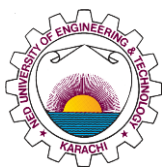
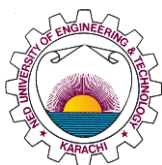


Final Year Project Showcase Batch 2020 Year 2024

Department: Software Engineering Programme: BE Software Engineering	
1	Project Title: Karachi Urban Observatory
2	Project Idea The Karachi Urban Observatory is an innovative multidisciplinary platform designed to monitor and analyze urban environmental factors such as water quality, air pollutants, and noise levels. The project aims to provide real-time data and predictive insights to support climate action and sustainable urban development in Karachi.
3	Process The project involves the deployment of various sensors across different urban regions in Karachi to collect data on environmental factors. These three prototypes are: <ul style="list-style-type: none"> • Water Quality Device (ph, TDS, Turbidity) • Air Quality Device (Smoke, Alcohol, Methane, etc) • Noise Detection Device (Noise levels) The data is processed and analyzed using advanced algorithms, providing a comprehensive overview of the city's environmental health. This information is then displayed on interactive dashboards for easy access by city planners, policymakers, and the public.
4	Outcome The Karachi Urban Observatory provides critical insights into the environmental health of Karachi. By offering real-time data and predictive analytics, the project enables better decision-making and promotes sustainable urban planning. The platform is designed to be scalable, allowing for the integration of additional sensors and data sources as needed.
5	Evidence (Theoretical Basis) As one of Pakistan's largest and most dynamic cities, Karachi grapples with the complexities of rapid urbanization, demographic shifts, and environmental challenges. The rapid urbanization has posed challenges related to water quality, air pollution and noise levels impacting resident's health. Lack of a comprehensive monitoring system hampers the city's ability to gather real-time data on water quality, air pollutants, and noise levels, hindering effective decision making. In response to these pressing concerns, Karachi Urban Observatory is a multidisciplinary initiative that utilizes advanced technologies, data collection, and analysis methods to monitor various aspects of the environment of Karachi. It serves as a comprehensive platform for understanding the dynamics of Karachi city in terms of water quality, air quality and noise levels. It is an innovative approach that integrates advanced hardware like specialized sensors and Arduino UNO microcontrollers with renewable energy resources. Real time data on parameters like TDS, PH, and pollutants is collected and visualized through a web dashboard, enabling authorities to make informed decisions promptly. By providing a comprehensive understanding of



	Karachi’s urban dynamics, this initiative empowers policy makers, researchers, and the public, fostering evidence-based policy making and improving the city’s overall quality of life.
6	Impact on Sustainability of Urban Regions or SDG-11 “Sustainable Cities and Communities” The Karachi Urban Observatory directly contributes to SDG-11 by providing a tool for monitoring and improving the sustainability of urban regions. The project addresses critical environmental issues in Karachi, such as air and water pollution, and promotes climate action by offering data-driven insights for urban planning and policy-making.
7	Competitive Advantage or Unique Selling Proposition The Karachi Urban Observatory offers a unique blend of advanced technology, environmental impact, and alignment with global sustainability goals. It provides a compelling solution for urban monitoring that not only addresses critical environmental challenges but also offers significant process improvements and market opportunities. This project stands out for its ability to deliver real-time, actionable insights that can drive informed decision-making, making it a valuable asset for both public and private sector stakeholders.
a	Attainment of any SDG The Karachi Urban Observatory project is a comprehensive initiative that aligns with several Sustainable Development Goals (SDGs), demonstrating a broad impact on urban sustainability and public well-being. Specifically, the project contributes to the following SDGs: <ul style="list-style-type: none"> • SDG#9, Industry, Innovation, and Infrastructure. The project leverages cutting-edge technology and innovative approaches to build resilient infrastructure for environmental monitoring in Karachi, promoting sustainable industrialization. • SDG#6, Clean Water and Sanitation. By monitoring water quality in real-time, the project helps ensure the availability of clean water and supports efforts to maintain safe sanitation standards across urban areas. • SDG11, Sustainable Cities and Communities. The Karachi Urban Observatory is directly aimed at making cities more sustainable by providing data that supports environmentally sound urban planning and policy-making. • SDG313, Climate Action. Through its focus on air pollution and climate-related indicators, the project empowers stakeholders to take urgent action to combat climate change and its impacts. • SDG#3, Good Health and Well-being. By reducing exposure to harmful pollutants, the project contributes to improving public health and ensuring well-being, particularly in densely populated urban areas. • SDG#15, Life on Land. The project’s environmental monitoring capabilities extend to factors that affect terrestrial ecosystems, promoting the sustainable use of land and the preservation of natural habitats.
b	Environmental Aspect The project is designed to tackle some of Karachi's most pressing environmental issues by monitoring and analyzing key indicators of pollution. The platform’s ability to provide real-time data allows for immediate action, thus helping reduce pollution levels in the city.



