Traffic studies from the bird's eye view?

Game changer in microscopic analysis!

Do you need super-accurate data about every single participant of the traffic flow? Are you looking for a non-invasive solution offering a complete telemetric data about all moving objects in the recorded image, including cyclists and pedestrians? Does your project require analysis of speed profiles and various types of acceleration (lateral or transverse), or distances between objects and even their dimensions? Are you looking for an ultimate solution in the field of microscopic traffic analytics for research of interactions, calibration of models or even development of autonomous vehicles and other scientific and commercial projects? With SWISSTRAFFIC.ai and its bird's eye view using drones and AI in image processing, you get all these functions and much more.

Why use a drone for traffic analysis?

A drone is a perfectly mobile camera with immense range of covered area, which can be "installed" within a few seconds. One drone is enough to cover the whole intersection or even a whole transport corridor. A bird's eye view is the most suitable option even regarding metering of dimensions, speed and acceleration of objects on the road. With this type of view, you can get data so accurate that will be able to detect change of gears of drivers. Interactions between drivers and links between individual traffic situations and objects can be observed much easier. Thanks to its accuracy, complexity, range and availability, drone-captured traffic data open a new chapter in the field of microscopic traffic analyses.
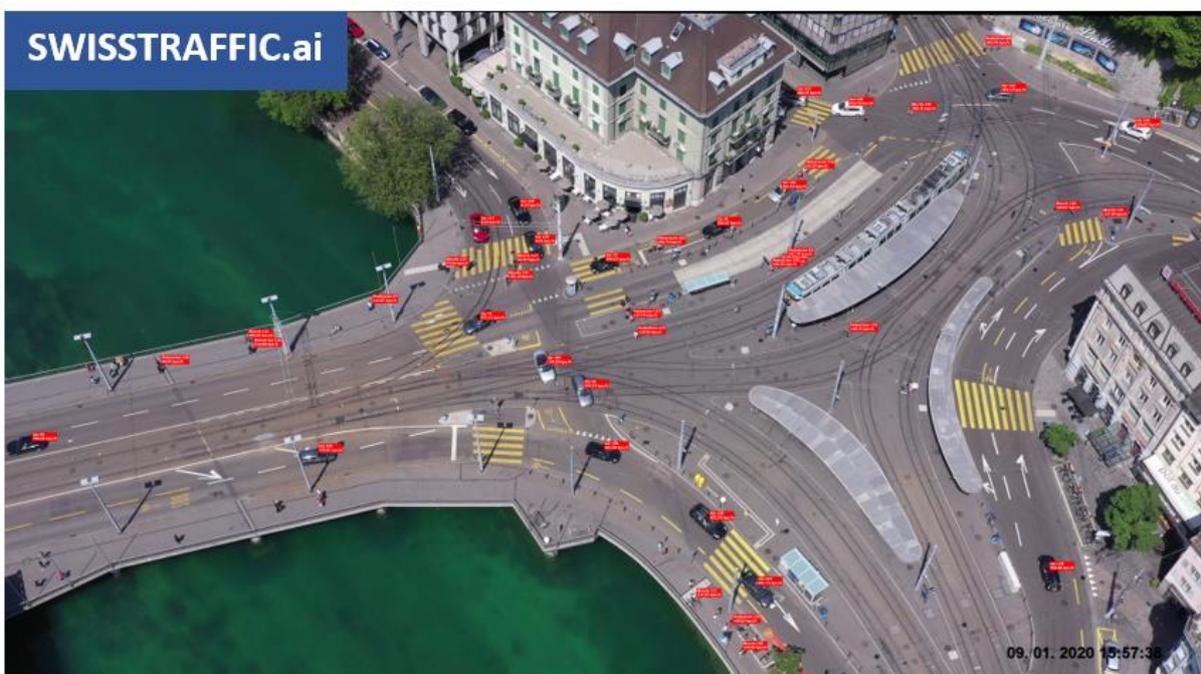
Bird's eye view is mathematically ideal when it comes to the localization of ground targets. In this case a camera has the highest sensitivity even with changing of object position within the image. With growing incidental angle, this sensitivity decreases rapidly. This is the reason why it is not possible to acquire highly accurate data with cameras located alongside the road. Another advantage of the bird's eye view is with natural minimization of object alignments and occlusions, making the metering even more accurate as the objects are always clearly visible. With this type of camera view, localization accuracy of a vehicle reaches up to 15 cm, with the measurement error under 2% and measuring to 30 cm in dimensions (according to the configuration). If you want extremely accurate not only in counting of object in classes (O/D matrix, TMCs), but also in telemetric data (speed, acceleration, object size), the bird's eye view is a perfect option. With this accurate telemetric data, it is possible to detect dangerous situations, calibrate models of driver behaviour or even count the capacity of crossroads and much more.

A dependence of localization accuracy on the angle of incidence and flight altitude. The plot shows the area which is possible to be covered with the given localization accuracy of vehicles up to 20 cm, using the 4K camera.
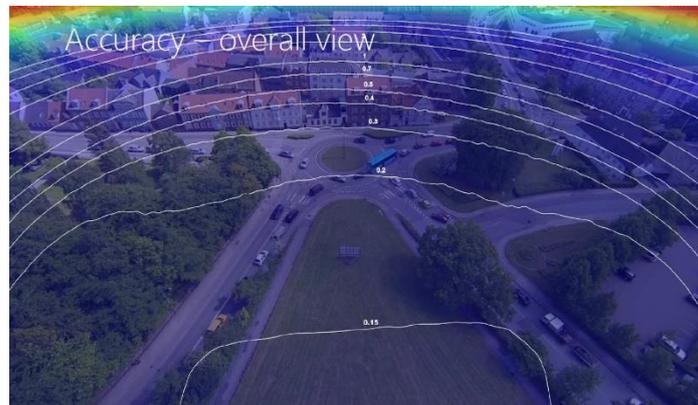
Accuracy of localization with a view from a drone. Contours within the image represent the possible object localization accuracy at the given part of the image (up to 15 cm!).

