**Designing an autonomous drone infrastructure for surveillance**

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*Abstract*— The use of drones in the modern world has been increasing. From the little drones children play with in their backyard and parks to their distant cousins in warfare, movie making, nature observing, and the list continues to increase. As the uses of drones becomes more normalized in everyday life there has been a demand for harsher laws to prevent unlawful uses of our beloved toys (S. McNeal 2015). These laws mean there are restrictions on who can fly certain drones and where drones can be operated. One aim of this research paper is to challenge the question: if we can’t fly the drones, can we make the drones fly themselves and achieve meaningful results? One such application of this question is to design infrastructure that would allow law enforcement agencies and search and rescue agencies to employ the help of autonomous drones with facial recognition for law keeping and searching for people of interest in urban areas.

Keywords—component, formatting, style, styling, insert (key words)

# Introduction (*Heading 1*)

In this literature review, the use of autonomous drones for surveillance, specifically, the uses of facial recognition software in drones is assessed and ethical and moral reasoning questioned. This is because the use of drones in recent years has become a controversial topic especially when considering their use in warfare as according to a paper by (O’Dwyer & Coymak 2019), “Armed drones are now a key component of military strategy”. There is a lot of research into drones for warfare but there is less research into drones for domestic surveillance and when domestic surveillance is the case; “The campaigns mounted by privacy advocates oftentimes make a compelling case about the threat of pervasive surveillance (S. McNeal 2015). The argument that stems from a fear of lack of privacy. The very privacy that is already challenged by the use of CCTV surveillance systems. My argument to this is that the cameras “provide safety and security for the wider law-abiding public (Muthusenthil B et al 2018).”

Furthermore surveillance systems have been proven to significantly reduce crime rates (Brandon C et al), an example case study being Lewisham, UK, at a station car park, in 4 months vehicle crime had reduced by 75% from 24 to 6. Hence the inclusion of surveillance drones is deemed necessary and justifiable as a paper by (Dilshad, N. et al) titled “Application and Challenges in Video Surveillance via Drone: A brief Survey” highlights the limitations of CCTV, namely: limited area coverage, no location sharing and lack of tracking capabilities.

In addition, when considering search and rescue operations, research by (Dilshad, N. et al) showed that when comparing the efficiency and accuracy of detecting a missing or lost person in an image by UAV quad-copter versus manual visual search by a human, the drone excelled in all 3 main characteristics that were focused on, prevision, recall and speed. For evaluation, a total of 49 high-resolution color images from the HERIDAL dataset were used. This dataset was accumulated from multiple locations in regions of Herzegovina (BiH) and Dalmatia (Croatia) by several UAVs (e.g., DJI Mavic Pro 3 or Phantom 3) on relative elevations of 30m to 60m. The image resolution is about 12 Mega Pixels, i.e., 4256 by 2848 pixels, to be exact, describing enough clarity and details. The experimental results show that the respondents failed to spot all 104 targets in the selected pictures. The average recall and average precision’s were 80.43% and 90.98%, respectively.

The maximum number of false detection’s was 8, mostly relating to animals, clothes, and several other objects. The manual search took almost 42 minutes for each person. Conversely, automatic search by drones took much less time [6]

# Background context

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# compare findings with other research

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# cOMMUNICATE THE PROJECT’S SCIENTIFIC NOVELTY BY FRAMING A RESEARCH GAP

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##### References

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