User Guide

for

Vayu - 'Digital Platform for Hyperlocal Mapping of Air Pollution of two Cities in India'

mistEO Private Limited

Submitted to

India

Contents

Introduction

The IEA report highlights that fossil fuel combustion is a primary source of air pollution and greenhouse gas (GHG) emissions in India, specifically contributing to pollutants like NOX, SO2, and PM2.5, as well as CO2 emissions. Addressing these energy-related pollutants together could lead to significant benefits. However, identifying pollution sources remains challenging, prompting the UNDP and partners to develop a GeoAI platform. This platform uses satellite imagery and AI to locate pollution hotspots, particularly over 47,000 brick kilns in the Indo-Gangetic plain, which account for 8-15% of regional air pollution. The project aims to expand air pollution data collection in Patna and Gurugram through citizen science, IoT sensors, and AI/ML algorithms. By creating a hyperlocal digital stack on air pollution and GHG emissions, this initiative seeks to drive more targeted actions and scalable solutions with reduced public investments.

Purpose of the document

This document is aimed at serving as a guide for users of the Vayu Web Platform. The manual covers various modules which will help the user to use the application.

For further information

To know more about this application, or for suggestions / feedback, please contact: Support Team, Accelerator Lab, UNDP India (acceleratorlab.in@undp.org)

Disclaimer

Best effort has been put to ensure that the content of this document is in sync with the actual product, however, since software products can undergo

multiple changes, hence it is not guaranteed that this document aligns with the latest product version. Certain administrative features can result in modification or deletion of the data permanently from the repository; hence the user / administrator of this product must exercise utmost care with required knowledge to execute such actions. The creator or owner of this document does not accept any liability of any untoward repercussions arising out of the product usage or information mentioned in this document. All the rights of this document lie with the owner of the above-mentioned digital product.

1. Getting Started
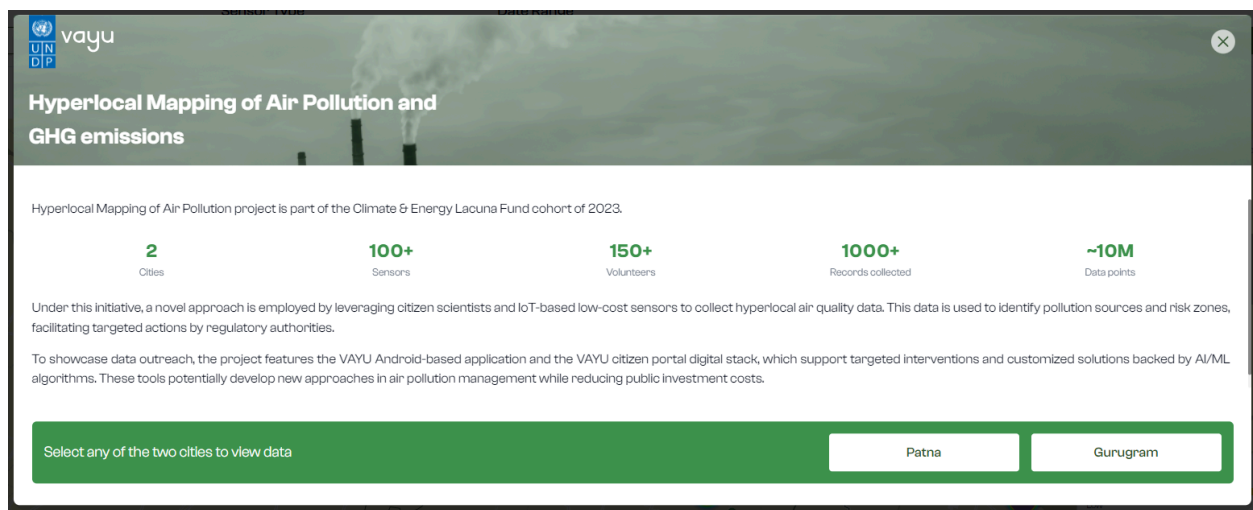
a) Open any installed browser on your desktop

b) Go to https://vayu.undp.org.in/

c) You will enter the Portal and pop up message will appear with the details and to select the city to continue

d). If we do not select the city and close the pop up then Patna will be the default city

to be displayed in the search field .