	The environmental benefits extend to the reduction of health risks for Karachi's population, particularly in areas with high levels of air and water pollution. This compelling environmental impact makes the project a priority for stakeholders concerned with public health and environmental sustainability.	
c	Cost Reduction of Existing Product There is no such system existing currently in Pakistan which is providing insights on all three air, water and noise pollution.	
d	Process Improvement which Leads to Superior Product or Cost Reduction, Efficiency Improvement of the Whole Process The Karachi Urban Observatory introduces significant process improvements in urban monitoring by integrating cutting-edge sensor technology with advanced data analytics. Traditional methods of monitoring environmental factors often rely on periodic manual data collection, which can be time-consuming and prone to inaccuracies. In contrast, this project offers continuous, automated data collection with high precision, allowing for more accurate and timely insights. This efficiency not only enhances the decision-making process for urban planners but also reduces the operational costs associated with environmental monitoring.	
f	Capture New Market The project opens up a new market segment by targeting urban planners, city administrators, environmental agencies, and policymakers who require reliable data for effective urban management. Additionally, the platform can be adapted and scaled for other cities facing similar environmental challenges, potentially expanding the market to a global scale. The unique combination of real-time data, predictive analytics, and scalability gives the Karachi Urban Observatory a competitive edge in the emerging field of smart city solutions.	
8	Target Market The primary target market includes urban planners, city administrators, environmental agencies, and policymakers in Karachi. The platform is also valuable for researchers, NGOs, and other stakeholders interested in urban sustainability and climate action.	
9	Team Members (Names along with email address)	<ol style="list-style-type: none"> 1. Muzammil Ali Khan (muzammilali1512@gmail.com) 2. Sannya Wasim (sannya.wasim01@gmail.com) 3. Tehreem Zahid (mstehreem123@yahoo.com) 4. Shahmeer Khan (shahmeerk3000@gmail.com)
10	Supervisor Name (along with email address)	Prof. Dr. Shehnaz Zardari (shehnaz@cloud.neduet.edu.pk)
11	Video (If any)	https://drive.google.com/file/d/1gFH_jESMgtf8B7ude1rWE_LBE30TeYXCg/view?usp=sharing

Pictures (If any)

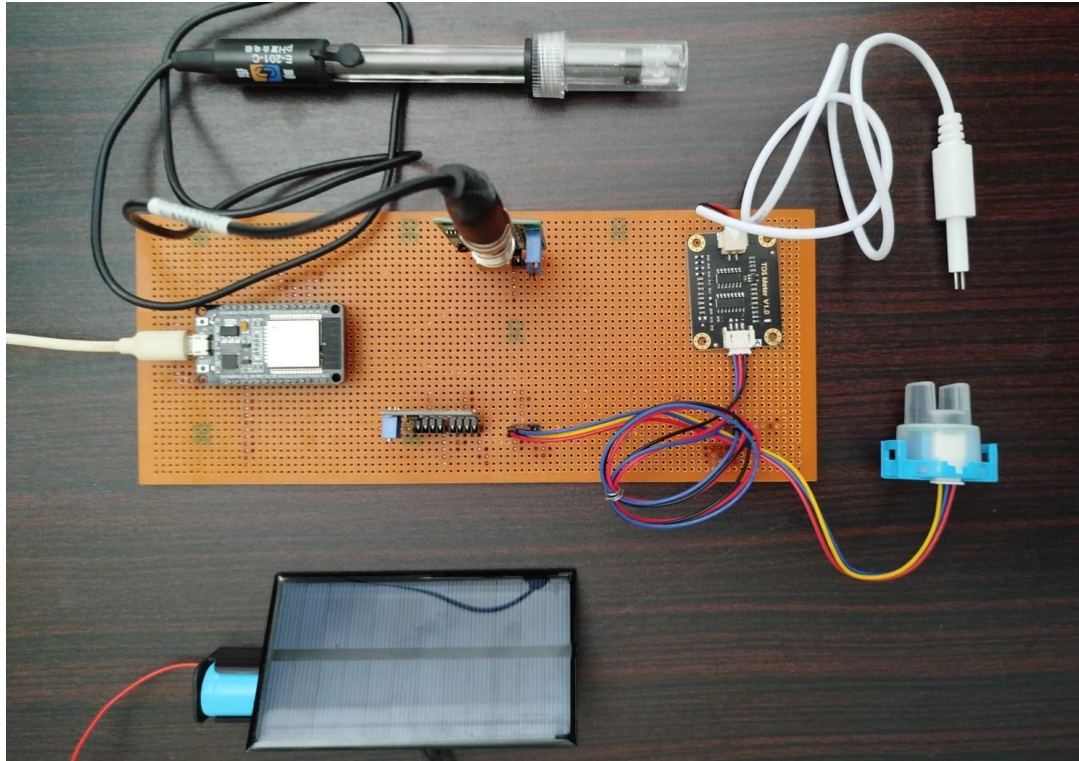


Figure 1: Water Quality Device

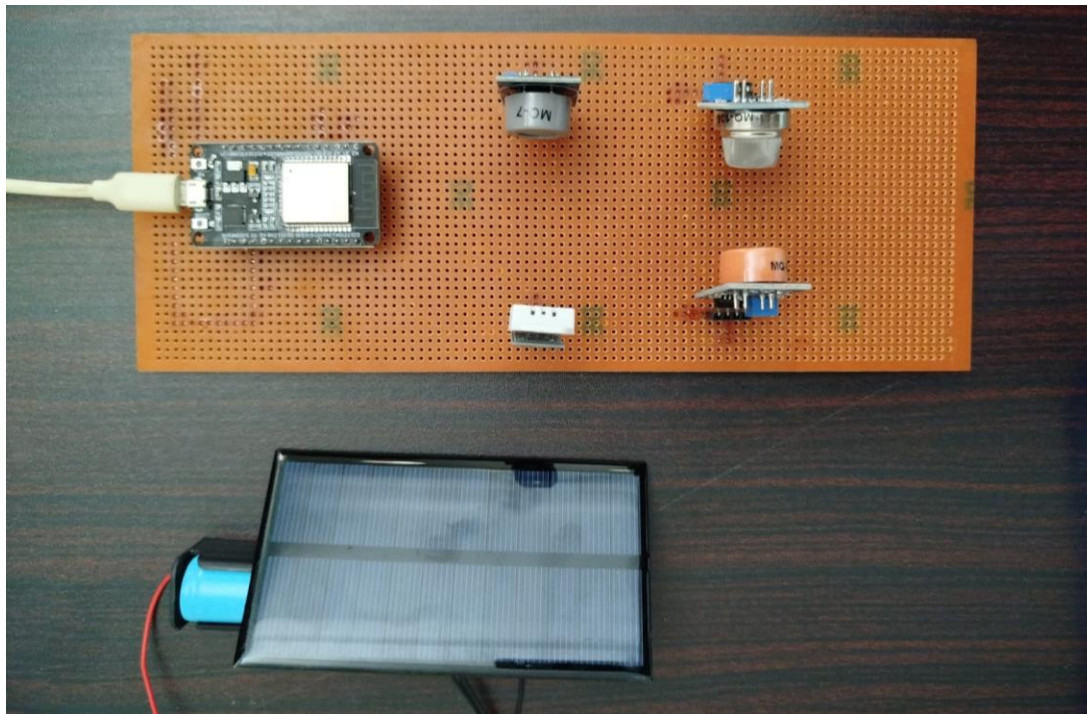


Figure 2: Air Quality Device

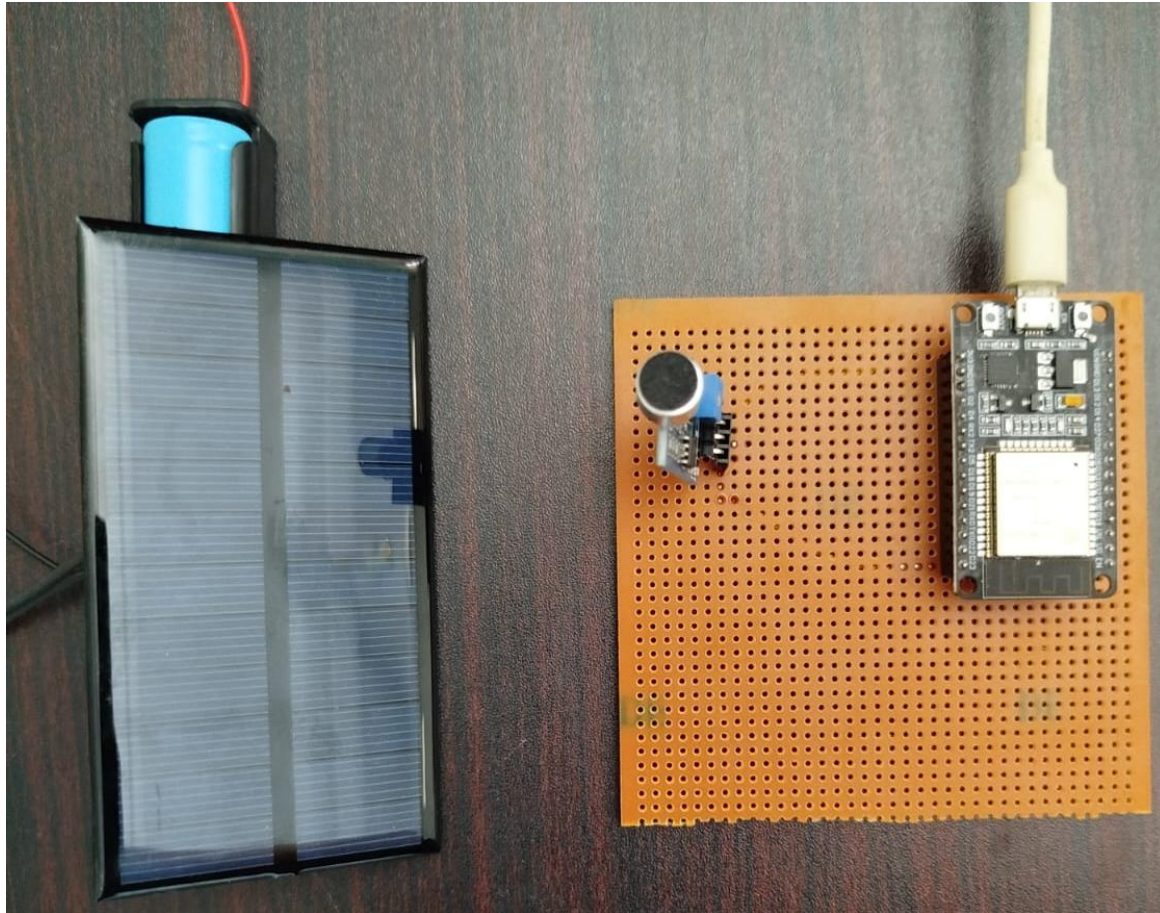


Figure 3: Noise Detection Device

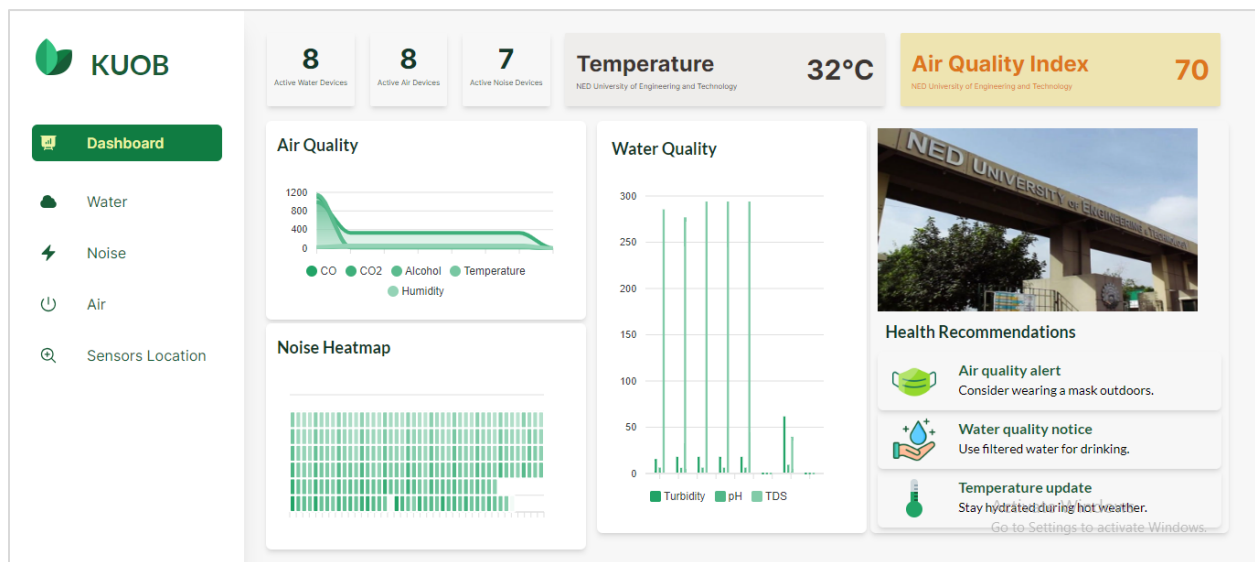


Figure 4: Dashboard Overview

