

## ***Abstract***

*Fire detection method used recently is based on smoke or temperature. But this method is unable to be used in a vast room or outdoor. Then the fire detection method was developed by using the video camera, webcam, CCTV that already widely installed in many buildings. Fire detection method by using the video camera, basically applies image processing over the frames in the video recorded by the camera, webcam, or CCTV. This method is better than the smoke or temperature-based method since it can be used in a wider indoor or outdoor area. Speed in fire detection is faster since it is unnecessary to wait until the smoke or fire detected by the camera. As many buildings have applied CCTV or supervising camera, this condition will be more advantageous.*

*Therefore, in this final project, the detection on fire object on off-line video is applied by detecting the pixel with fire characteristic by using four stages; first, moving pixel detection uses three frame differencing method, second, detection of fire-like colored pixel uses the method of matching the pixel with the database of clustered fire-colored pixel using K-Means, third, the detection of pixel color change frequency to detect flicker uses transformation of wavelet 1-D, forth, the detection of pixel value variation in the region suspected as fire uses the transformation of wavelet 2-D. By using the wavelet transformation, the pixel value change can be analyzed based on the frequency of change or time. In addition, the wavelet transformation is able to analyze color variation on the fire, therefore by using the wavelet transformation, fire object and non-fire object can be distinguished in a video.*

*Therefore, with adding flicker and color variation detection using wavelet method, detection process will be better than just use moving pixel and color pixel. This system have successfully detect fire in video with 82,35% accuracy*

***Keywords:*** *video, fire detection, k-means, wavelet transformation, three frame differencing.*