

COVID Saarthi

A Real-time Dashboard for COVID and generating alerts

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Abstract: We are in the middle of a COVID pandemic to achieve the most understandable and accurate display of information. The visualization is done using interactive maps. Improving existing platforms and designing user-friendly and interactive are among the important tasks to perform an accurate visualization of the information. Furthermore, the necessary resources of people living in India according to the district are implemented with the existing API. Hardware has been developed which alerts the user whenever new cases, deaths and recovery occur. The visibility of the data will be made transparent globally. It would help people of different sectors to analyze the data better, take quick action, identify patterns in the data, identify errors, understand the story in every region, and last but not the least, grasp the latest trends. It would help leaders as well as decision makers leverage data to drive their crisis response. This would help the government authorities to impose a curfew or impose specific restrictions on the concerned region. We plan to reduce the spread of rumours and need to find contacts that can be done by providing the necessary and important contacts such as helpline numbers.

IndexTerms - Internet of Things, Visualization, Real-time systems, styling, electronic mail, Data visualization, User interfaces, Application programming interfaces

I. INTRODUCTION

The Novel Corona virus is a new virus that was first discovered in Wuhan, China. It was named as such because it had previously not been identified. The exact origin of COVID-19 has not been discovered presently. The virus has a substantial family of viruses, which are responsible for illness among human beings as well as animals. Some evidence made relations with the seafood and animal market in Wuhan, China, where initially many patients were found. This relationship gives an indication that the corona virus has emerged from an animal source.

The symptoms of patients with the corona virus include acute fever, cough, and problems with respiration. Since it is a unique virus, the spread of transmission of the virus is not clear. The animal source is the main reason behind corona virus, but the transmission is from one human to another. It occurs when a person is infected with the corona virus, coughs, or sneezes. The national helpline numbers that are functional 24*7 were set up by the Government. Additionally, a dedicated WhatsApp group to spread awareness regarding the deadly corona virus has been set up by the government.

The government is constantly updating the latest information related to corona virus such as the number of people infected, deaths, etc. on its official website [1].

No treatment, vaccine available or synthesized medicine is ready that can fight this virus completely. There are no specific treatments approved by the World Health Organization (WHO) available to cure the novel corona virus, but the infected people should make sure to take supportive care and improve their immunity power to get relief from the symptoms. Unnecessary travelling must be cancelled. Washing your hands in regular intervals with soap and covering your mouth with a handkerchief while coughing and sneezing must be followed. Observing clean hygiene is recommended. In case a person has contact with a person who has a positive case of corona virus, then your health is constantly checked for 4 weeks running from the last day of the occurrence of symptoms [2]. One must observe oneself for symptoms such as coughing, fever, dry throat, shortness of breath or difficulty in breathing and other breathing-related problems. The nearest health facility must be visited for any of these symptoms to arise.

Those who come into contact with the virus are quarantined and monitored even if they are not ill but might be infected, which means that the person who encountered contact with the medically affected patient or disease is either quarantined at home or at the centre to stop the spread. Right away, the person's well-being is monitored constantly [3]. WHO recommends a quarantine period of 2 weeks right from the time for the person who was subjected to contact of the Novel corona virus patient. If home quarantine is selected or ordered, the person should be allotted a separate uncrowded room, or if a single room is not feasible, maintaining a space of 1 meter from other family members or social distancing, reducing the usage of commonly used spaces such as cutlery, kitchen, washroom and bathroom if used should be well-ventilated and sanitized [4].

To understand and discover the findings from the data, the picture would mean thousands of words [5]. The brain processes 90% of the visual information. Within 13 milliseconds, an image is processed by the human brain. Image processing in humans is 60,000 times quicker than text. 80% of people are able to recollect what they see, compared to 10% of what they listen and 20% of what they read. In reply to the analysis of the questionnaire, 95% of B2B buyers responded that they required short-lived and beautiful visual blends of content. Normally, publishers whose matter consists of visual features have the potential to enjoy 12 times more customer traffic, 12 times quicker than those who do not follow these principles. Most of the time, people generally do not prefer text. The general populace only read 20-28% of the words on a given page. 80% of individuals will prefer to opt for video, but only 20% of individuals will indulge in reading textual content. 55% of web surfers stay active for less than 15 seconds to read. Many people surely are not great listeners. People generally recall only 10% of the details after three days of consumption [6]. If a related image is coupled with similar information, people's attention was retained by 65% of the information three days later. People genuinely feed pictures, infographics, and videos to their brains to entertain themselves. In the case of Instagram, close to 95 million infographics pictures are uploaded daily. Elsewhere on Twitter, tweets consisting of pictures and videos usually acquire 150% more retweets as compared to tweets without them. Functions of the brain related to visual processing are allocated 50-80% of the human brain's usage [7].

