RE:DESIGNING TRAFFIC

Traffic Control System for the future

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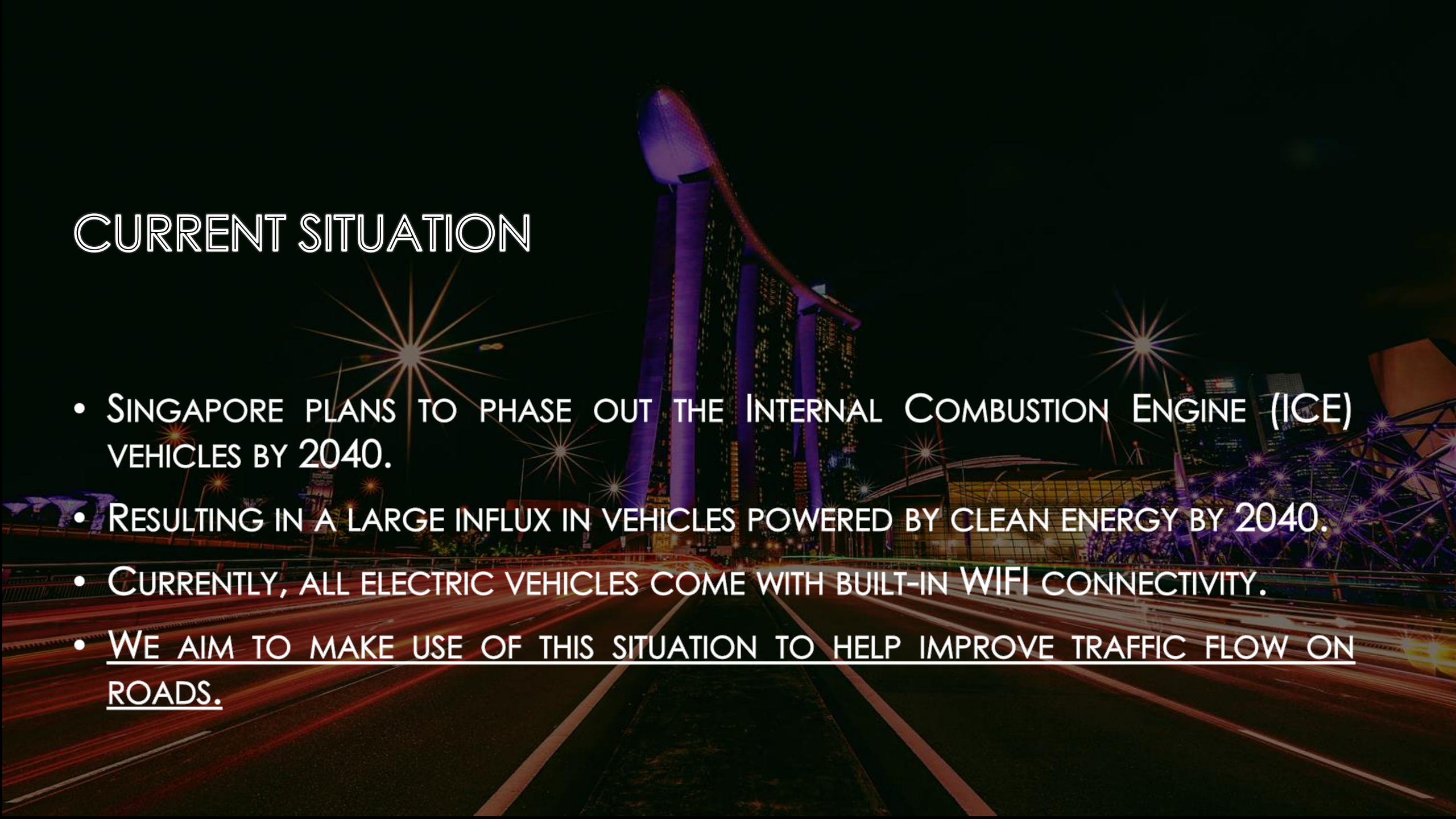


Current Situation

- Singapore plans to phase out the Internal Combustion Engine (ICE) vehicles by 2040.
- Resulting in a large influx in vehicles powered by clean energy by 2040.
- Currently, all electric vehicles come with built-in WIFI connectivity.
- We aim to make use of this situation to help improve traffic flow on roads.

