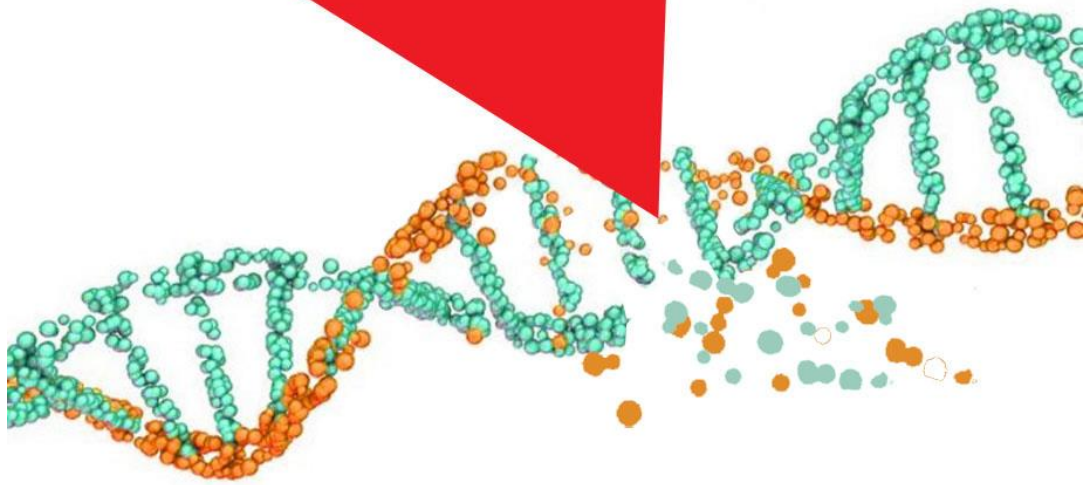
# On Board Cleaner



Nomadic Solutions

CAR&D

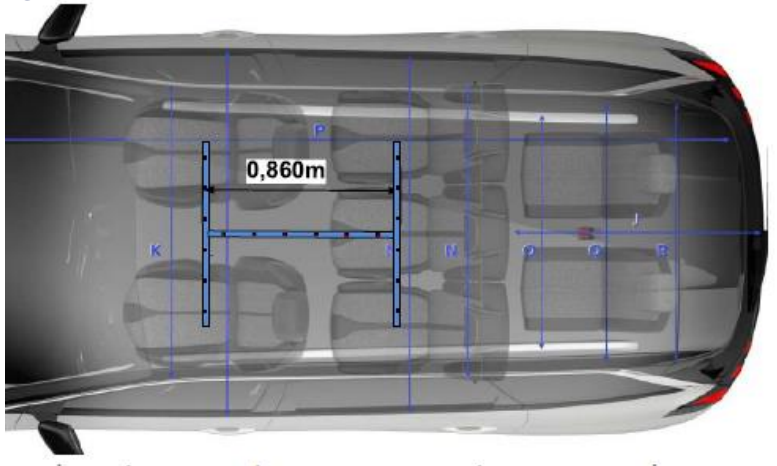
# 1. what’s On Board Cleaner

**ON BOARD CLEANER (OBC) is an on-board device that operates rapid disinfection cycles of viruses and bacteria in the vehicle, in an autonomous, automatic and secure way.**

After checking that there are no people or animals in the cabin, On Board Cleaner is launched by a smartphone app, diffuses ozone in the cabin and powers UVC LED strips attached to the roof and directed towards the seats and dashboard.

During a cycle, OBC controls the air conditioning accessories (ventilation, recirculation valve) through an interface with the vehicle’s BUS CANs and/or LIN, and only "returns" the vehicle after a controlled efficiency rinsing phase.

*OBC concerns vehicles for the transport of swaping persons: Taxis, VTC, Short-term rental, Car-sharing, Car-pooling, Ambulances, Driving schools...*



# 2. Context

The sanitary crisis is long-lasting and leads us to propose solutions that will allow us to recover sufficient economic activity while limiting the risks.

Passenger transport services are used by many people and the means of disinfection between two batch of passagers are not very efficient.

As a result, these services are failing out for fear of contamination.

It is therefore necessary to propose a simple and fast system to disinfect the vehicles concerned.

Today, decontamination can be done by several means:

- Chemical products (gels, 80° alcohol sprayers...)
- Ozone
- UV

# 3. State of the art

Chemical treatment is used in the food industry, but its dangerousness during treatment and with regard to residues strongly limits its domestic and individual use.

There are ozone generators for disinfecting vehicle interiors, but they are external and require human handling each time to install and be plugged : Karcher, Gruau, Airclean...

For the disinfection of objects, there are manual UV ramps on sector or battery. The efficiency is linked to the care of the human operator who comes to lick all the surfaces with his ramp.