Corona virus is continuing to spread globally with now more than 4750124 cases worldwide. The global death toll has surpassed 313797. Hence, a dashboard was developed that would display real-time data. Hardware will send alerts as per updated activity.

II. BLOCK DIAGRAM

A. Dashboard

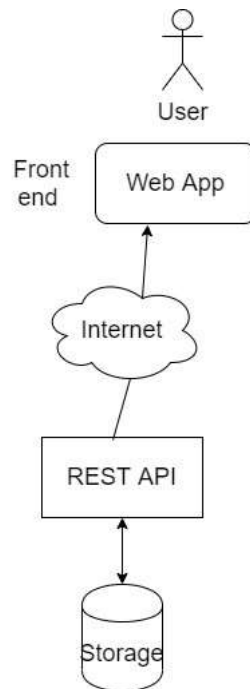


Fig. 1: Block diagram of web based dashboard.

From a broad perspective, the web app sends a request via the internet asking for data from the API. In return, it receives a response to the request.

B. Hardware for sending email alerts

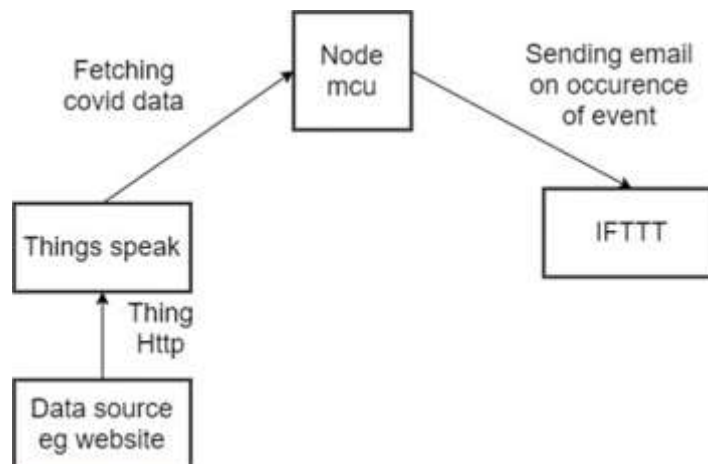


Fig. 2: Block diagram of hardware for sending email alerts.

The API is made by scraping data from a website with Things Speak service. The Node MCU fetches data from this API. When new cases are reported, an email is sent to the user.

III. CASE STUDIES

Best corona virus tracker dashboards

A. Johns Hopkins University Dashboard

A team consisting of Dong E, Du H, Gardner L from Johns Hopkins University designed a user-friendly web-based dashboard, it was made live by the Center for Systems Science and Engineering of that university in action for COVID 19 to represent and track current cases. It was first publicly visible on January 22 [8].

B. Microsoft Bing COVID-19 Dashboard

Microsoft Bing's COVID-19 dashboard is the simplest of all and easier to access and use on mobile phones and tablets. The interface is not heavy and takes very little time to load. The main plus point of this tracker is that it shows the latest updates, news, and stories of corona virus cases from your current location you are in [9].

C. World Health Organization Dashboard

It represents WHO data in a user-friendly way to help keep communities safe, alert, and informed. The dashboard, which is interactive, is available in a desktop and mobile-friendly version. The dashboard's beautiful and clean interface maps confirmed cases and deaths and highlights how the corona virus is spreading over time to provide an update on a community's risks and to empower people to make knowledgeable decisions [10].

D. COVID 19 India

They are using state bulletins and official handles like Twitter and government websites to upgrade their numbers. Volunteers verify the data and push a Google sheet and an API [11].

IV. TECHNOLOGY STACK

It is a group of technologies, software frameworks, and tools that were used in completely developing and deploying the web apps, apps, hardware, and other digital products.

A. Dashboard

1) React JS (Javascript)

- It was launched back in 2013.
- React is a virtual Document Object Model that is properly structured and quite a user interactivity is handled by it. It has the final say on performance [12].
- It offers fast rendering or loads the web app quickly.
- The code comprises of modular structure and is quite flexible.
- Google rank is determined by the rendering speed and less time required to retrieve the page. Nevertheless, it is Search engine optimization friendly.
- Lastly, it is used by a majority of companies under the category of fortune 500 [13].

