## App Details and Layout:

The app is constructed using Android Studio 3.6.

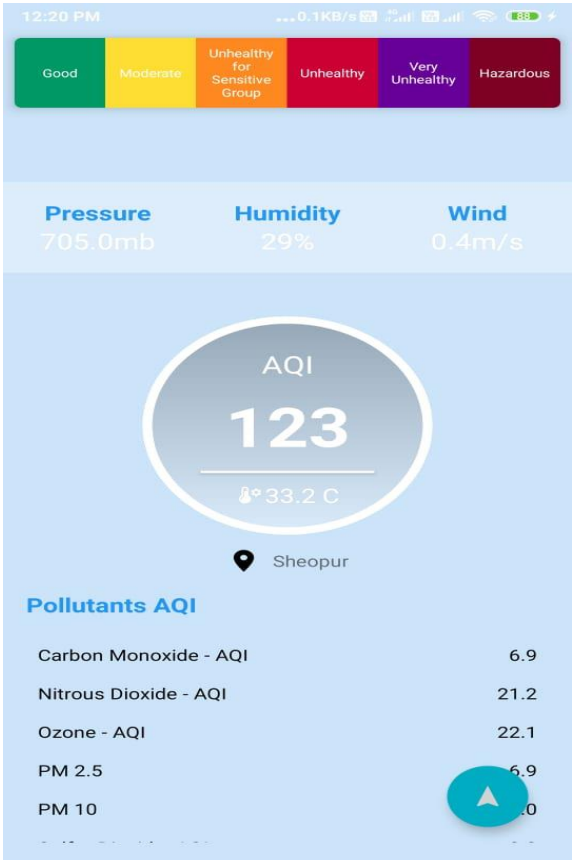


Fig 13: App Layout

**Navigation is still under development phase**

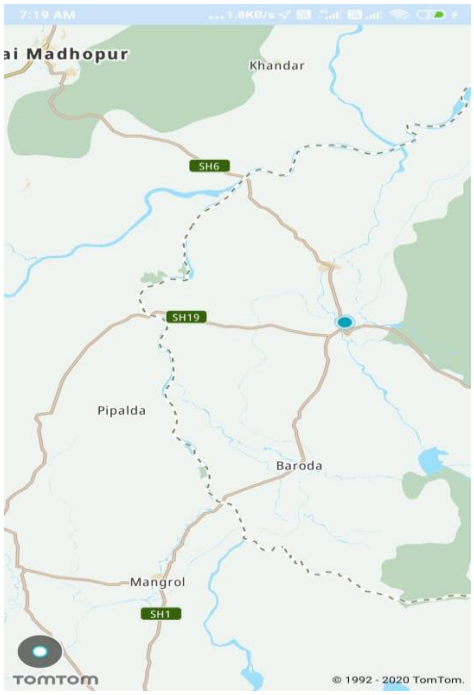


Fig 14: Navigation page




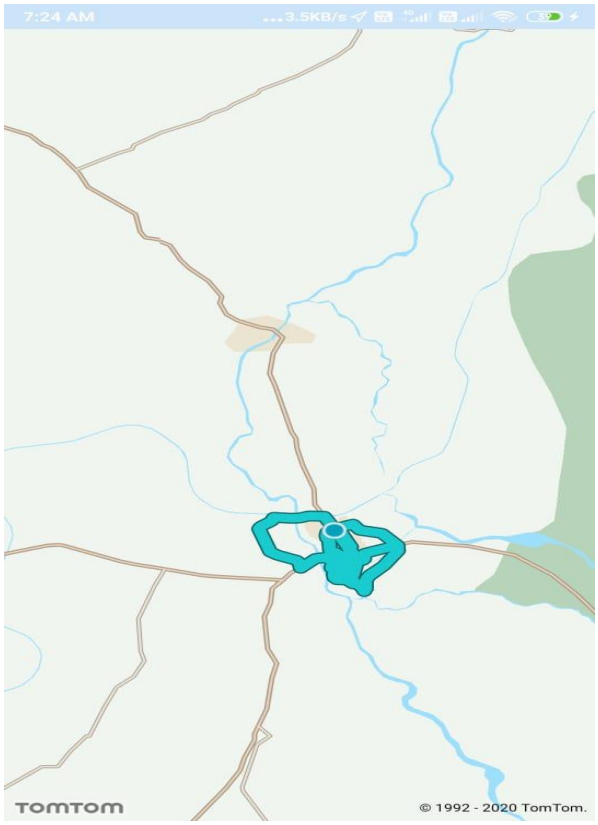


Fig 15: All possible paths from one place to another


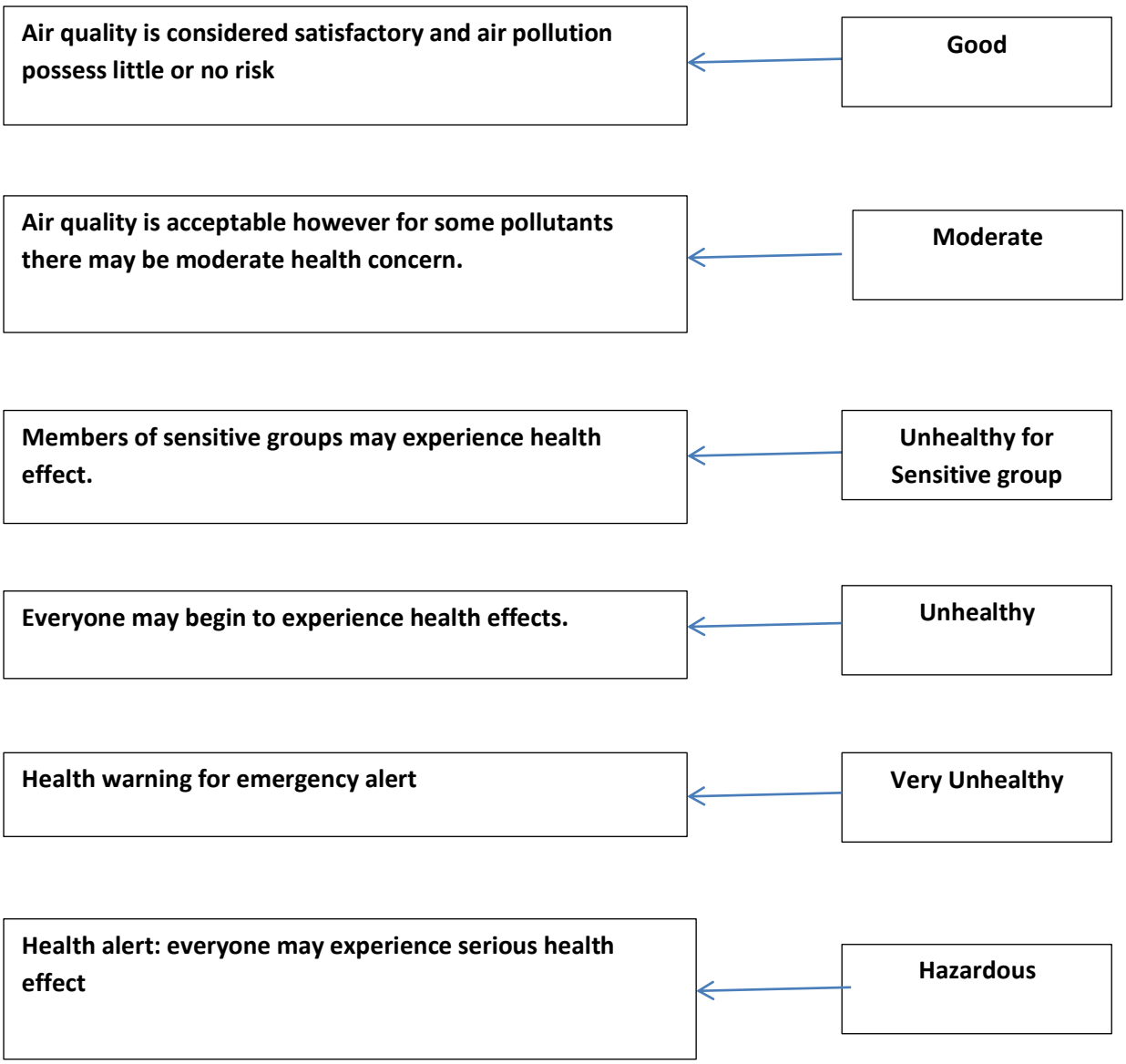


Fig 16: Classification based on Air quality index

**Implementation:**

The project is implemented using the Arduino nano and the values of the ppm of surrounding air is captured using the smoke sensor, The data the transferred to the server so that it will be easier for the person to communicate and find the quality of air in the surrounding environment. The concentration of air is displayed on the LCD display attached to the front of the mask. And a buzzer is also attached so that when the ppm level reaches a maximum value the buzzer starts buzzing and a warning is also displayed on the screen saying "Danger" move to fresh air.

Recent scientific research has drawn strong links between air pollution and adverse health, particularly in susceptible parts of the community which include children, the elderly and sick. Common effects of air pollution include changes in heart and lung functions with increases in associated medical conditions such as asthma, bronchitis, and heart disease. Air pollution also contains compounds which can affect the nervous system and are carcinogenic. The National Pollutant Inventory (NPI) is a database that provides information on the pollutants being emitted to air from a range of industrial, commercial, transport and household activities. Some research has found that the adverse health effects of air pollution has a real cost to the community through increased hospital admissions and premature deaths. The NPI also provides information on the types and amounts of certain pollutants and their impact on human health and the environment.

This project is very useful for the people having health problems related to breathing like asthma, lung cancer, etc. The causes of asthma are an active area of research and involve both genetic and environmental factors. Risk factors leading to asthma include the intake of harmful gases. Almost 7.7 % of American adults have asthma.

The prototype model can be implemented in the cities with poor quality of air due to increased effect of air pollution. So that the prototype model can help the public to breathe clear air and thereby reducing the health risk due increased air pollution day-by-day.

**Comparison:**

Smoke detection is a key component of disaster and accident detection. Despite the wide variety of smoke detection methods and sensors that have been proposed, none has been able to maintain a high frame rate while improving detection performance. In the base paper, a smoke detection method for surveillance cameras is presented that relies on shape features of smoke regions as well as colour information. The method takes advantage of the use of a stationary camera by using a background subtraction method to detect changes in the scene. The colour of the smoke issued to assess the probability that pixels in the scene belong to a smoke region. Due to the variable density of the smoke, not all pixels of the actual smoke area appear in the foreground mask. These separate pixels are united by morphological operations and connected-component labelling methods. The existence of a smoke region is confirmed by analysing the roughness of its boundary. The final step of the algorithm is to check the density of edge pixels within a region. Comparison of objects in the current and previous frames is conducted to distinguish fluid smoke regions from rigid moving objects.

What we are doing is we are recording the quality of air using gas sensor particularly for smoke. It uses a Arduino board, sensor, LCD display and a WiFi module. Our model captures the ppm of the surrounding air and he data is transferred to the server via which the person can see the quality of air around him.

The technologies that have been used in the past are not as efficient as the model proposed by this paper. The previous models have used cameras that are not that accurate as fire could start at blind spots, also it does not help to filter the air of harmful particles. Also, our model has two features that distinguish our model with the previous models, first, it is portable and can be carried anywhere, second, it can be used both ways, to alert from the smoke of fire or filter out the harmful particles from the air. Unlike the previous detection systems, it also provides a pathway if it fails to detect smoke. Our model combined with modern technologies in healthcare could provide support for asthmatic patients.

**Result:**

The prototype model is successfully presented indicating the quality of air. The air quality of the surrounding environment is successfully estimated with the help of senor is displayed over the server with the help of mobile application. The app determines whether the quality of air is very good, good, fair, poor, and very poor depending on the ppm concentration. The ppm concentration for very good air is from 0 to 33, for good air it is 34 to 66, for fair air quality it is 67 to 99, for poor air its 100 to 149 and for very poor air it is above 150 ppm.


Fig 17: Air quality index values

The given values are air quality index for the different types of air based on the concentration of pollution. The app developed successfully measures attributes like concentration of Co2, So2, O3, No2, PM 2.5 and PM 10 which will contribute toward the quality of surrounding air. Pressure, temperature and wind can also be determined at a particular location by using this app. The app contains a navigation button which is attached with Google maps through unique Api-key which is required to access Google maps. The navigation part is still in development phase and soon will be incorporated in the app.

The mask is developed using 3D printing and all the facts are taken in consideration such as weight of mask, shock proof etc. So that our project will work efficiently and is more reliable to the mankind. We are still working on building a compact model which will be light weighted and is more economical.

**Future Scope:**

The prototype model which we presented is based on a small microcontroller (Arduino) which when implemented on large scale is not reliable. So to make our model more reliable the mask can be constructed using powerful microcontrollers or FPGAs. That will help to reduce the cost of production in bulk. And also the mask can be made more compatible.

So the future scope of this project is to implement the model using powerful microcontrollers and also enhance the navigation routes.

## Conclusion

Our model is multipurpose and can be implemented with the help of efficient microcontrollers and a powerful Bluetooth module. The model proposed in this paper is the solution to most of the problems proposed by the other models. Even if an outbreak of fire is not detected, at least a safe passage for the person will be presented by our app. It is safe to use and can be switched on or off using the android application that is paired with the mask.

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