Current Implementation

YOLOV5

- YOLOv5 is a family of object detection architectures and models pretrained on the COCO dataset.
- Using YOLOv5 we can identify vehicles (cars, buses, motorcycles, trucks) moving in and out of any junction using CCTVs which are already located in the roads of Singapore.
- With the help of Computer vision, we can find the number of vehicles present with high confidence.

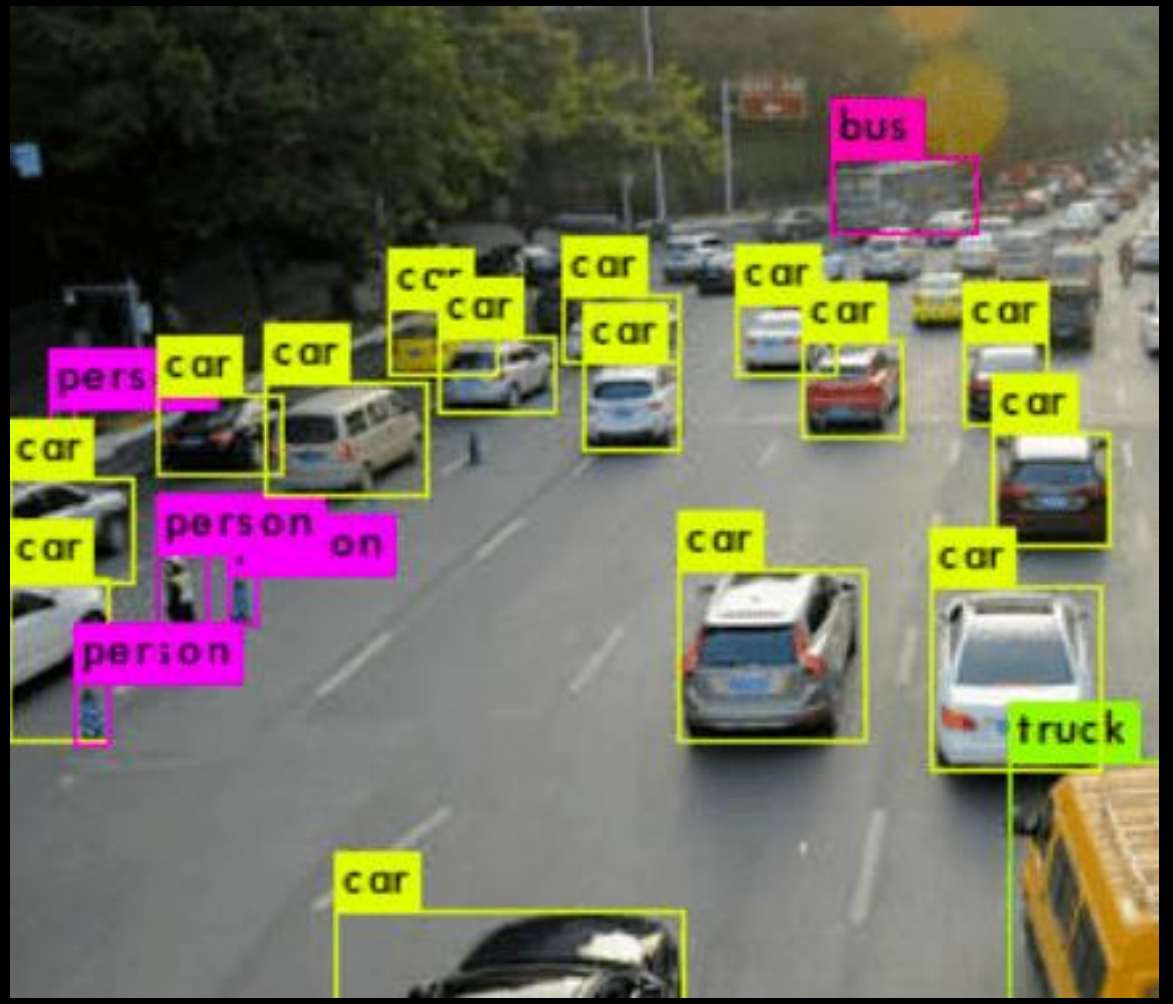
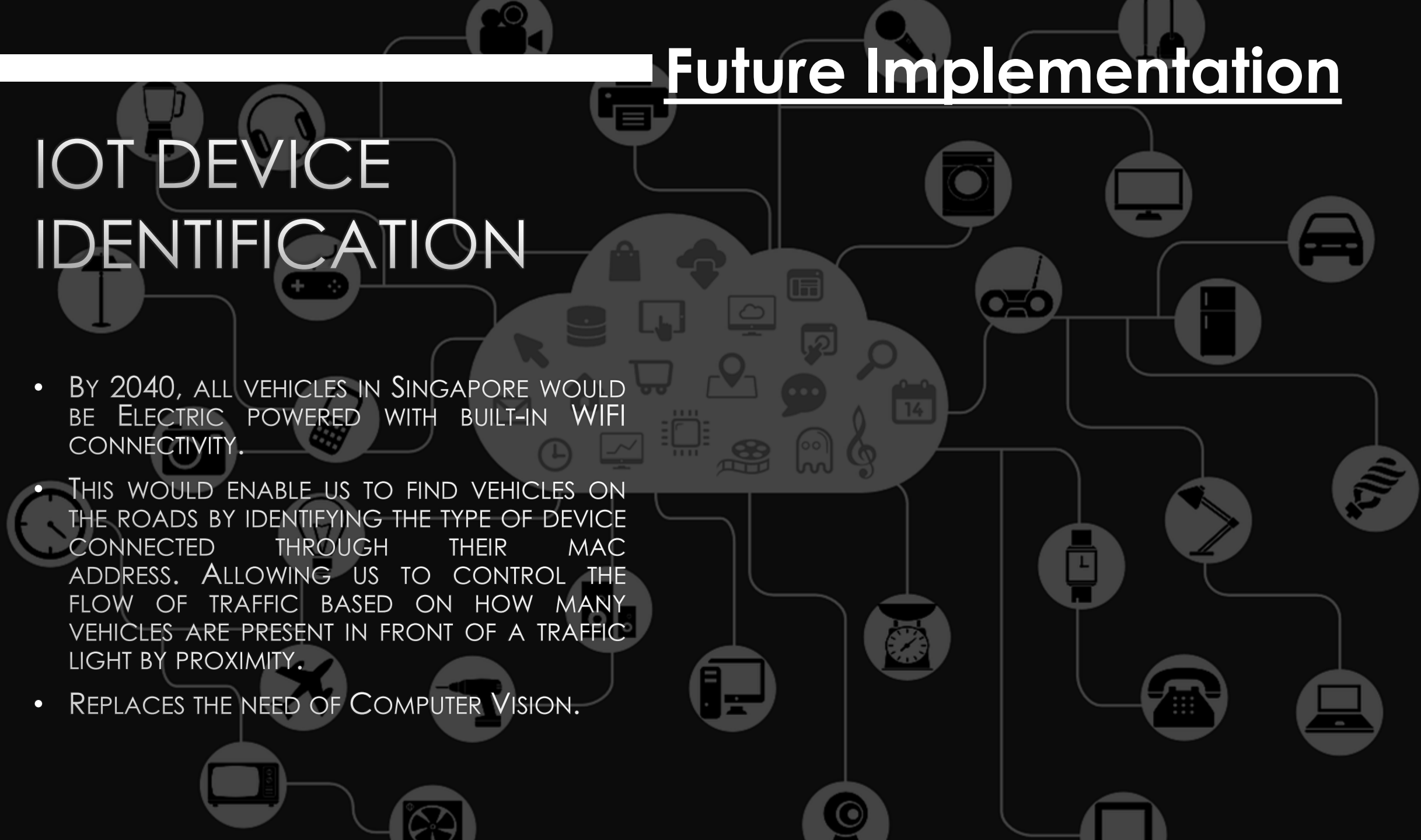