The operation is therefore quite long, therefore expensive and infrequent.

This solution of UV ramp without passenger presence is used for aircrafts with the same disadvantages : necessary operator, mono-technology.

Finally, UV ramps are sometimes used in rooms with people, for example in waiting rooms or operating rooms in hospitals in Asia, but the human presence imposes inefficient wavelengths.

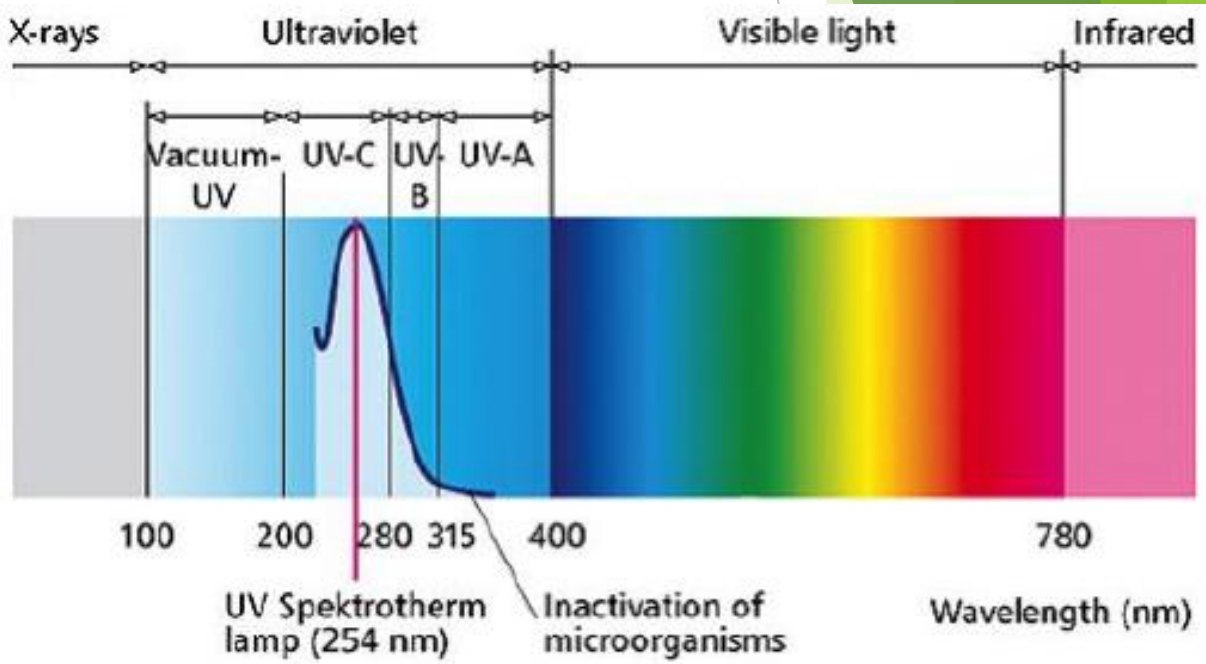
# 4. UV scientific elements

UV rays are known since 1903 to kill bacteria (Nobel price Niels Finsen).

Among the UV rays, the UVC has the best effect for biocid action, especially on the airborne Pathogen as flues, H1N1, MERS-CoV, SARS-Cov2 but Staphylococcus and Tuberculosis.

UVC are used for a long time in hospitals, laboratories, airplane, wasted water disinfection.

These rays exposition are harmful for human, raison why we have add sensor which detects any human or animal  to ovoid any UVC production if there is a presence in the car.

