



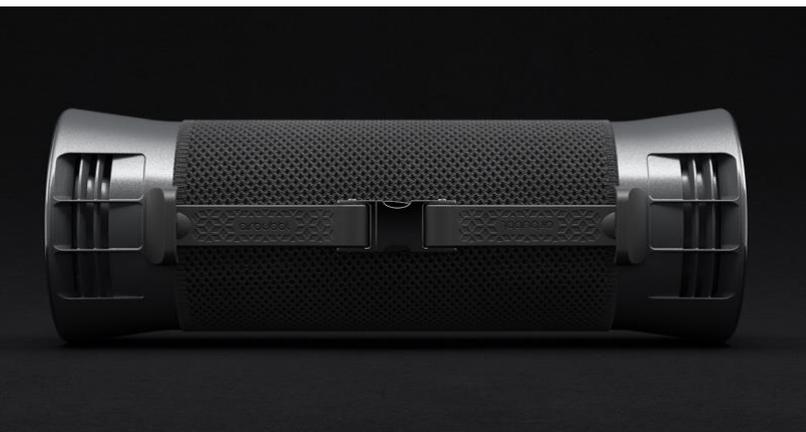
## The Technology Behind The AirBubbl

The inside of a vehicle cabin can be one of the most polluted environments that people experience each day. A series of studies have shown that pollution inside vehicles can be much higher than elsewhere in a city, or at home or at work, and also often higher than other means of transport. This air pollution has detrimental effects on people's health, and it is clear that an effective method of combating this issue is needed. The Airbubbl was designed to tackle this specific problem, and multiple aspects of the design required novel technological solutions.

**To deliver clean air in the most optimal way to passengers in a vehicle cabin, an air cleaner must be able to do two key things extremely well:**

- 1. Remove pollutants from the air, which is passing through the unit, without restricting airflow**
- 2. Deliver the cleaned air to the passengers, so that they only breathe air which has been cleaned**

To tackle the first point, a novel filter cartridge was developed which removes both particles and gases effectively and with a low pressure drop. To address the second point, the airflow through the unit was engineered to deliver air as effectively as possible. These two design features of the unit are described below.



## Airflow Design

To deliver clean air to the breathing zone of the driver and passengers the airflow coming from the unit must be carefully designed. Airlabs engineers developed an optimum method for this using computerised flow modelling on the interior of vehicles. The geometry of the Airbubbl was then formed to provide the necessary flow qualities. An example of the modelled results for the final design can be seen below in Figure 1:



*Figure 1: Air flow inside a car cabin when using the Airbubbl. Blue/light blue indicates clean air, while red/orange/green indicates polluted air.*

The areas of the car in which the occupants are breathing from are kept clean while polluted air comes in from outside but is not allowed to reach breathing zones.

**The design of the airflow through the Airbubbl is the subject of a patent which has been granted.**

## Filter Cartridge

The filter technology used in the Airbubbl was developed to address the air pollutants which constitute the greatest threat to people's health. The three most important in this sense are Particulate Matter (PM), Nitrogen Dioxide (NO<sub>2</sub>) and Ozone (O<sub>3</sub>), especially in urban areas. Alongside these main three are others such as Benzene, Ethylbenzene, Toluene, Xylene, Sulphur Dioxide along with other volatile organics. The filter cartridge is split up into a PM filter and a gas filter.

The gas filter was developed by Airlabs together with the Atmospheric Chemistry Department of the University of Copenhagen. This intensive two-year process resulted in a filter that has an excellent affinity for NO<sub>2</sub> and O<sub>3</sub>, being specifically designed for the conditions inside a vehicle. Many other gases are also removed at very high levels.

The PM filter used in the cartridge was carefully developed for use in the particular enclosed environment of a vehicle cabin. The particulate matter seen inside vehicle cabins also has a unique composition which was analysed and taken into account in the design. Altogether, the result is highly efficient PM removal.

**The unique technology used in this filter is patent pending.**