Up to 250 000 m² of covered area

With only a single flying camera/drone, it is possible to cover an immensely large area. From the altitude of 120 meters, you can monitor a road section of up to 250 meters in length. With 300 meters of altitude, you can cover up to 700 meters of the road, and that is a very decent area of monitored traffic area! To acquire image data even from very large traffic corridors, it only takes one device. Therefore SWISSTRAFFIC.ai gives you the most detailed analysis for every single participant of the traffic flow you measure.
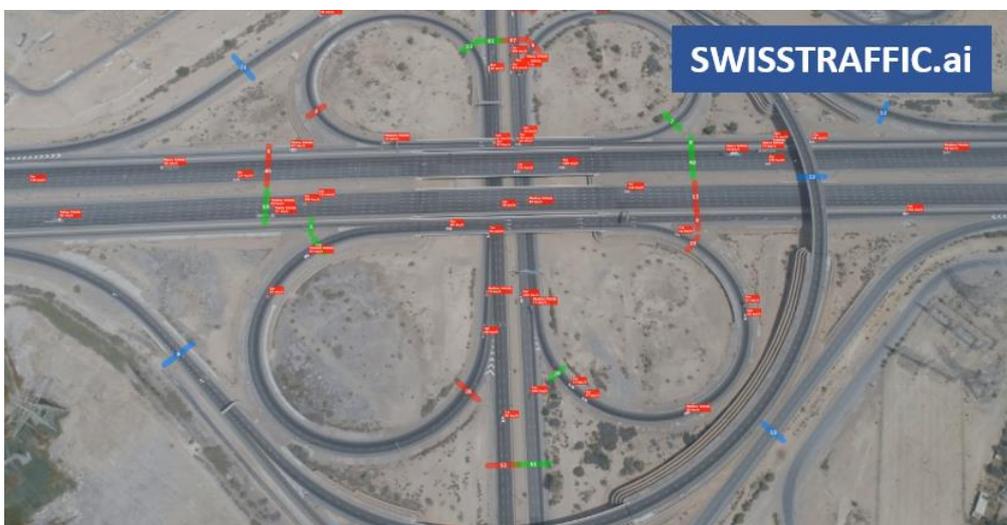
Installation within a few seconds

It is definitely not easy to prepare and carry out a traffic research, especially in case of larger intersections, as you have to install a sensor device for every single mouth of the intersection. You also must deal with mounting, power supply and on top of this, even protect the device against robbery or vandalism. What you usually get is a series of outputs, which have to be interconnected into one coherent output, which is a very complicated and tedious process. This is not the case if you choose to use a drone for your research! All it takes to analyse the given traffic flow is to fly above the section you are interested in, and make only one video-recording, which contains everything you will need. If your project requires recordings for a longer period of time, a drone can be supplied with a cable or you can swap a few drones to get the job done and give you the data you need.
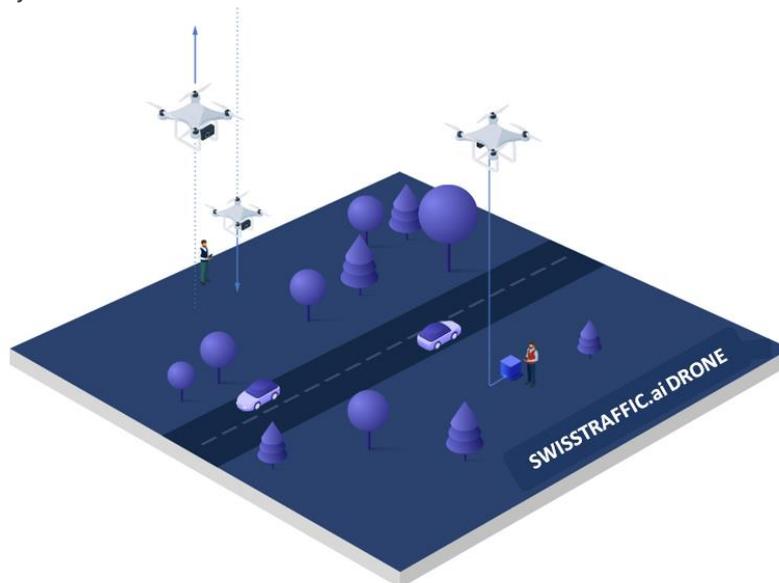

Figure: Drone on the cable and drone swapping

An ultimate solution

A video from the bird's eye view is the cutting-edge solution also when it comes to richness of acquired data. With one take, you get microscopic data from the whole intersection. AI and smart tracking algorithms then convert the video output into an extract with super-accurate trajectories within the individual classes. With data like this, you can answer even very complex traffic research questions, such us: What are the bottlenecks of the traffic flow? Where do the conflict situations take place? What is the capacity of the intersection? How much time do the vehicles need to cross the intersection in its various parts? How many vehicles have breached the speed limit? Where do the pedestrians usually cross it?