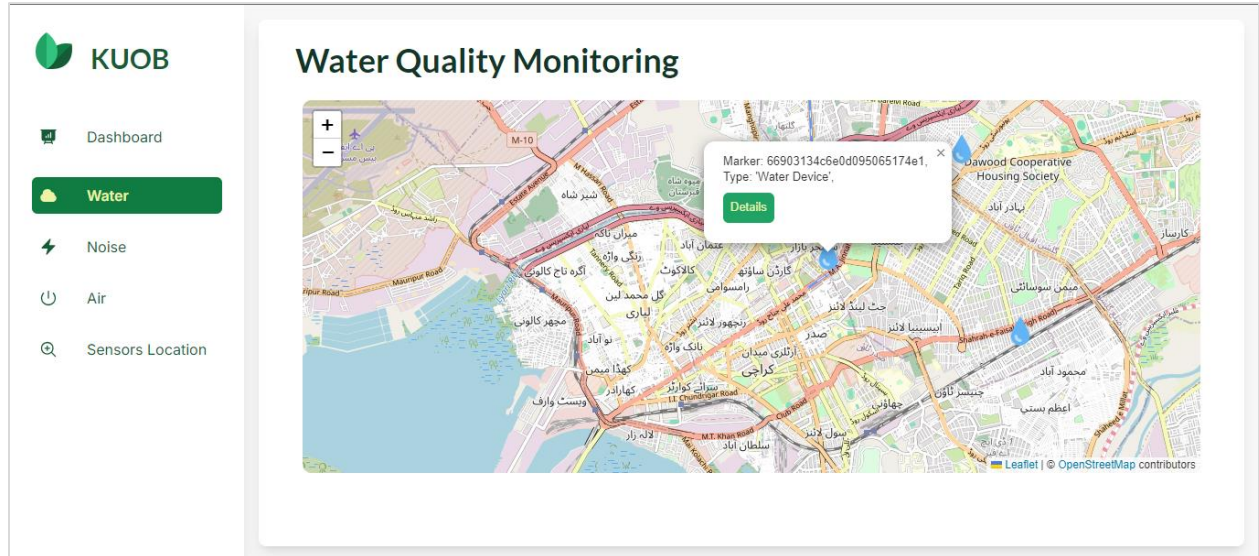


Figure 5: Water Devices Location

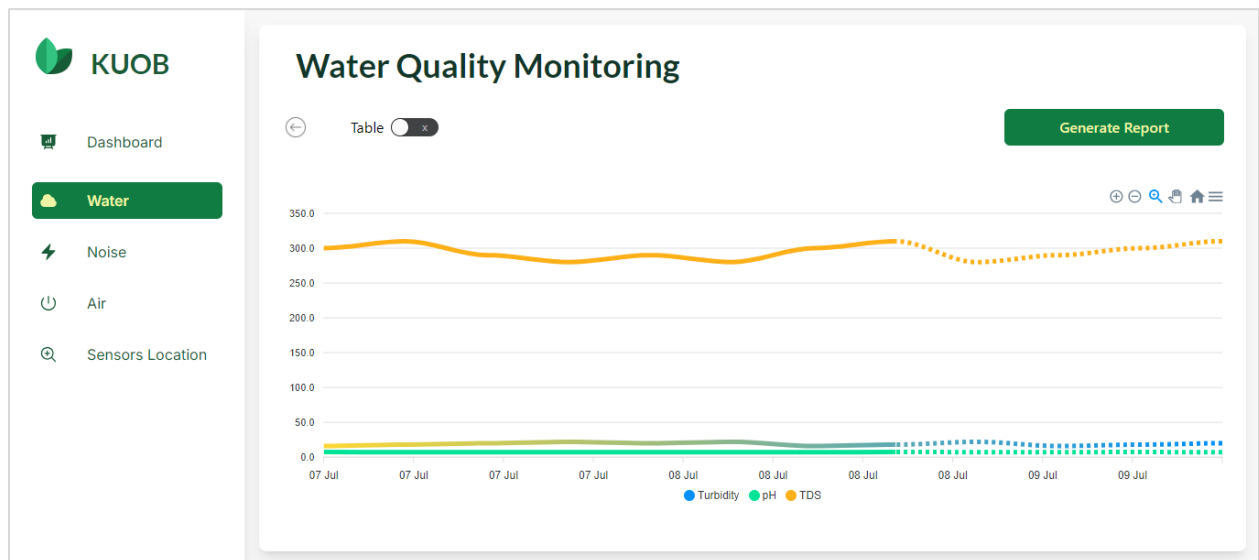


Figure 6: Water Device Graphical Representation



Figure 7: Water Data Tabular Representation

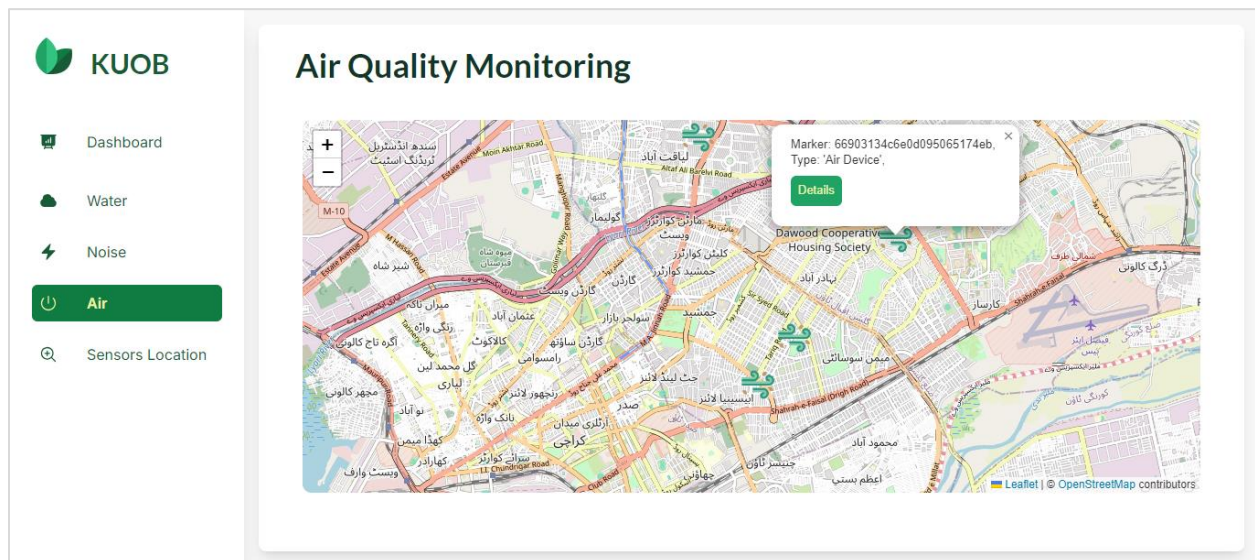


Figure 8: Air Devices Location

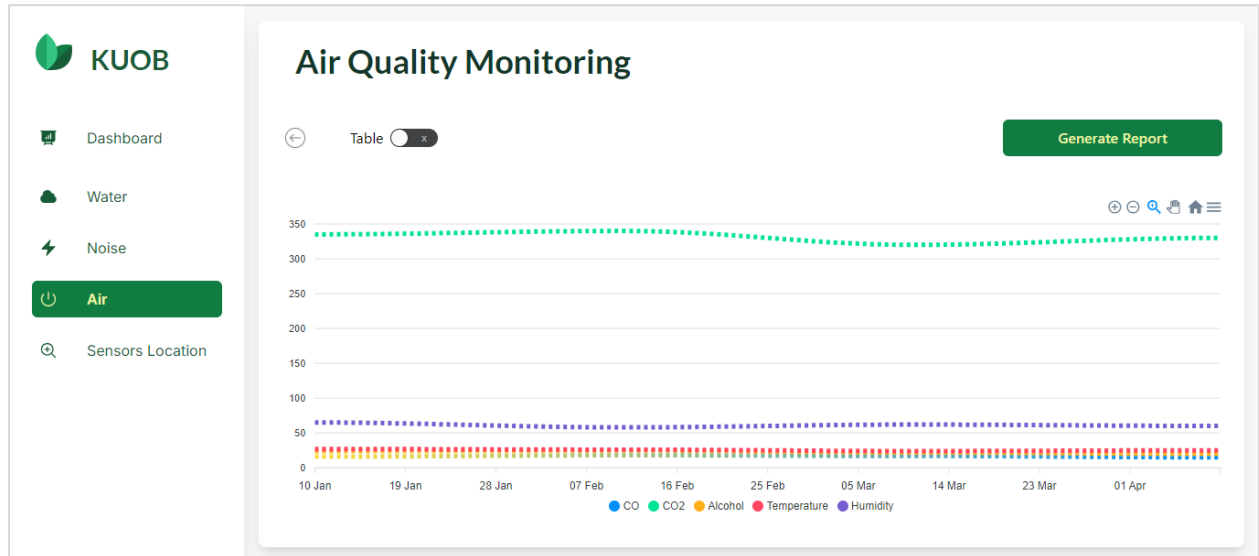