e). If we select a particular city to continue then that city name will be displayed
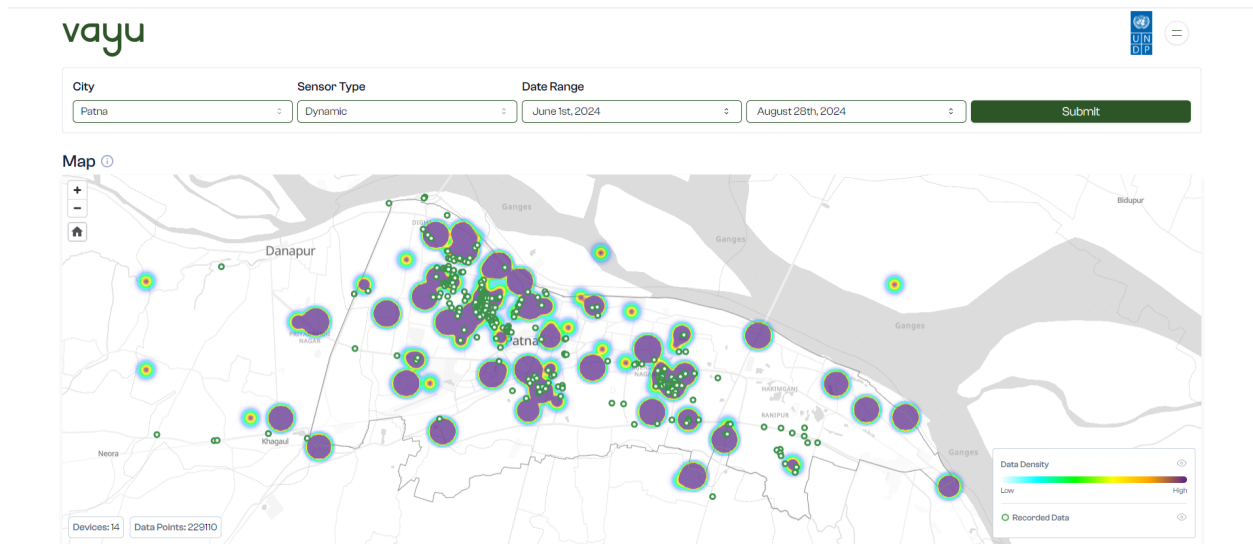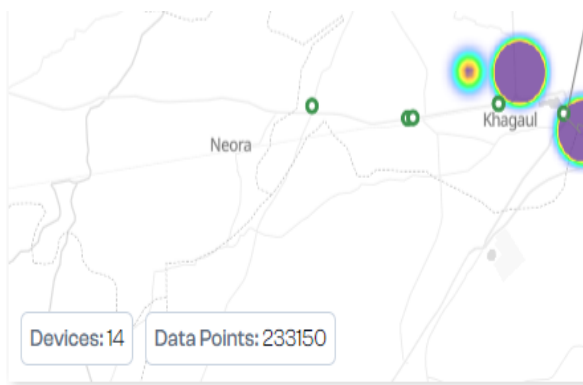

f). There are mainly 4 sections in the home page Search, Map, Data Trend and Activity .
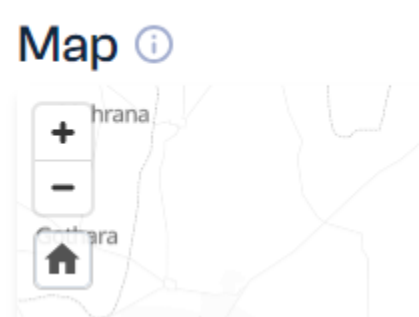
Search

1. The user can be able to enter the inputs and search the data here
2. The search field will be auto populated according to the selection of city from the pop up page
3. According to the search criteria the heatmap will be display the details
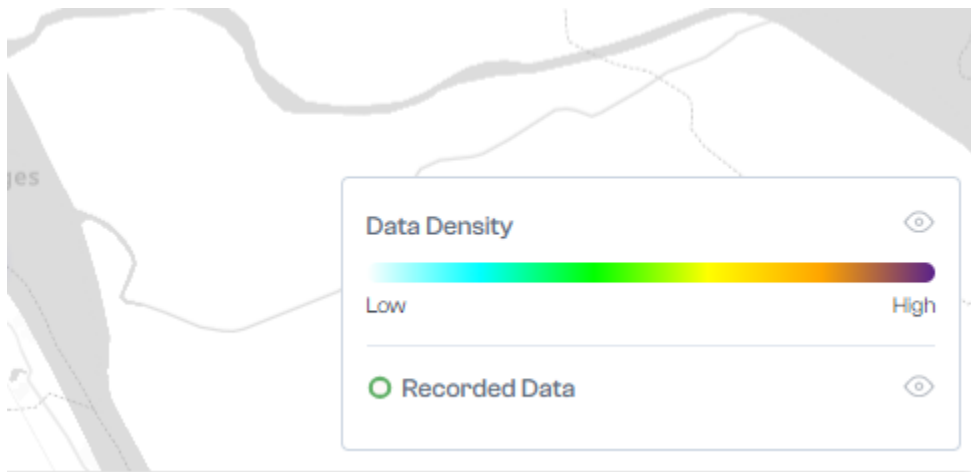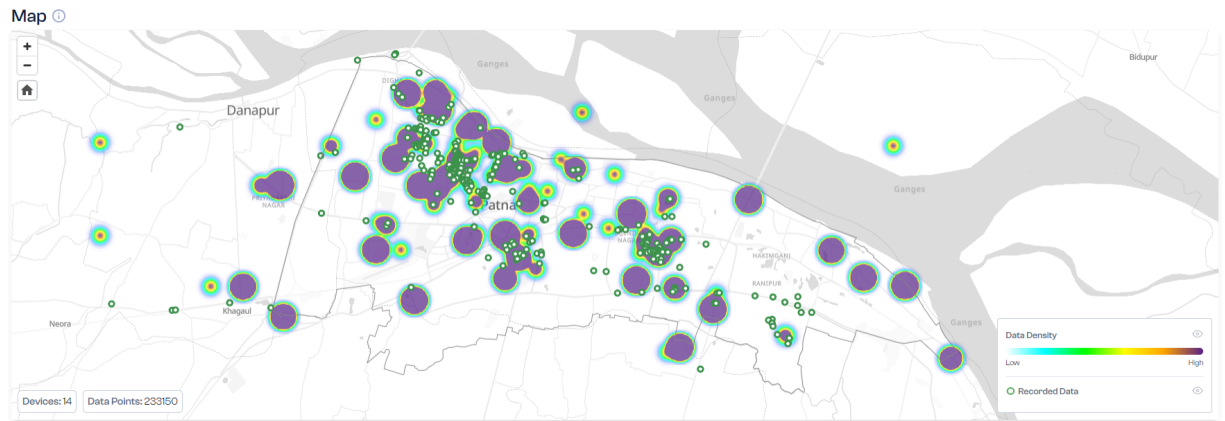
Map

1. This is the major module where the data visualization happens
2. The heatmap shows the density of the data points collected by sensors
3. User can view an info icon against the Map header to know the details
4. There are 3 map controls Zoom in, Zoom out and Reset view
5. User is able to view the Device count and Data points collected in the map
6. The color gradient represents the intensity of data points collected in a specific area
7. For Static sensor type , sensor name will also be displayed in the map
8. For Dynamic sensor type, user can view the details of the selected location
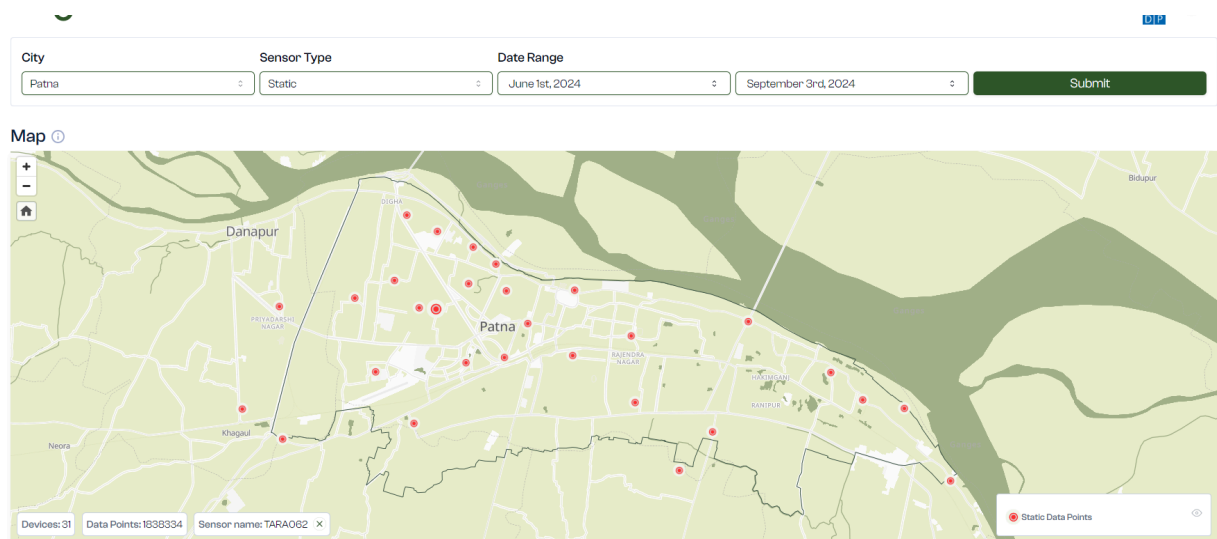9. User can view the legends with show/hidden button in the map
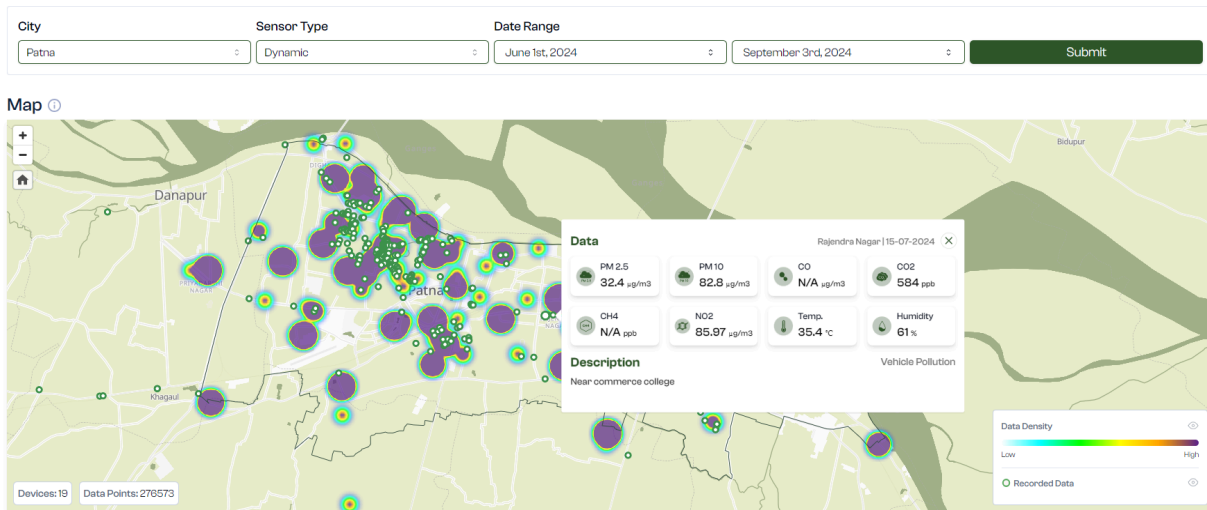

Devices & Data Points

Map controls

Map ⓘ

Devices: 14 | Data Points: 233150

Data Density ⓘ
Low ——— High
○ Recorded Data

Data Density 👁
Low ——————————————— High

○ Recorded Data 👁

Legends with show/hide icon

City	Sensor Type	Date Range		
Patna ⌄	Static ⌄	June 1st, 2024 ⌄	September 3rd, 2024 ⌄	Submit

Map ⓘ

Devices: 31 | Data Points: 1838334 | Sensor name: TARA062 ✕

Static Data Points 👁

Data Trend

1. This section shows the trend of data points collected by the sensors over a specific period

2. The graph represents the data points collected over time for each sensor type

3. According to the search criteria the data trend will be updated
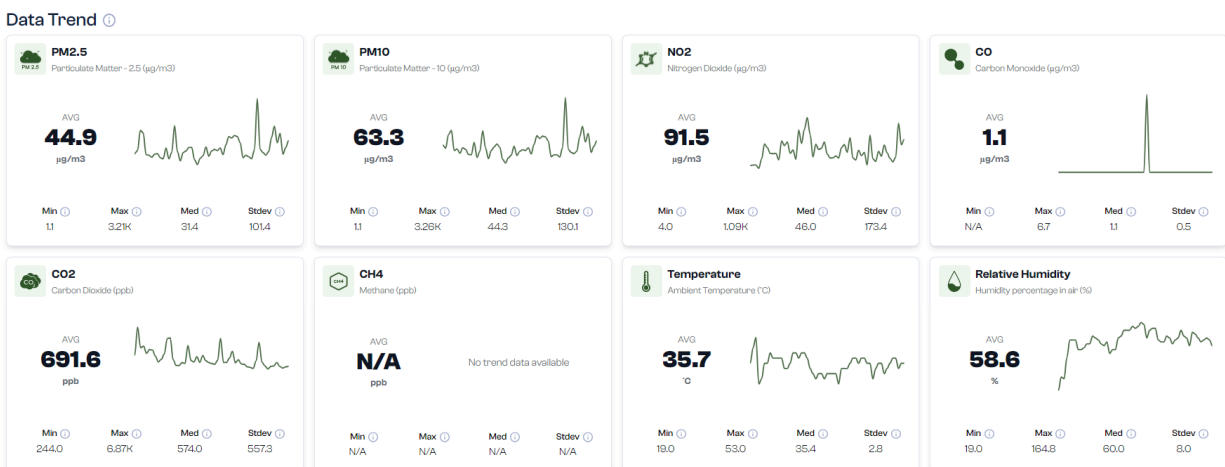
Activity

1. This section shows the activity graph of data points collected by the sensors over a specific period
2. The graph represents the data points collected over time for each sensor type
3. The data range will be shown at the top
4. According to the search criteria the activity section will be updated
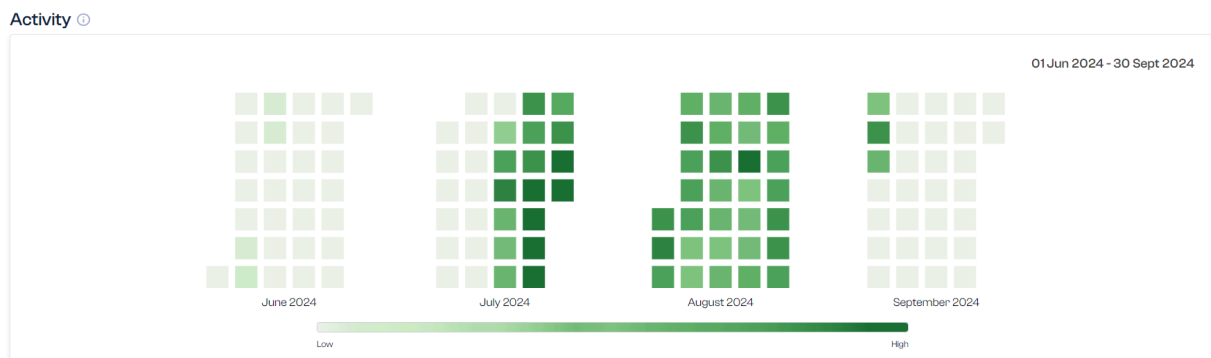
Download Data

1. The user can view the Download Data button at the bottom right
2. While clicking on the download button a pop up will appear
3. User can enters the details for downloading the data and clicks on the download data button
4. The data downloaded in csv format
5. User can close the download pop up while clicking on the close button

June 2024   July 2024   August 2024   September 2024

Low   High

Download Data

Developed by mistEO
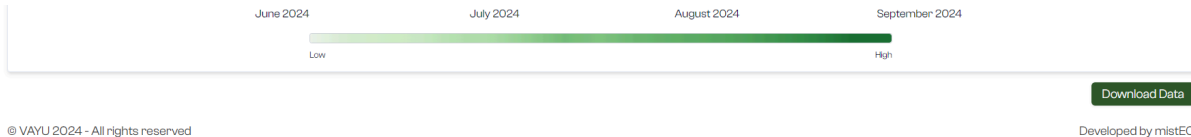
Download Data

Download data for the selected month, city and device type

Month

August 2024
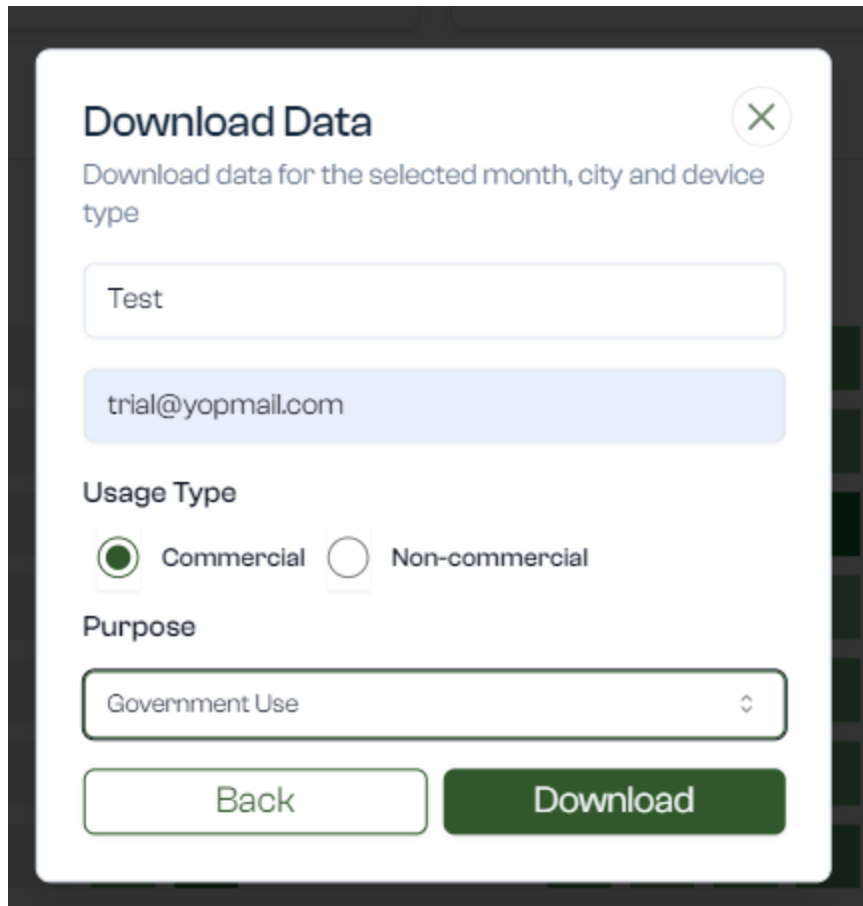
City

Patna

Device Type

Dynamic

Next

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About Section

1. The user can view the About section button near to the UNDP logo
2. Clicking on the the about section leads to the list of menu
3. The user can clicks or scroll on the each options to view the details
4. The user can clicks on the close the button in order to close the about section and it navigate back to the home page
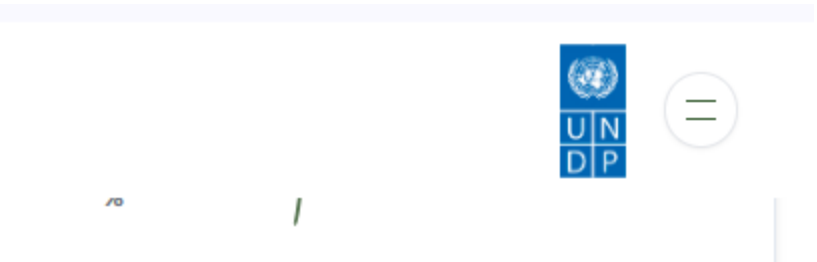
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Hyperlocal Mapping of Air Pollution and GHG emissions

Hyperlocal Mapping of Air Pollution project is part of the Climate & Energy Lacuna Fund cohort of 2023.

Under this initiative, a novel approach is employed by leveraging citizen scientists and IoT-based low-cost sensors to collect hyperlocal air quality data. This data is used to identify pollution sources and risk zones, facilitating targeted actions by regulatory authorities.

To showcase data outreach, the project features the VAYU Android-based application and the VAYU citizen portal digital stack, which support targeted interventions and customized solutions backed by AI/ML algorithms. These tools potentially develop new approaches in air pollution management while reducing public investment costs.

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Activity 1 : Identification of Risk Zones: Use primary and secondary air quality data to identify high-risk zones within cities.

Activity 2 : Training Citizen Scientists - Recruit and train 100 citizen scientists (50 from each city) to collect air quality data.

Activity 3 : Data Collection - Utilize IoT-based low-cost air quality sensors and the VAYU Mobile App for data collection.
- Install static sensors in major emission zones identified via satellite city maps.
- Equip citizen scientists with mobile low-cost IoT sensors to measure hyperlocal air quality in high emission areas.
- Collect data on pollutants (CO, CO2, NOx, PM2.5, PM10) every 15 seconds and transfer via WiFi/Bluetooth to the Mobile App.
- Upload collected data along with location information to UNDP's VAYU API server.

Activity 4: Data Processing - Process collected data for analysis and insights.

Activity 5: Use Case Pathways - Collaborate with research partners (e.g., University of Nottingham) for data modeling using open data sources (satellite data from ESA/NASA, IoT data).
- Establish data pipelines and automated data modeling to create India's first real-time digital stack on emissions, covering all emission sources in targeted cities.

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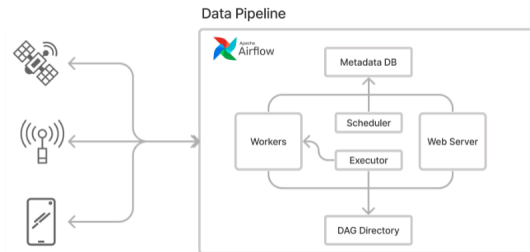
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If you have any questions or comments about Vayu, please leave a comment on the Discussions tab of our GitHub repository or send an email to acceleratorlab.in@undp.org

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