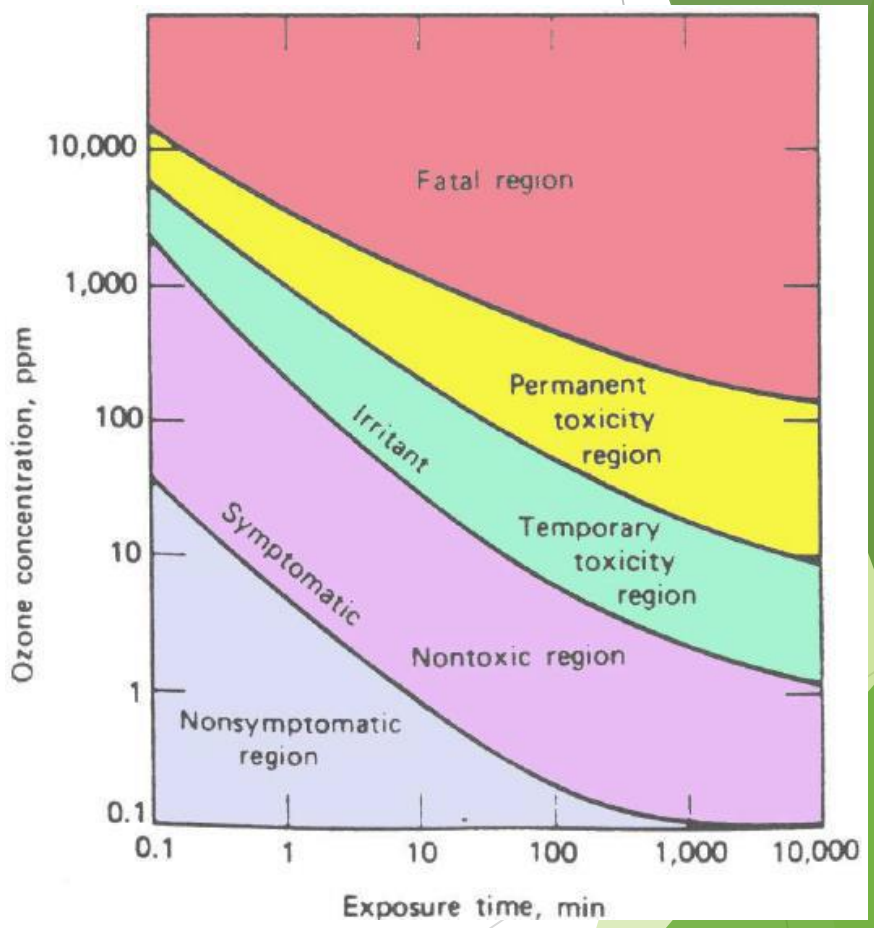


# 5. Ozone scientific elements

Ozone is highly oxidizing and virucidal by attacking the proteins and lipids of the spikes and the virus envelope.

Two techniques exist for the disinfection of houses:

- low doses in the presence of humans, not very effective
- higher doses in the absence of humans, dangerous in case of false manipulation by lack of automation "presence sensor and window opening"



# 6. Innovation regarding others systems

**No product ticks all the boxes :**

- ✓ Combination of both UVC surface and ozone volume to maximize efficiency and speed
- ✓ No human presence to use effective doses and therefore a fast treatment 5 minutes
- ✓ Suitable for automotive applications
- ✓ Installed once and for all
- ✓ Complete automation without human intervention with remote "on demand" launched by a single smartphone button
- ✓ Secure against human presence
- ✓ Closed loop system ensures efficiency

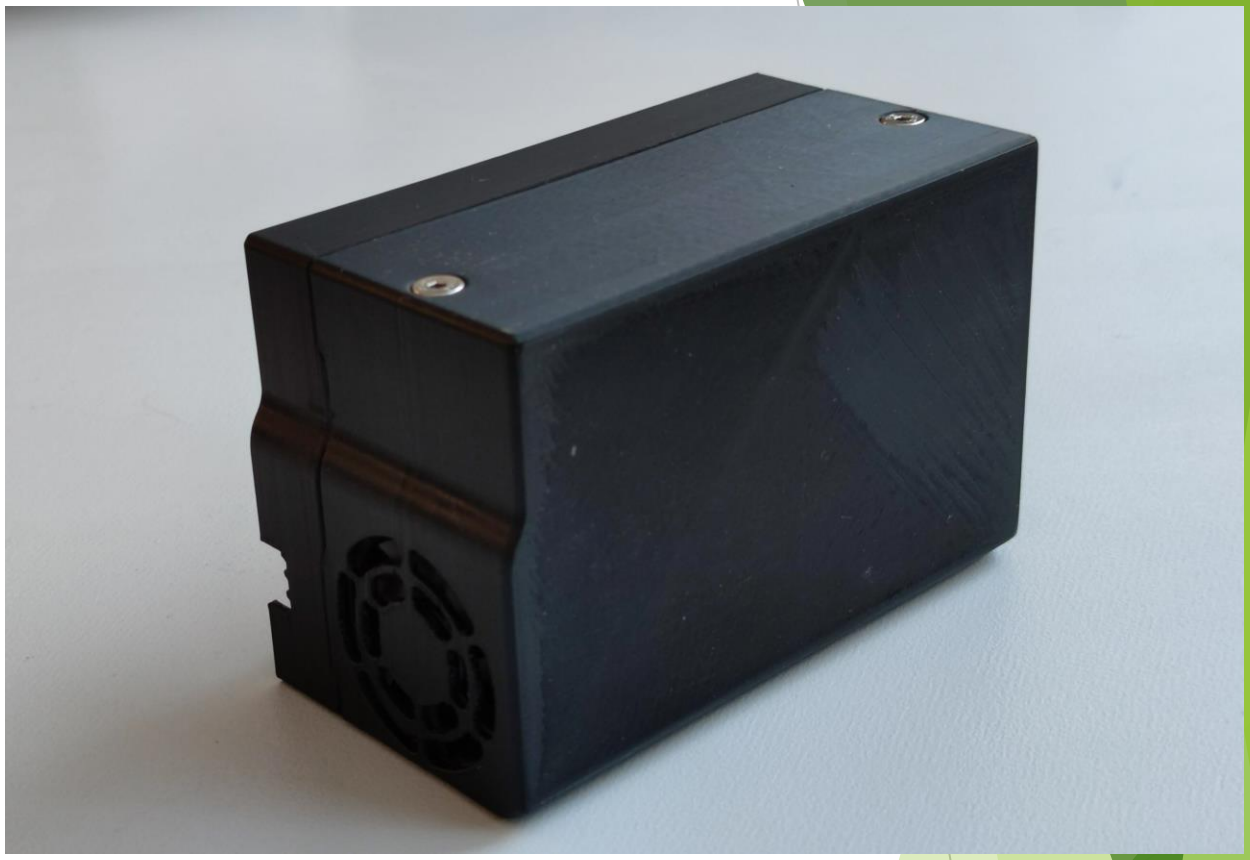
# 7. How it works ?

## OBC Process :

- The OBC Android/iOS app is launched by the driver on his smartphone from outside the vehicle.
- OBC management device (powered by the vehicle's 12V electrical network)
  - Communicates with the vehicle's CAN/LIN buses to :
    - Control the vehicle's air conditioning system.
  - Controls a UVC and ozone production combo to disinfect a volume of 5m3 in 5 minutes maximum by a closed loop on the virucidal ozone content.
  - Communicates via Bluetooth with the smartphone app to monitor the treatment steps:
    - Checking the starting conditions (car without occupants and closed loop)
    - Launching of the closed loop disinfection cycle
    - Rinsing: stop active elements, aeration, ventilation until low ozone content
    - Verification of the return to original conditions
    - Return the disinfected vehicle to the driver
    - Emergency treatment stop

# 8. Hardware :

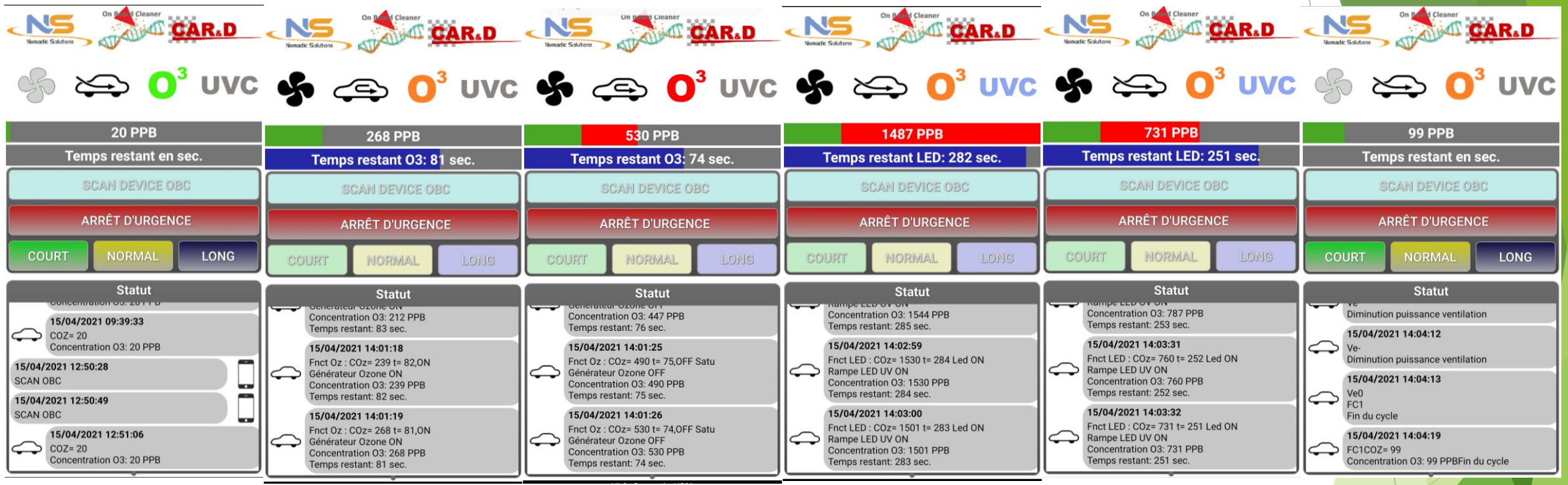
UVC



Central Control unit and ozone generator

Sensors unit behind
the inner mirror

# 9. Apps Screenshots



# 9. Video

# Questions ?

# Thanks for your attention