Autonomous Drones for Search and Rescue Operations

Doan, An (School: Nikola Tesla STEM High School)

The annual number of search and rescue operations in the United States alone is over 100,000, and the use of drones could significantly improve the survival rates of these operations. The survival rates of these missions drop exponentially after 18 hours from the beginning and drop to almost 0% after 20 hours, making the operation extremely time critical. If a drone could a flown to explore a large overall area, and return points of interest, it would significantly reduce the area that is needed for closer inspection. Currently, the process of deploying SAR workers in helicopters and traveling long distances puts the rescuer's life in danger as well. And the use of drones for search and rescue operations (such as the DJI M210 RTK) are not autonomous, require trained police officers to fly them, and are extremely expensive, costing over $2,000. This project aims to develop a human detection model that can be used by drone cameras to detect victims in a search and rescue simulated environment. The YOLO (You Only Look Once) object detection model was used and finetuned to detect human victims, and then tested on with drone videos taken of humans in a local forested park. The human detection model performed an average accuracy of 92.50%, precision of 97.11%, and recall of 95.26% over 268 seconds and 5494 frames of video.

Awards Won: