D3 – Dream, Diverse, Develop

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1. Problem Statement

*Trivandrum is a metropolitan city which is growing day by day. Many new buildings and malls are being build, infrastructure of the city is improving and more people are moving into this city. Expansion of a city also brings new challenges and we must be prudent to make sure that no harm is caused to environment during this process.*

*Trivandrum is a green beautiful place, but as more and more people will come in the city, the human activities will cause more pollution and these pollution levels should be tracked.*

*The most hazardous of these pollutions is Air Pollution which is mainly caused by burning of fossil fuels. The numbers of vehicles on the roads; be it 2-wheelers, cars, buses, trucks, etc. ; are increasing day by day and many harmful gases are released by them. Also chemicals, fumes from spray cans, methane gas from landfills and domestic burning of waste all contribute to Air Pollution.*

1. Suggested solution

*As Air pollution will be increasing day be day in the city, we need to have proper instruments to track the rate at which it is affecting our environment. So our solution is that we should deploy air quality sensors all over the city (4-5km range) and have a centralized system from where we can check the air quality. These data will be collected in real time and stored on cloud, so that we could have a better understanding of how much impact air pollution have on our environment. Vehicles on the roads are the main cause of Air pollution in a city, by having an understanding about how much these vehicles are affecting the air quality we can come up some necessary steps like limiting the numbers of roads, or improving public transport.*

*We will also have an Smartphone application which people of the city can use. It will show the quality of air at a particular area and also let the user check the air quality of any area in the city.*

*Moreover, we will also include temperature and humidity values in our device so that residents of the city can check the customized weather of their area, which will also let them make daily decisions more efficiently.*

*We can also deploy these sensors on public transport and as they move around the city we can have a better understanding of the city’s air quality.*

*All this data will be uploaded in real time to the cloud and can be accessed anywhere with the help of smartphone app.*

1. Implementation details

*The implementation of this solution will be achieved in 3 Steps. First 2 steps will be off the field and can be carried out from 1 place.*

1. *Prototyping the sensors : To measure the air quality, temperature and humidity we need sensors. Then we need a microcontroller to collect data from these sensors and after that we need to push these values on the cloud.*

*To collect the temperature and humidity values we can use DHT-11 sensors which sends the required values using I2C protocol.*

*And to collect Air quality value we can use MQ135 sensor which can measure the overall air quality. This sensors send the required value using serial communication.*

*The values from the sensors can be collected using a Arduino board and pushed to the cloud using raspberry pi/ ESP8266 and a wifi connection.*

1. *Monitoring of the Data : The values which are send by Arduino should be collected on the cloud. We can use AWS or any other cloud platform to collect these values. Then we should hava an smartphone app. We can stick to progressive web app, which are cross platform and can be developed rapidly. We can also integrate Google Maps (API’s) and show sensor values in real time.*

*The 3rd step will be off the field. This comprises of choosing the necessary locations and will require human effort in manually going there and deploying the device.*

1. Projected Results

*The results will be that authorities can clearly see the real time and historic data of different parts of the city and can analyze what is the cause of this pollution. The common people can also use this app to check different air quality and temperature of different parts of the city. We can also check how much air quality changed over the span of years and months.*

*Trivandrum is a big city and growing at a good pace. Its important to take care of the environment at an early stage because prevention is always better than cure.*

1. Challenges/constraints

*The challenges faced are*

1. *We need to find and deploy all the locations where we can deploy these devices.*
2. *All the devices need to be connected to internet to push their data to cloud.*