1. Introduction

In recent years, there has been a growing interest in the development of efficient and reliable surveillance systems capable of monitoring crowded areas, particularly in the context of public health crises such as the COVID-19 pandemic (Fadzil et al., 2021). The COVID-19 pandemic has underscored the need for innovative approaches to crowd management and monitoring. Traditional methods of crowd control, such as physical barriers and manual surveillance, often prove insufficient in densely populated areas, making it challenging to implement and enforce social distancing protocols effectively (Al-Sa'd et al., 2022). Furthermore, the contagious nature of the virus necessitates prompt identification and response to potential outbreaks, requiring systems capable of detecting and tracking individuals in real-time (Yadav et al., 2022).

The proposed Aerial Object Tracking System leverages the advantages of micro quadrotor drones, which are small, lightweight, and agile aerial platforms equipped with high-resolution cameras and sensors. These drones can be deployed in small-scale areas, such as parks, markets, or public transportation hubs, to capture comprehensive visual data from an elevated perspective (Wu et al., 2017; C. Zhang et al., 2022). By employing advanced computer vision algorithms and machine learning techniques, the system can identify and track individuals, detecting instances of overcrowding or violations of social distancing guidelines (Wang et al., 2022). One key advantage of using micro quadrotor drones for crowd detection is their ability to navigate complex environments and rapidly respond to changing situations (Castellano et al., 2023). These drones can autonomously adapt their flight paths, providing dynamic coverage of different areas of interest. Moreover, the integration of real-time video streaming and analysis allows for immediate decision-making and response by authorities responsible for crowd control, enabling timely interventions and ensuring the safety and well-being of the public (Alzahrani et al., 2022).

By focusing on small-scale areas, the Aerial Object Tracking System offers a localized approach to crowd detection, enabling targeted interventions to mitigate the spread of health disease (C. Zhang et al., 2022). It provides valuable data for authorities to identify hotspots, monitor compliance with health guidelines, and optimize resource allocation. Additionally, the system can support contact tracing efforts by providing visual records of individual movement patterns, aiding in identifying potential transmission chains and reducing the risk of outbreaks.