2) REST API

- Representational state transfer, called REST API (application program interface), is a set of rules for implementing Web services with a proper architectural style defined.
- It is the interface between systems using the HTTP protocol to transfer data or do manipulation operations over it in different formats (like XML and JSON) which enable quicker handling.
- Scalability is increased due to the segregation between client and server by a team of developers without much difficulty, flexible and portable due to the shift from one server to another server or else perform manipulations on the database anywhere and anytime.
- If the front and back ends could be hosted on different servers, a significant management advantage would be added upon [14].
- API used are
 - <https://corona.lmao.ninja/v2/countries/>
 - <https://corona.lmao.ninja/v2/all>
 - <https://api.covid19india.org/>
- Major library used in React JS

Library Used	Purpose	Significance
Reactsimplemaps [15]	For maps	It is a simple, tiny, flexible, extensible library to create maps. It integrates with other libraries offered by React.
@materialui/core [16]	For adding appbar	It is the best component library that emulates Google's Material Design.
Reacttable [17]	For table generation	It is the library which organizes information into rows and columns. A lightweight react-table is separately allotted to store, represent and visualize data in a properly well-defined format. The react-table is quite fast, fully customizable and has an extendable datagrid.
React tooltip [18]	For customizing hover	It is a library that supplies tooltips that display important information in the text boxes when hovering, focusing, and tapping on an element is done.
Reactchartjs-2 [19]	For charts visualization	It is the library to provide charts.
Axios [20]	fetch api	It is a library that helps us make http requests to external resources.
Styledcomponents [21]	For adding beauty into various elements	It is library to write Cascading Style Sheets(CSS) that is scoped to a single component, and does not apply to any other element in the page.

TABLE I: Library used

B. Hardware

Node mcu is a 32 bit microcontroller whose power consumption is very low, it is used to connect things speak to receiving data, and IFTTT is used to recognize alerts and send via email. Arduino IDE is used to compile and program Node mcu with a specific code.c code.

- Arduino IDE [22]
 - It is an Integrated Development Environment application which is supported on different platforms. It is used to upload and compile code in an Arduino supported board and, with the help of 3rd party libraries of various cores it is used to upload the code.
- Node MCU [23]
 - It is an open source microcontroller based on IOT (Internet of things) platform in addition to that it contains Wi-Fi SoC(system on chip). The size of the microcontroller is small.
- IFTTT [24]
 - It is used to connect different apps and devices and it is used as an automating tool for web-based applications to perform actions such as posting the same content on various socially connected virtual networks.
- ThingSpeak API [25]
 - It works on HTTP and MQTT protocols to store and retrieve data, also it is an Internet of Things API which is available to all because it is open source.

V. WORKING**A. Dashboard**

- 1) The useEffect hook essentially is to allow side effects within the functional component in React JS.
- 2) The useEffect hook replaced the componentDidMount, componentDidUpdate, and componentWillUnmount combined in the react framework.
- 3) The useEffect hook is used to retrieve the data from an API with Axios after that it is stored in the local state variable with the state hook's update functionality. Since state variables are updated after every change, the component automatically upgrades itself and the effect is called once more in action. It retrieves the data again and again. Thus, it automatically upgrades on the change of values in the API.
- 4) The data from the state variables are then passed to the region allocated by the map. Hence, vital information such as active death and recovery are accurately displayed onto the map. By clicking on the state, the district level view is visible along with the zone colour.
- 5) As soon as the API is updated, it is automatically reflected.
- 6) Contacts with Valuable Resources as per the filters can be availed by the users.
- 7) API used
 - a) Total cases info API - corona.lmao.ninja/v2/all
 - b) Country-wise info API -
 - c) corona.lmao.ninja/v2/countries/
 - d) India state wise info API covid19india.org/data.json
 - e) Indian district wise info API covid19india.org/state/ district wise.json
 - f) Indian district zone wise info API covid19india.org/zones.json
 - g) Indian resources district wise info API covid19india.org/resources/resources.json

