MYC

MILLENNIUM YOUTH CAMP

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ICT GROUP

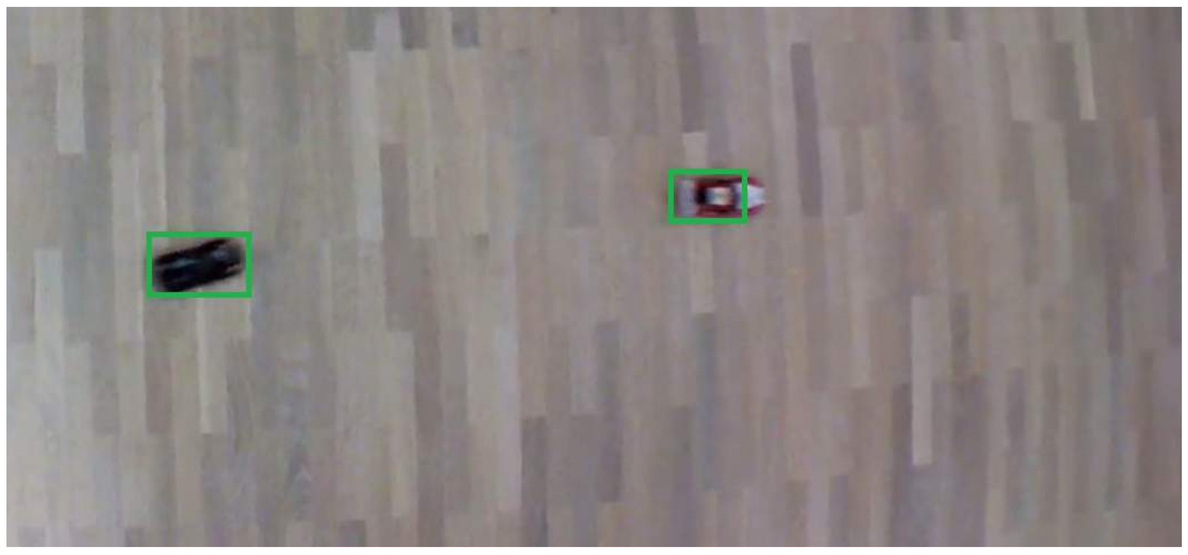
OPTIMIZING TRAFFIC

THROUGH AUTOMATED AERIAL TRAFFIC MONITORING

WHAT WE DID

VIDEO PROCESSING

We implemented a background substraction algorithm for tracking moving objects. This video processing algorithm identifies and separates the background (street, buildings) and foreground (vehicles) by performing a subtraction between the current frame and the background of the image. The size and velocity of the identified vehicles can then be found. In our implementation, we compensate for the movement of the drone to emulate a stable background.



VIDEO STABILIZATION

Background substraction is dependent on a “static camera” or stable image. Due to turbulence, a drone in flight cannot remain perfectly stable. We used Adobe Premiere to post-process and stabilize the videos we obtained from the drone.
In the future, it will be possible to process everything in real time, by using GPU computing.

MODELLING TRAFFIC

To avoid the problems and risks that might arise with flying a drone on the road and recording videos of real cars, we tested our system on a smaller scale. We used small remote-controlled cars to simulate different scenarios. This included a car moving forward, cars moving in opposite directions and cars colliding with one another.

WHAT WE AIM FOR

INTERSECTION OPTIMIZATION

Modern intersections detect waiting traffic by using induction coils, but induction coils cannot detect small vehicles or the presence of multiple vehicles. Aerial drones could supplement these systems with more comprehensive information about the number of vehicles and traffic flow surrounding an intersection, and use this information to optimize real-time traffic light control to save time and energy.

EMERGENCY RESPONSE

The data collected by these aerial monitors has many other applications, including accelerating emergency response.
An AI system could automatically identify vehicular collisions from the drones’ live video, and automatically alert emergency dispatch officers. Instead of waiting for the local emergency number to be called, ambulances can be alerted of and be on their way to an accident seconds after it occurs.

PREVENTING TRAFFIC JAMS

Traffic jams often begin as small delays or hiccups in traffic flow, but quickly grow to large-scale gridlocks. Using aerial traffic monitoring and artificial intelligence, these delays could be identified and early traffic jams could be corrected before they escalate. The 2006 Eddington Transport Study, commissioned by the UK government, found that the rising cost of traffic congestion will waste an extra £22 worth of time in England alone by 2025. The use of drones could gather data for drivers so that they take the best paths, avoiding traffic jams and saving time.

DEVELOPING NATIONS

Although more developed nations have access to extensive traffic monitoring infrastructure, traffic data is less available in developing nations without the necessary infrastructure or resources.Unlike conventional fixed infrastructure like induction coils and traffic cameras, drones could relocate to high-activity areas. Additionally, a fleet of drones could serve many purposes - we propose a set of modular sensors (optical, microwave, infrared) be used, to enable a drone fleet to collect a wide variety of data as needed - traffic, weather, environmental, and more. Traffic monitoring drones would be a cost-effective and scalable approach to collecting public data without infrastructure.