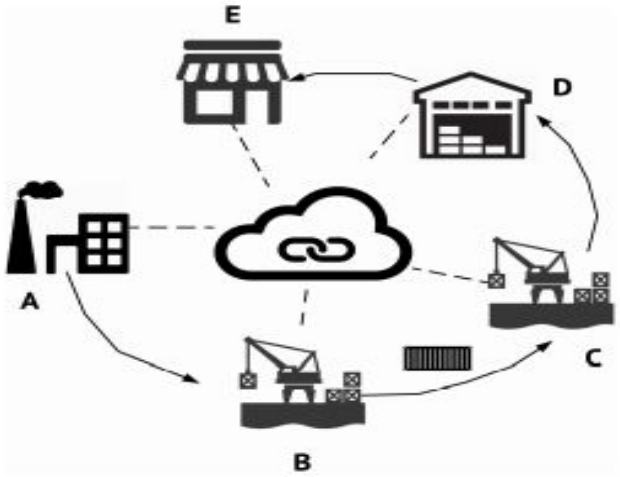
Project Presentation on

IOT BASED AIR QUALITY MONITORING SYSTEM and BLOCKCHAIN SOLUTION



ABSTRACT

- When air get mixed with harmful gases and substances it is called air pollution.
- Mainly three types of air pollutants has been considered namely **green house gases** (CO2, CH4, O3, CO), **acid rain** (NOx and SO2) and **particulate matter** (PM2.5 and PM10).
- The sources of pollutants are industrial emission, hazardous emissions form vechicles,burning of fossil fuels etc.
- Pollutant air can causes severe health effects such as heart disease, lungs cancer, respiratory infections etc.

INTRODUCTION

- This project is aimed to develop an IOT based application to deal with air pollution
- With the help of sensors such as MQ135 various air parameters are sensed and transmitted.
- We used Raspberry Pi because it has built in Wi-Fi and allows us to connect our system to the internet with an ease.
- The prototype connects with Wi-Fi and uploads all air parameters to centralized server.
- Encryption of data was done in the server database using block-chain technology and libraries like Hash library.

EXISTING SYSTEM

- To collect parameters many electro mechanical devices are used.
- These devices are heavy and not economical to install at many places.
- Periodical collection of data is difficult
- Still manual intervention is required for collecting and feeding data to central servers.
- Data is not secured. It can be hacked or tempered.

PROPOSED SYSTEM

- Since its IOT based product all functional units are connected in a network.
- All things such as sensors base station,cetralized server work together by means of communication over network.
- Data collected from sensors gets uploaded to cloud servers instantly and it is encrypted using block-chain technology.
- For authorities such as pollution control board, data is easily available and secure.
- They can draw conclusions and take actions instantly.

HARDWARE REQUIREMENTS

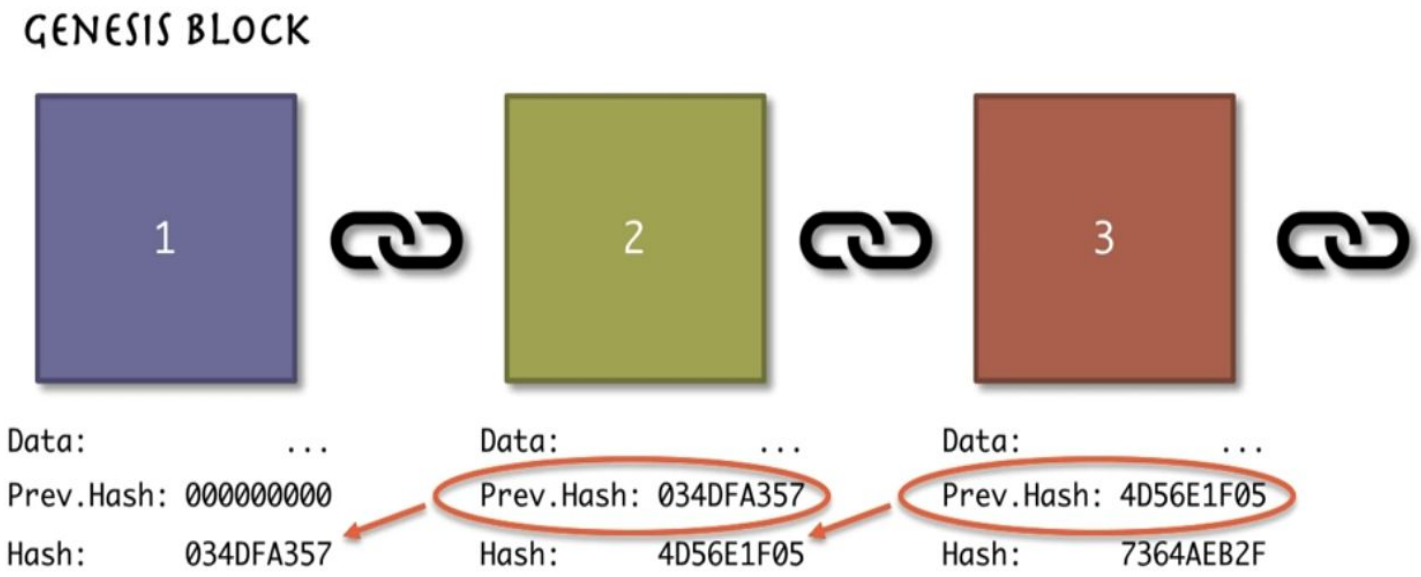
- Raspberry Pi
- Memory Card – 32 GB or higher.
- 1 MQ 135 sensor for CO2 measurement
- Resistors (1k, 2k ohm)
- Bread board
- Jumper wires.

SOFTWARE REQUIREMENTS

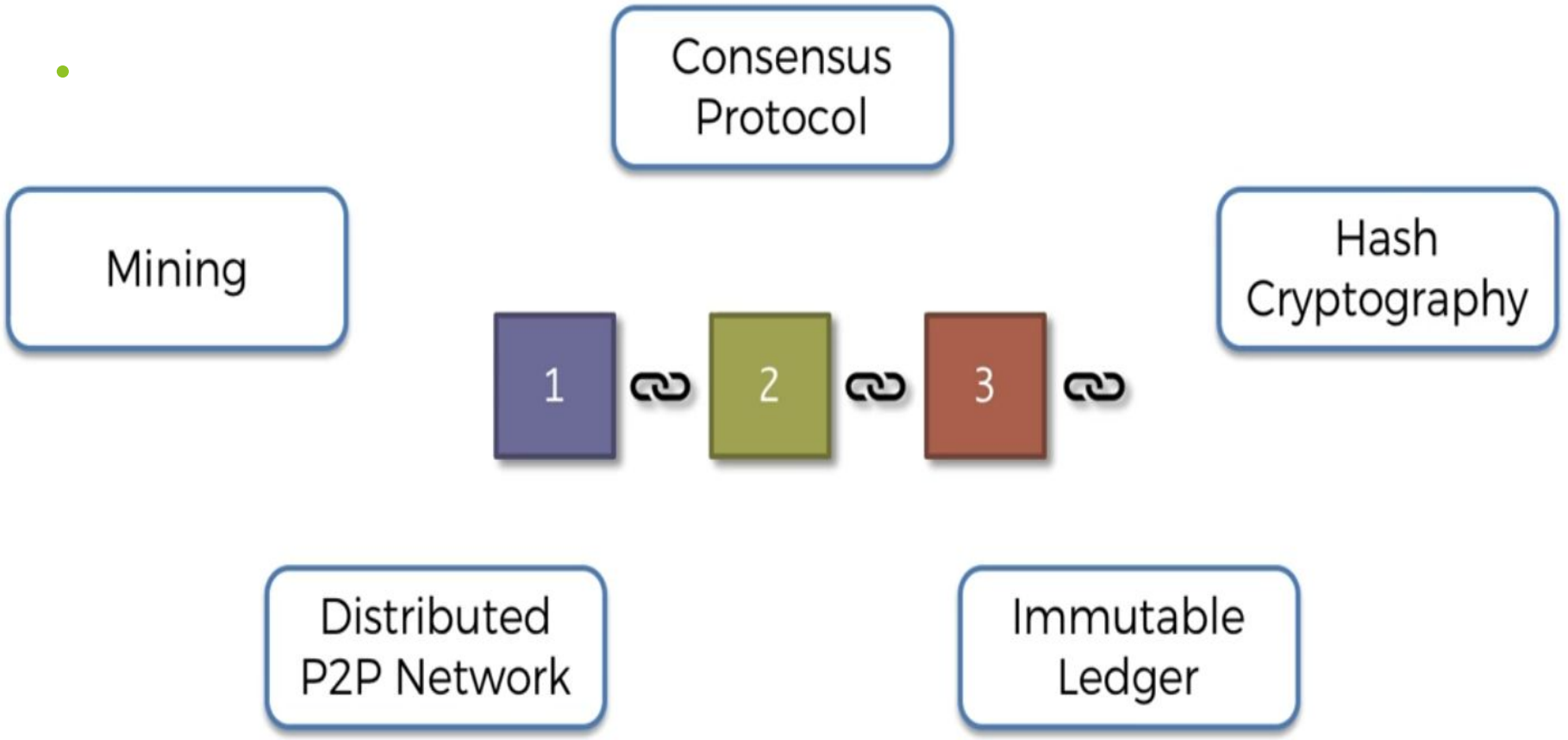
- Knowledge of Block-Chain Technology
- Knowledge of Programming Language (Python)
- App Development
- Cloud Server
- Cloud Database

What is a Blockchain:

- A blockchain is a continuously growing list of records, called blocks, which are linked and secured using cryptography.



"Blocks are cryptographically linked together"



- Fig: key elements of a blockchain.

SYSTEM DESIGN

ARCHITECTURE DIAGRAM

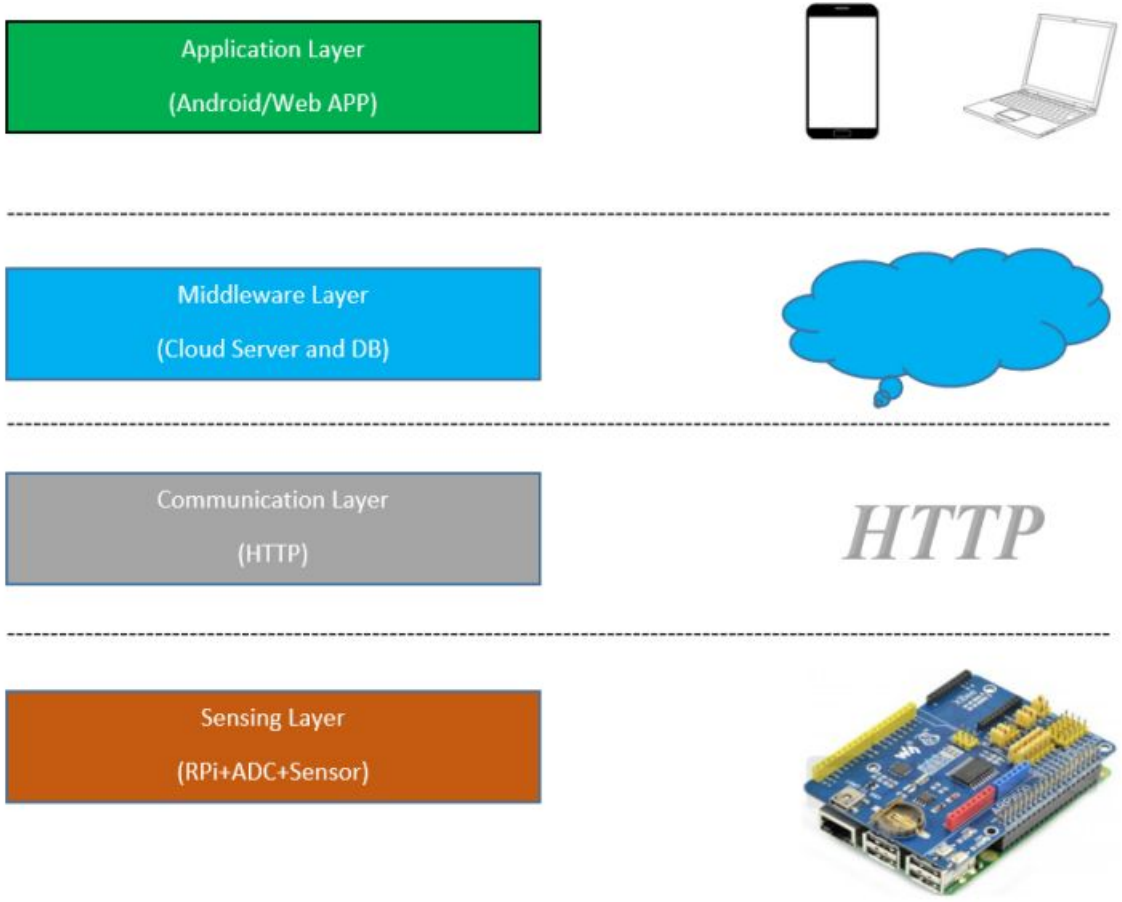
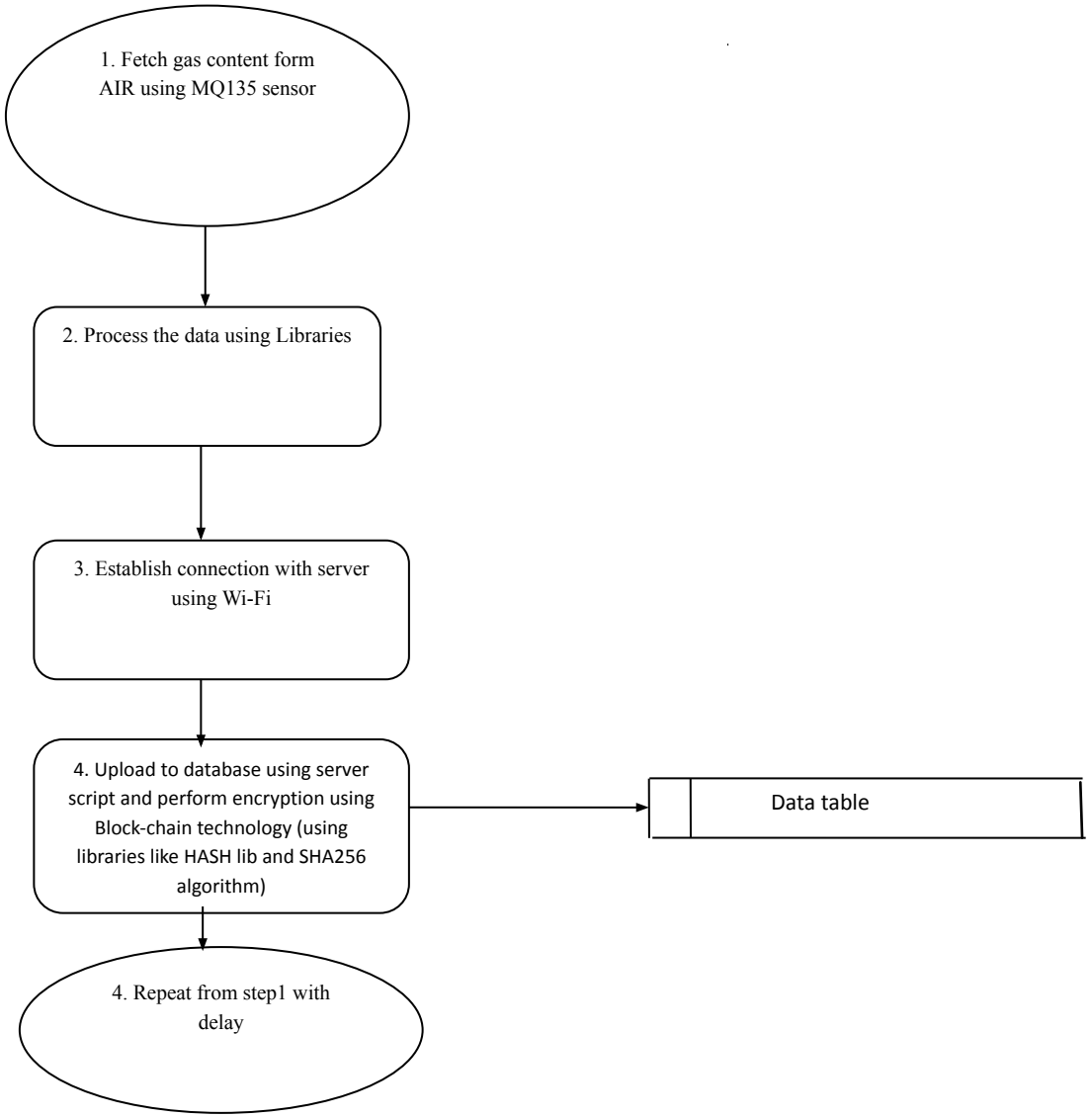
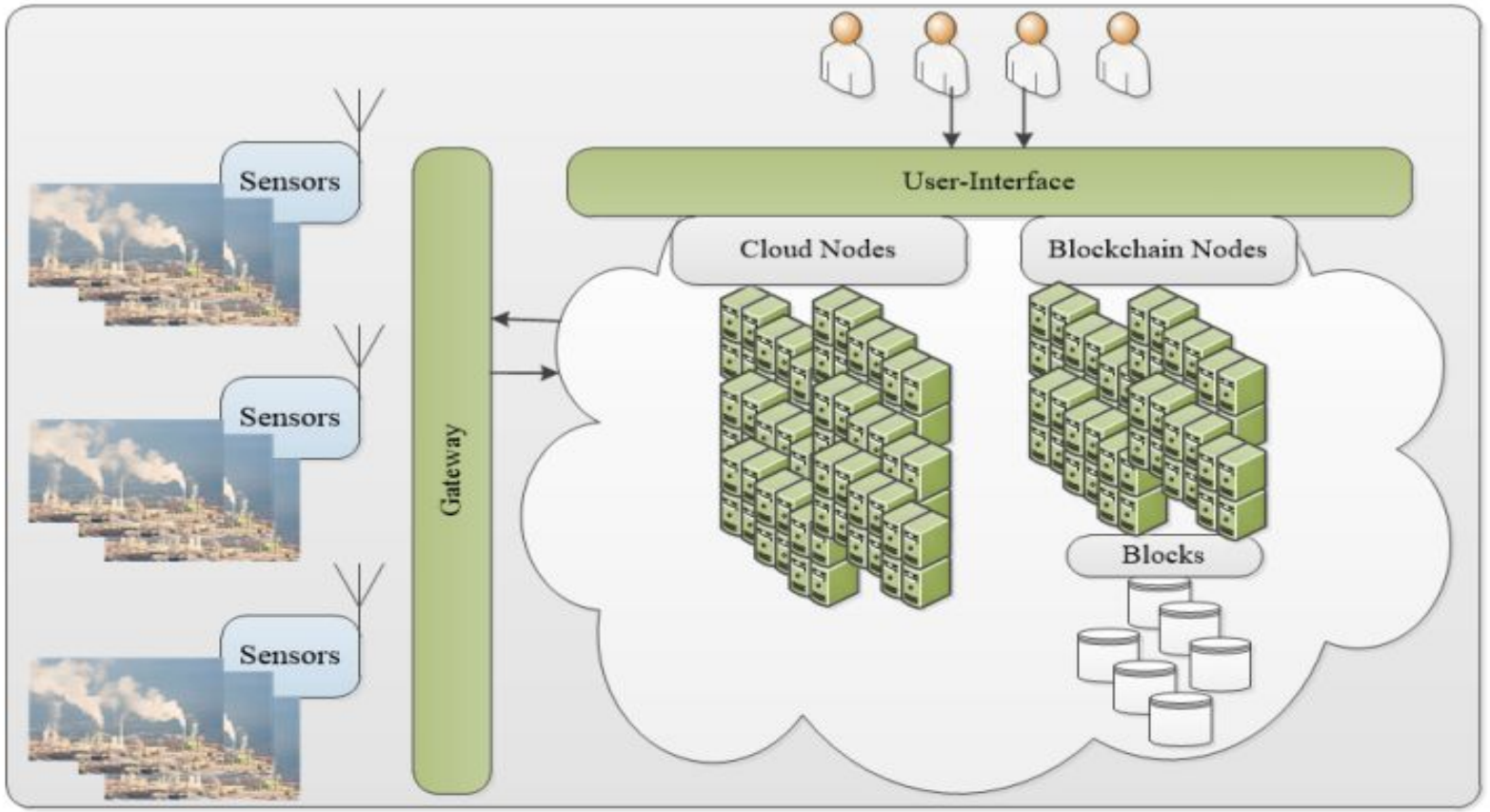


Figure 3.1: Four layered IoT architecture

DATA FLOW DIAGRAM



Implementation of Blockchain



Circuit DIAGRAM

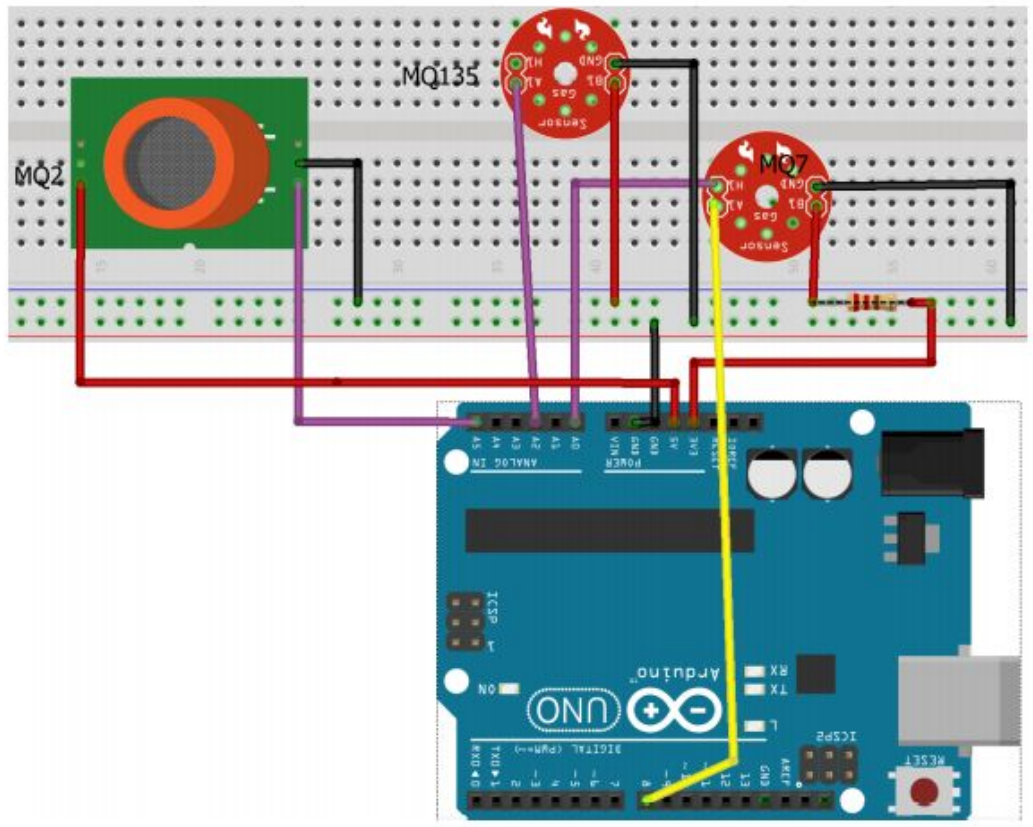


Fig: Circuit Diagram for sensing Air Quality Parameters such as CO, CO2 and Smoke particles

RESULTS

User Interface Part: Mobile Application

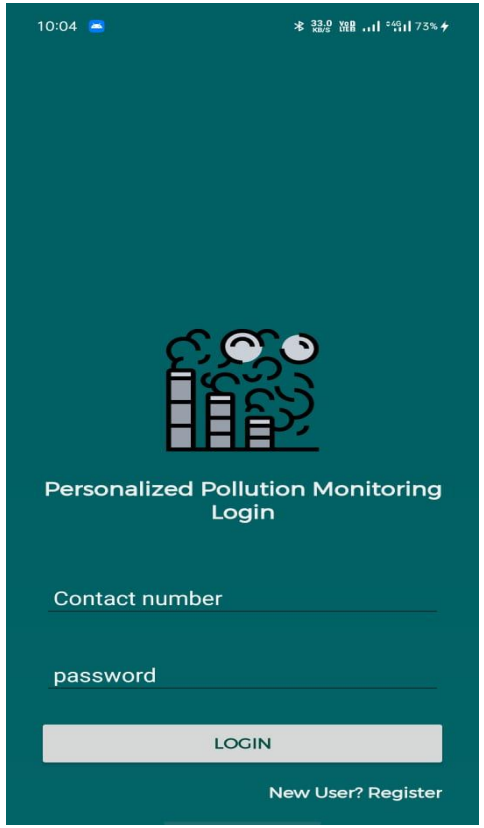
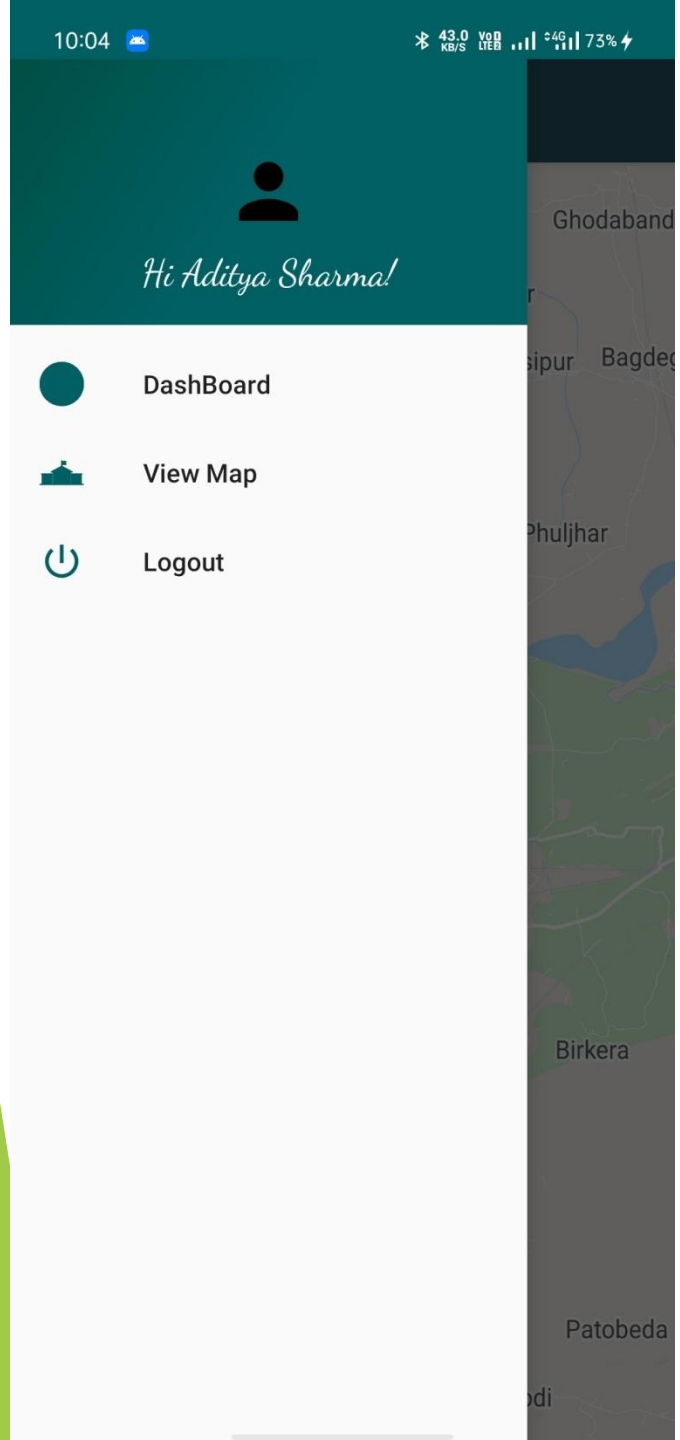
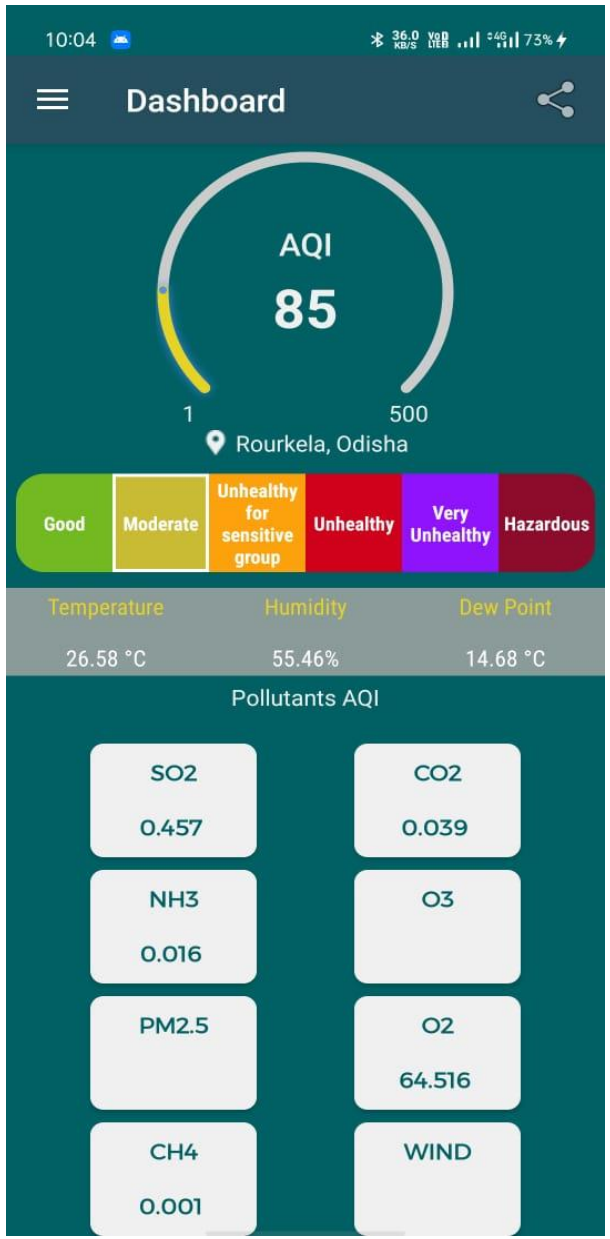
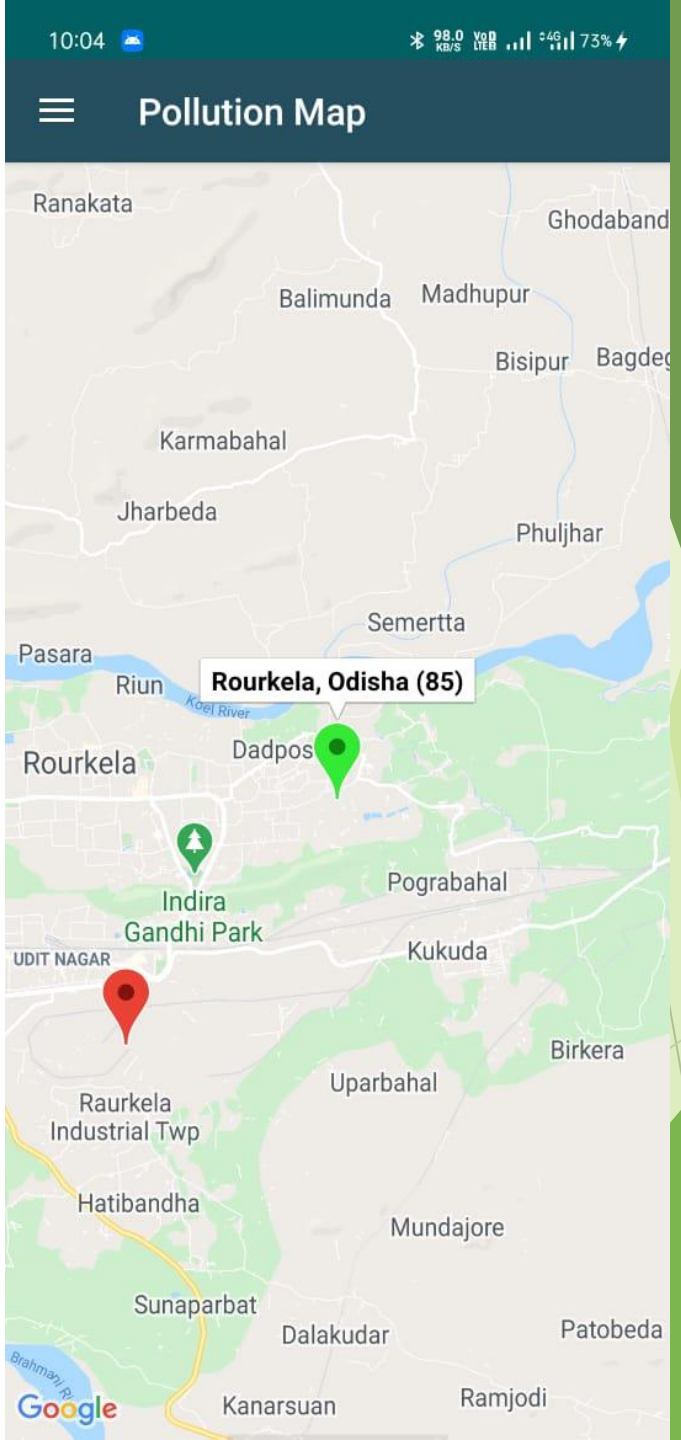


Fig: Showing Login Page of our mobile App





Mobile Application



CONCLUSION

- Monitoring the environmental parameters especially with respect air plays very important role to ensure healthy environment for living beings. We have seen various hazards being caused at Delhi due to air pollution. There are many reasons for causing air pollution but knowing their concentration at various locations helps to take decisions on prevention measures.
- The proposed application works on the principle of IOT, data read from sensor are processed by the processor then uploaded to database, these data are analyzed and displayed to users, and user could fetch this information over phone or webserver and take proper action to prevent pollution.

FUTURE ENHACEMENTS

- It can be improved further by adding more sensors to existing system like dust particles sensors and etc.
- 2. Interface GPS module to screen the contamination at precise area and transfer on the website page for the netizens.

References

[1] AirQuality dataset, https://data.gov.in/catalog/air-quality-residential-areas-under-national-ambient-air-quality-monitoring-programme-few 2019.

[2] AlMasri, Eyhab Diabate, Ibrahim Jain, Richa Hoi Lam Lam, Ming Reddy Nathala, Swetha. (2018). A Serverless IoT Architecture for Smart Waste Management Systems. 179-180. 10.1109/ICII.2018.00034.

[3] Air Quality Indexing software, https://waqi.info/, 2019.

[4] Benedict S., Revenue oriented air quality prediction microservices for smart cities, in IEEE 2017 International Conference on Advances in Computing, Communications and Informatics (ICACCI), Udupi, pp. 1-6, doi: 10.1109/ICACCI.2017.8125879.

[5] Bharadwaj B, M. Kumudha, Gowri Chandra N and Chaithra G, "Automation of Smart waste management using IoT to support “Swachh Bharat Abhiyan” - a practical approach," 2017 2nd International Conference on Computing and Communications Technologies (ICCCT), Chennai, 2017, pp. 318-320. doi: 10.1109/ICCCT2.2017.7972300

[6] Leo Breiman, Random Forests, in Machine Learning, Vol. 45, No.1, pp. 5-32, 2001.

[7] Cai, C.-J., X. Zhang, K. Wang, Y. Zhang, L.-T. Wang, Q. Zhang, F.-K. Duan, K.-B. He, and S.-C. Yu, Incorporation of New Particle Formation and Early Growth treatments into WRF/Chem: Model Improvement, Evaluation, and Impacts of Anthropogenic Aerosols over East Asia, Atmospheric Environment, Vol.124, pp.262-284, 2016.

[8] Giffinger R., Fertner C., Kramar H., Kalasek R., Pichler-Milanovic N., Meijers E., Smart cities: Ranking of ´ European medium-sized cities, http://www.smart-cities.eu/download/smart_cities_final_report. pdf, 2007.

[9] Gubbi, J., Buyya, R., Marusic, S., & Palaniswami, M. (2013). Internet of Things (IoT): A vision, architectural elements, and future directions. Future Generation Computer Systems, 29(7), 1645-1660. doi:10.1016/j.future.2013.01.010.

[10] P. Haribabu, S. R. Kassa, J. Nagaraju, R. Karthik, N. Shirisha and M. Anila, "Implementation of an smart waste management system using IoT," 2017 International Conference on Intelligent Sustainable Systems (ICISS), Palladam, 2017, pp. 1155-1156. doi: 10.1109/ISS1.2017.8389367

[11] Hori, M., Ono, S., Miyashita, K., Kobayashi, S., Miyahara, H., Kita, T., . . . Yamaji, K. (2018). Learning System based on Decentralized Learning Model using Blockchain and SNS. Proceedings of the 10th International Conference on Computer Supported Education. doi:10.5220/0006666901830190.

[12] A. Kadri, E. Yaacoub, M. Mushtaha, and A. Abu-Dayya, Wireless sensor network for real-time air pollution monitoring, in Proc. of IEEE Int. Conf. on Commn., Signal Proc. and their Appln, pp. 1 - 5, 2013.

[13] Lake, D., Milito, R., Morrow, M., & Vargheese, R. (2014). Internet of Things: Architectural Framework for eHealth Security. Journal of ICT Standardization, 1(3), 301-328. doi:10.13052/jicts2245-800x.133.

THANK YOU