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Air Ink : An Alternative to Conventional Inks

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ABSTRACT

In the last few decades, Asia has grown exponentially, but this growth has come at a cost of air pollution due to increase in carbon-footprint. AIR-INK is the first ink made entirely out of air pollution. After capturing air-pollution through pilot trials of KAALINK and other pollution sources the carbon rich pollutants are converted into tools for art. Research has shown that many premature deaths are directly related to soot in the environment. Our vision is to arrest the urban PM air pollution in a way that it doesn't reach our lungs or waste streams. The process of creating AIR-INK carefully ensures that the end product is safe-to-use. The pollutants which could have been in the lungs of millions of people, or mixed into our water, land streams are now beautifully resting as art.

Keywords : Soot, Fossil fules, Respiratory problems, AIR-INK

I. INTRODUCTION

Air Ink is an Indian start up brand which produces ink and ink- based art products by condensing soot-based gaseous effluents generated by motor vehicles due to incomplete combustion of fossil fuels.Recycling environmental air pollution and convert it to paint/pigments and printing ink.Founded by Graviky labs, a spin-off group of MIT-MEDIA LAB.ANIRUDH SHARMA is founder of Graviky lab.Firstly AIR-INK products were used in august 2016 in association with TIGER BEER to create STREET ART. It mainly uses a device called KAALINK which captures carbon emission from vehicles or chimneys before it enters into atmosphere.

AIR-INK is a brand of ink and ink-based art products made by condensing soot-based gaseous effluents generated by air pollution due to incomplete combustion of fossil fuels.[1] Founded by Graviky Labs, a spin-off group of MIT Media Lab, Air Ink produces its materials through a step-by-step process which primarily involves capturing of emissions, separation of carbon from the soot, and then mixing of this carbon with different types of oils and solutions.

It uses a patented device and technique called 'Kaalink' to carry out the filtration of soot, which contains carbon and other polluting agents like heavy metals and carcinogens.

AIR-INK is marketed as a solution to air pollution and its negative effects on human life, by allowing print industry to offset its carbon. Dubbed as "the first ink made out of recycled air pollution," its products were used in August 2016 in association with Tiger Beer to create street art and murals in Hong Kong's Sheung Wan district.[2] 30–50 minutes of car pollution can supply enough carbon to fill one AIR-INK pen. Our vision is to arrest the urban PM air pollution in a way that it doesn't reach our lungs or waste streams.

The process of creating AIR-INK carefully ensures that the end product is safe-to-use. The pollutants which could have been in the lungs of millions of people, or mixed into our water, land streams are now beautifully resting as art.

II. HISTORY

Anirudh Sharma, the founder of Graviky Labs, first conceived the idea of Air Ink in 2013 after he and his friends observed that his clothes were being stained by air pollution. Sharma and his team spent close to three years researching how to purify and repurpose carbon soot from auto emissions, a major contributor to air pollution.[3]

In 2013, the Fluid Interfaces research group, at the Massachusetts Institute of Technology demonstrated the process of converting carbon residue into ink for use in an inkjet cartridge.[4]

In 2016, Air Ink products were given to graphic artists in Hong Kong, which is known for its high air pollution [5] who was requested to paint murals. An artist, who participated in this campaign, said of the product, "genius, and deserves a chance."[6][7]

III. METHODS AND MATERIAL

PROCESS OF AIR INK

1. Kaalink is developed primarily for mitigating some of the world's most harmful emissions.
2. The device is prepared well, and it is doing so on a small scale.
3. Kaalink is being used to capture pollution from vehicle exhausts
4. It is then removing all toxic components from the harvested pollution to create clean and safe black ink that artists can use as normal ink.
5. According to the company "45 minutes worth of vehicular emissions captured by the Kaalink device can produce 1 fluid ounce of Air Ink."
6. While cheaper carbon black inks are manufactured through the deliberate burning of fossil fuels, we use our proprietary device—what we call KAALINK—to capture soot that is already being emitted from vehicles.
7. KAALINK is retrofitted to the exhaust pipe of vehicles/generators to capture the outgoing pollutants.

IV. RESULTS AND DISCUSSION

HARVESTING POLLUTION & CREATING INK

1. The unit automatically turns on when an engine is activated and gases start flowing through the exhaust.
2. This activates the flow and thermo sensor, which, in turn, engages a mechatronic capture system.
3. All fine particle matter is then captured within the walls of the unit.
4. However, gases are allowed to pass through, leaving the engine unaffected.
5. When the lights on the exterior of the unit turn from blue to red, the catchment is full.
6. Back in the lab, the captured pollution is taken through a process that removes trace heavy metals and carcinogens.
7. The purified soot goes through several industrial processes to make different types of inks and paints.
8. The soot we collect undergoes various proprietary processes to remove heavy metals and carcinogens.
9. The end product is a purified carbon rich pigment .
10. We purify the carbon pigment by cutting out the heavy metals, dust particles, and all other harmful materials.

11. The carbon is then used to make different types of inks and paints.

ABOUT "AIR INK"

Kaalink is a contraption retrofitted to the exhaust pipe of vehicles to capture the outgoing pollutants. This does not affect vehicle/engine performance.

Soot collected by Kaalink undergoes various proprietary processes to remove heavy metals and carcinogens. The end product is purified carbon based pigment. In the final stage, the carbon is taken through another chemical process to make different types of inks and paints. Kaalink, a device that, once placed on exhaust pipes, captures pollutants. It's a mechatronic system which consists of electrostatics filtration, depth filtration, wall flow filtration etc….to filter soot.

The final product called carbon is then mixed with different types of oils and solutions to form inks and paints.

BLOCK PROCESS

- THE TECHNOLOGY

  I partnered with scientist Anirudh Sharma of Graviky Labs to innovate devices that collected pollution from exhausts before it reached our air.
- THE HARDWARE :-

  The unit automatically turns on when an engine is activated and gases start flowing through the exhaust. This activates the flow and thermo sensor, which, in turn, engages a mechatronic capture system. All fine particle matter is then captured within the walls of the unit; however, gases are allowed to pass through, leaving the engine unaffected. When the lights on the exterior of the unit turn from blue to red, the catchment is full.
- HARVESTING POLLUTION :-

  We fitted the devices to trucks, generators and ferries across Asia and over a period of months, captured billions of particles that would otherwise be in our air…or lungs.
- CREATING INK :-

  Back in the lab, the captured pollution is taken through a process that removes trace heavy metals and carcinogens. The purified soot goes through several industrial processes to make different types of inks and paints.

V. FEATURES

- Every 45 min worth of car emissions- 30 ml of ink.
- 600 ml spray- holds the equivalent of 2000 hrs of pollution.
- Kaalink can even fit over the polluting mouths of boats, chimneys and cranes.
- It not only stops co2 gas enter into air but also captures a dangerous carbon soot called PM 2.5 here P.M Particulate matter 2.5 size of particle in microns.
- Each device can collect up to 95% of pollutants.

VI. FUTURE SCOPE

- In future the overall air pollution will be controlled and health problems which effecting by air pollution will be reduced like premature death, heart attacks, and strokes, bronchitis and aggravated asthma among children.
- As we are using pollution as an ink which can be used to print, draw and do various creative things , so it will be an new exposure to emerging as well as professional paint artists.

VII. CONCLUSION

- It will the best for controlling air pollution in environment and best for living things to protect the health.

- When we are using these the whole world be having less respiratory diseases.
- It's very useful to our life cycle to protect from diseases.
- It gives a different perspective to emerging environmentalist artists to create their idea.

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