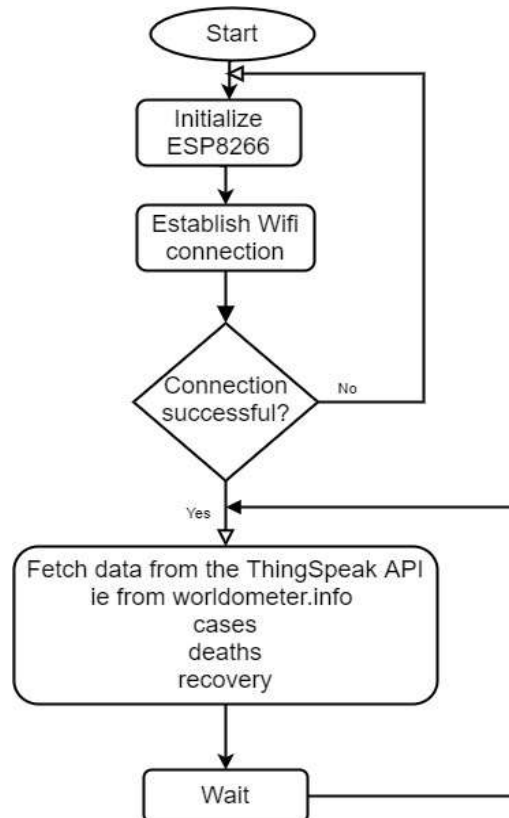


Fig. 3: Flow diagram of fetching data from Thing Speak API.

The hardware is explained with the help of a functional flow diagram. The flow diagram would help in understanding the complex system. It would help in addressing the solution in a better way. The API is made from a Worldometers info website using Thing Speak thing http. Thus, the data is scraped from the website from a particular div tag in the HTML code. This website is decided to get the data. In our case, we are fetching the deaths, active cases, and recovery of corona virus cases. This API can be requested by the hardware.

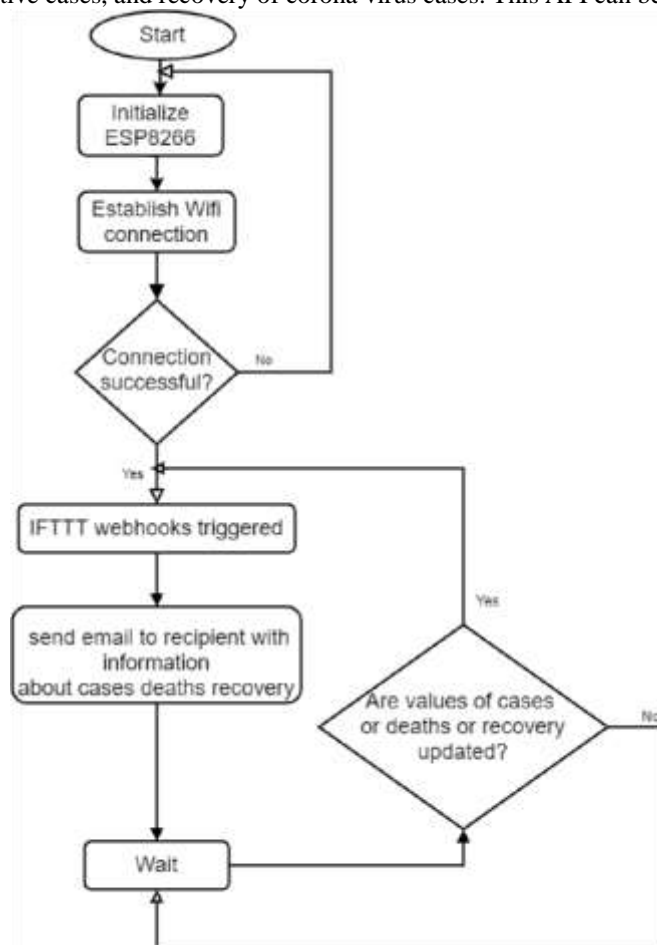


Fig. 4: Flow diagram of sending data from IFTTT webhooks.

IFTTT uses a straightforward trigger-event logic and works with a variety of services for both the triggers and events. Webhooks accept, GET, and POST requests, with POST requests one can send some JSON data if needed for more complex events. In this case, GET request is used. Now the data that is fetched onto node mcu. On the occurrence of new cases, deaths, or recoveries, IFTTT webhooks are

triggered and notifications are generated. These notifications are sent through IFTTT using the Webhooks service, that is, an email is sent to the user regarding the updates of cases, deaths, and recoveries.

