AQeye

1. Idea

There is a serious risk to public health as India deals with a significant worsening of Air Quality, especially in its major cities, for example, its capital city of Delhi, where every winter the AQI index rises far above 300 due to a variety of reasons. We are pleased to present AQeye, a ground-breaking solution created to increase awareness in response to this urgent need. AQeye responds to the Air Quality around it in real time by dynamically changing colour, thus indicating to the user, and people around the user, the desperate nature. This cutting-edge feature is a potent tool for involving people and communities, encouraging a shared commitment to reduce air pollution and give respiratory health first priority, along with increasing awareness about the issue.

2. Problem Statement

There is an urgent environmental crisis in India due to the rising Air Quality Index (AQI) values, which are having a negative impact on people's health and well-being. Growing pollution from transportation, industry, and other sources is a serious concern that has to be addressed right away in order to stop this worrying trend. As a revolutionary answer to this pressing problem, AQeye is our ground-breaking invention, as we need to find a way to increase the awareness of the worsening air quality, and the dire need to wear masks that this creates.

3. SDG in play

SDG-3

4. Constraints

- The device had to be waterproof. All circuitries should be enclosed.
- It had to be portable, light and comfortable to carry around and use
- It had to be sturdy and durable, to withstand daily use
- It should be aesthetically appealing as an ugly circuit is not appreciated.
- The mask should be more comfortable.
- The box should be made more portable and lightweight

5. Solutions Brainstorming

We had many ideas starting this project off something which can purify the air but since we were on a time constraint we decided not to do that and instead work on something else. We started brainstorming and thought why not make a project which can help create awareness about the increasing air quality levels in India. Thats how the idea of ‘AQeye” was born.We decided to have all our electronics in a box which can be clipped onto anything such as your backpack.It has a transceiver which sends data to an arduino which is attached onto the mask. To show increasing AQI we decided to add a LED strip which can change colours on the mask as per the air quality.Moreover,we have very exciting ideas for the future such as adding an bluetooth module which will send a notification to the users phone and help the user understand when to wear a mask and when not to.We also plan to add a humidifier inside the mask in the near future and also have a technology which will light up the mask when it senses the AQI is going be increasing that particular day, thus telling the user in the morning whether they need to wear the mask that day.

6. Final Solution

· **Name of the project**

AQeye

Instead of the “I” in AQI we replaced it with eye since we are trying to spread awareness about the increasing air quality levels.

· **Design process**

Our design idea constitutes of a mask, with leds fixed at the bottom, shooting upwards to create an aesthetic “glow” and allow the light to spread without it being uncomfortable for the user. The mask will have a small board and transceiver attached to the bands to control the colours. Additionally, there will be a box, roughly 5 by 3cm, which will have a screen to display the readings, and an on off button. We aimed to make the box and packaging as small as possible to make it comfortable for the user.

· **Materials and machines used**

Materials

- 1x BREADBOARD
- JUMPER WIRES
- 1x ARDUINO NANO
- 1x ESP8266
- 1x 3M 9105 VFLEX N95
- 1 METERx WS2812B LED STRIP
- 1x ELECTRONIC SPICES 9V BATTERY AND CONNECTOR
- 1x I2C LCD(16x2)
- 2x REES52 NRF2 NRF24LO1 2.4GHZ WIRELESS Transcievers
- 1x NEO-6M GPS MODULE
- 2x NRF24L01 Wireless transceivers
- 2x 9V batteries
- 2x 9V battery connectors
- GP2Y1010AU0F Optical Dust and PM2.5 Sensor Module
- MB102 breadboard power supply module

TOOLS

- WIRE CLIPPERS
- SCISSORS
- Tape

MACHINES

- LASER CUTTING
- 3D PRINTING MACHINE
- SOLDER IRON

SKILLS USED

IOT

Electronics

Cad

Lazer Cutting

CHALLENGES FACED AND SOLUTIONS

The first issue we ran into was finding a mask on which LED's could be comfortably attached, with a great enough surface area, and enough volume to ensure that the users comfort was not compromised. We thus settled on the 3M Vflex disposable respirator, due to its large surface area, and comfortable boxy nature. The flaps on the sides also gave us room to attach electronics if we needed to without compromising on integrity of the mask

While initially we wanted to add the functionality of bluetooth to allow the user to get notifications on their phone, we were unable to do so due to time constraints, so we decided to build on that in a later prototype.

A second issue we ran into, was that our GPS sensor started malfunctioning, thus we had to push the API usage to a later prototype, when we could get it to work, as our API to get the AQI depended on the user's latitude and longitude, which we needed a GPS sensor for

Another issue that we ran into was that our Dust and PM2.5 sensor was not perfectly calibrated, so we decided we used an existing prototype at the maker space, which had a hepa filter and an air outlet, to create a dustless environment to simulate '0' mg/m^3 to calibrate the dust sensor.

Finally while we planned to use two NRF24L01 Wireless transceiver modules to make communication between the Mask and the Hub wireless, we were unable to get the transceivers to work between an Arduino nano and ESP8266, so we ended up drilling a hole in our prototype box, and using jumper cables to make an extended wire through the hole to allow us to wire the LED's on the Mask directly to the Hub to make up for a lack of wireless transmission