points, and MQ-2 for smoke sensors. If a fire has been detected in one room, the system will be processed with the KNN algorithm and the SVM algorithm to produce an output in the form of a classification that is used as the final result of this house fire detection system which can then be sent to the Telegram Bot and an alarm warning with a buzzer directly. After the prototype and program are generated, the results will be tested with Quality of Service (QoS) parameter with 15 tests on the throughput value to determine the speed of data transmission, delay to determine the distance between each data packet delivery, and jitter to determine end-to-end delay variations. In addition, testing is carried out with a confusion matrix on 3 simulations of training data variations and data testing (70:30, 80:20, 90:10) to produce the best level of accuracy using google colab with python language. Ideal conditions are obtained at high throughput and low delay.

The test results show that the average value of throughput is 1.848 bps with the best value being 1.858 bps, thus the test result are in the very good category. In addition to the delay and jitter values, it is known that the test result have a poor delay with an average delay value of 593.045 ms and an average jitter value of 594.188 ms. In the test results with the confusion matrix, it is known that the simulation with the highest level of accuracy in the KNN and SVM algorithms is simulation 2 with an accuracy of 97.5% with K = 1 on the KNN algorithm and 100% accuracy on the SVM algorithm. Meanwhile, in simulation 1 KNN has an accuracy of 95% and SVM 98%, simulation 3 KNN 97% and SVM 100%. Thus the SVM algorithm can classify fire detection systems better than the KNN algorithm.

Keywords: Internet of Things, K-Nearest Neighbor, Support Vector Machine, Fire Detection, ESP32, DHT11, MQ-2, *Flame Sensor.*