VI. BENEFITS

- Better analysis
 - Based on the number of cases and the frequency of the same in a particular area, the areas can be designated as COVID-19 hot spots or containment zones. These areas would ideally require longer lockdowns and aggressive testing measures. Thus, these analyses can be done with the help of the current setup.
- Quick action
 - Government officials can take urgent action as per the current scenario and can order a complete lockdown or would uplift or relax some restrictions on some regions.
- Identifying patterns
 - Mathematical and data modelling techniques may help provide real evidence and insights into the transmission, severity, and intensity of the disease, which could ultimately help in decision-making in combating the disease.
 - The patterns will help to inform modelling predictions of the disease's spread and to assess and design control strategies.
- Finding errors
 - The errors can be found by comparing with other sources and references about the statistics.
- Understanding the story
 - Transparency would be enhanced and would be reaching the common audience.
- Grasping the Latest Trends
 - This would help in planning in the post Covid 19 era.
 - Like working from home, the trend will continue further in the coming months and adapting will help the organization to experience exponential growth.
- Get notification updates
 - Emails would be sent on alerts hence keeping the users up to date.

VII. RESULTS

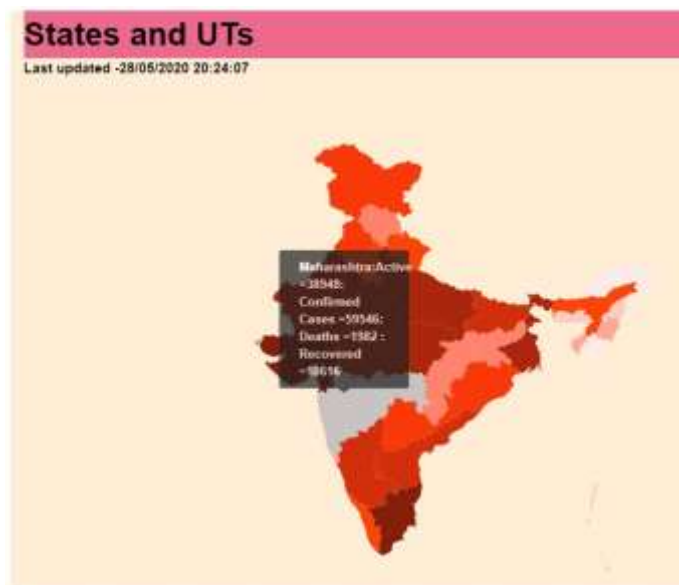


Fig. 5: Demographics page.

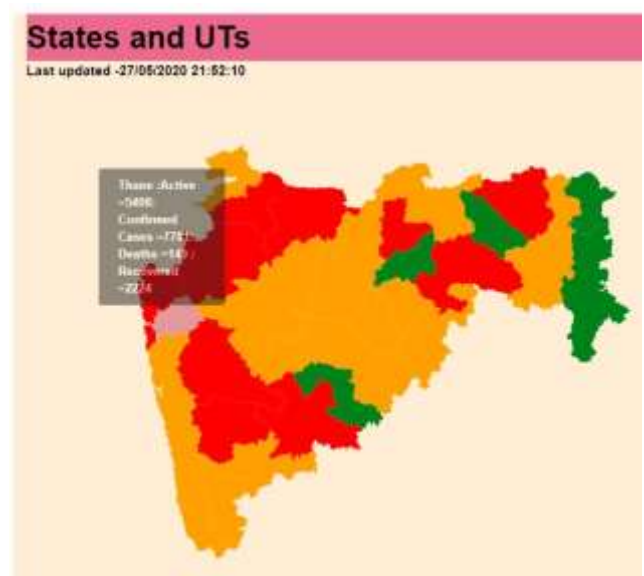


Fig. 6: Demographics page when clicked on a state

The demographics of India are displayed along with an App Bar containing tabs of demographics, Statistics, Resources, and World. All the states are filled with colours as per the number of cases registered. As we hover over each state, important information such as active cases, confirmed cases, deaths, recoveries are displayed on the tool tip. The time at which it is updated is displayed at the position above the map.

If you click on any state, it will take you to the district level view where you can zoom in and zoom out as per the requirements as shown in Fig. 6, also the states are mentioned. The districts are given colours as per the zones declared by the government authorities.



India	
Cases	159138
Deaths	4542
Recovered	67983
Today's cases	1052
Today's Deaths	8
Active	86613
Critical	8944

Fig. 7: Statistics page.

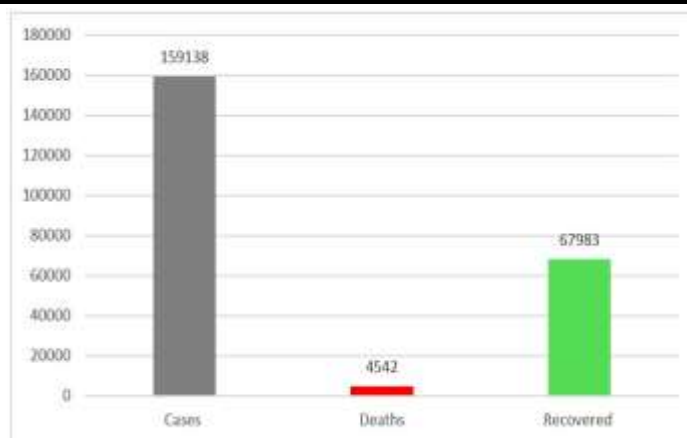


Fig. 8: Statistics page with charts.

It gives information on corona virus cases of countries all around the world. There is a search bar to search countries. The card also contains a bar chart of the infected recovered and deaths as shown in the above Fig. 8.



Fig. 9 World page with information on click on country.



Fig. 10: Resources page.

Next, the world tab as shown in the above figure would give information on the tooltip by clicking the country. It would provide information on the time at which the updates were made. Recovered active and deceased people. The resources page, as shown in Fig. 10, has different filters and the user will enter details as per location and will get to know various resources available in nearby areas. The resources contain information about quarantine centers, hospitals, Labs, NGO (Non-Governmental Organisation), fund, well being, grocery shops etc their details along with contact number is mentioned. Such details could help in tackling emergency situations.



Fig. 11 Code snippet for sending email alerts and fetching data from Thing Speak API

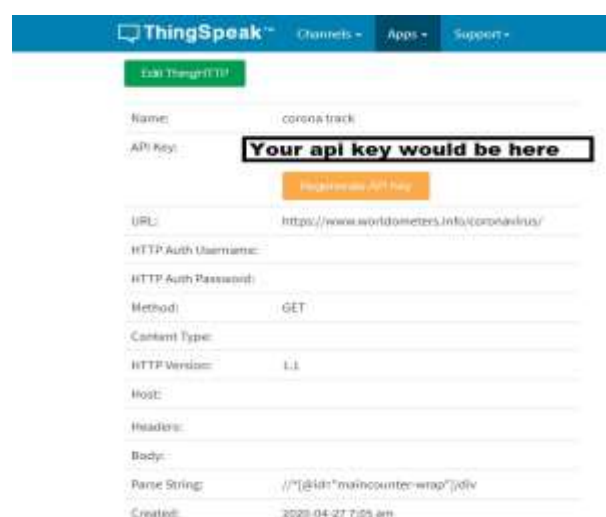


Fig. 12 Snippet of Thing Speak API creation of cases.

Here is the code snippet for generating email alerts and fetching data from Thing Speak API in the arduino IDE. Mention the event name as entered earlier while creating the web hooks service. Add the IFTTT key and the host IFTTT. The data from worldometers is used to make an API, in this scenario the cases are fetched from the URL and the GET method is used. Similarly, death data is scrapped from the Worldometers Info website and used over here and the data of recovered patients is fetched and is used to make an API.



Fig. 13 Snippet of IFTTT webhook trigger.



Fig. 14 Snippet of email received.

Now, whenever the variables containing cases, deaths, and recoveries are updated, the web hook service is triggered, as shown in Fig. 14. Emails are sent whenever the data changes. Therefore, email alerts help in keeping the user up to date, informed and transparent.

VIII. CONCLUSION

As per Sanskrit meaning "Saarthi" means a charioteer, companion, helper leader guide which helps or navigates during tough times. In this case, it helps or guides us by keeping the user updated and transparent by sending emails, visualizing through the dashboard, and getting information about valuable resources nearby.

Hence, the user-friendly dashboard would help update users of different backgrounds to gain insights about the areas impacted most heavily by the spread of the pandemic. Filter by location for custom views and granular insights. Creating a positive impact during the COVID-19 crisis. The global health crisis would ultimately result in the spread of rumours regarding the disease. It calls for leaders and experts to take authoritative action to truly update global citizens of the world on the corona virus. Thus, updates would be triggered with the help of hardware. The resources would help the misinformed, uninformed, or stranded people to get transparent information.

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