Figure 1: YOLOv5 identifying cars, buses and people

Future Implementation

IOT DEVICE IDENTIFICATION

- By 2040, all vehicles in Singapore would be Electric powered with built-in WIFI connectivity.
- This would enable us to find vehicles on the roads by identifying the type of device connected through their MAC address. Allowing us to control the flow of traffic based on how many vehicles are present in front of a traffic light by proximity.
- Replaces the need of Computer Vision.



Traffic Management

A control system is implemented to each road junction to adjust its red and green light duration for better flow. Each junction monitors 4 road directions (purple and pink arrows) where vehicles go towards the junction. Junctions can be combined to form a complete traffic system.

n0 represents the junction we are controlling. First, we check if the roads after the junction (all blue arrows) are jammed. If those roads are jammed, there is no point in letting vehicles to pass faster at this junction, so we will not change the traffic light timings until the roads after it clear up.

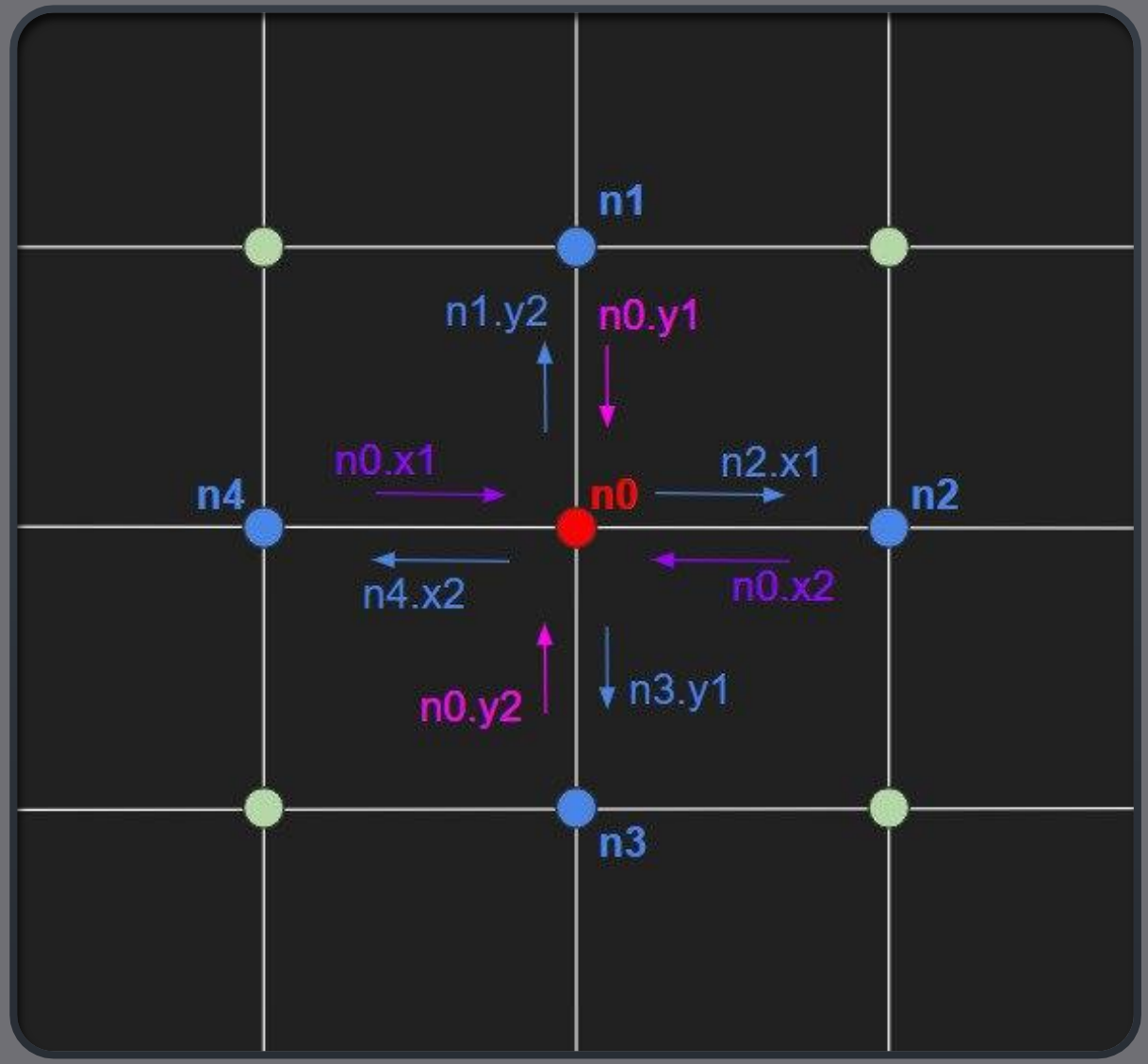
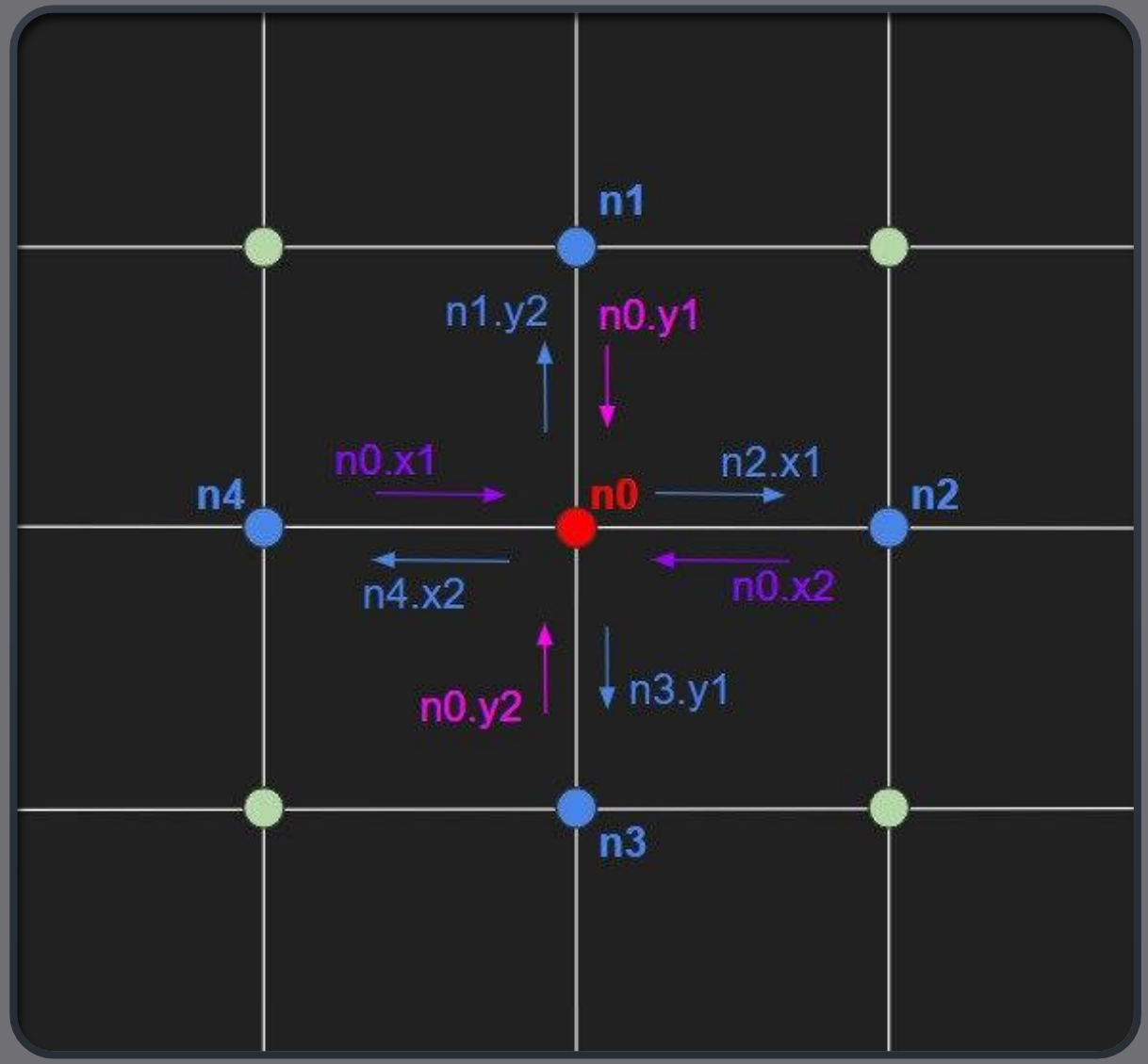


Figure 2: Illustration of traffic junctions and vehicle count

Traffic Management

If the road is not jammed and there is little vehicles on all the roads, we will set the traffic light to change color faster to let vehicles pass through faster.

If the x road (purple arrows) and y road (pink arrows) have disproportional vehicle counts, we will increase the green light duration of the road with more vehicles. The time adjustment will be increased with larger disproportionality.



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