Figure 9: Air Data Graphical Representation

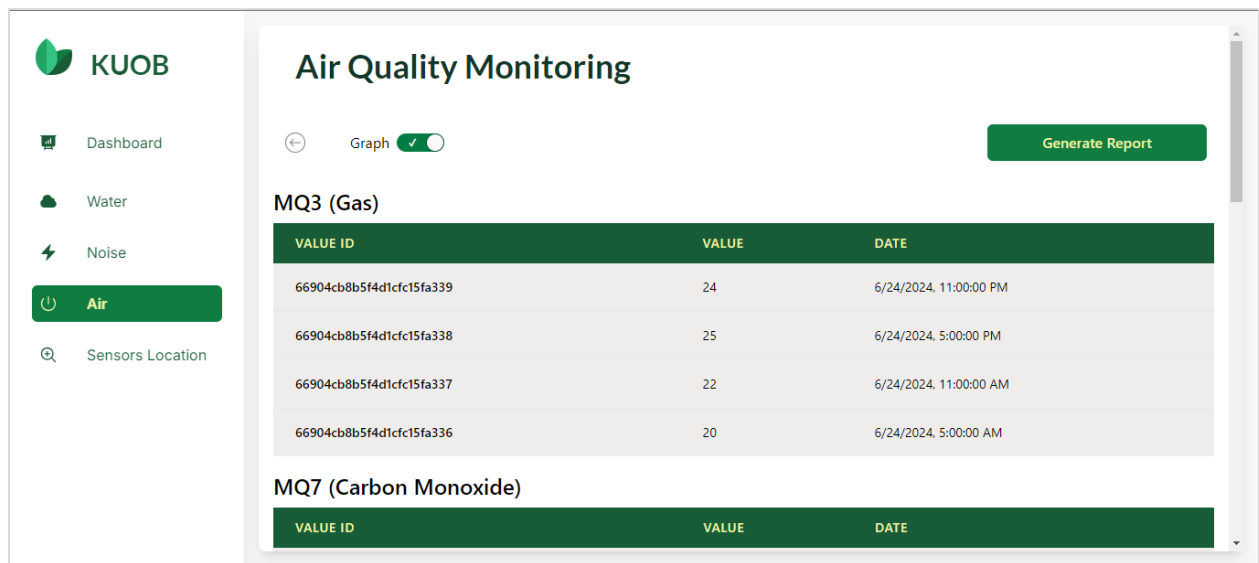


Figure 10: Air Data Tabular Representation

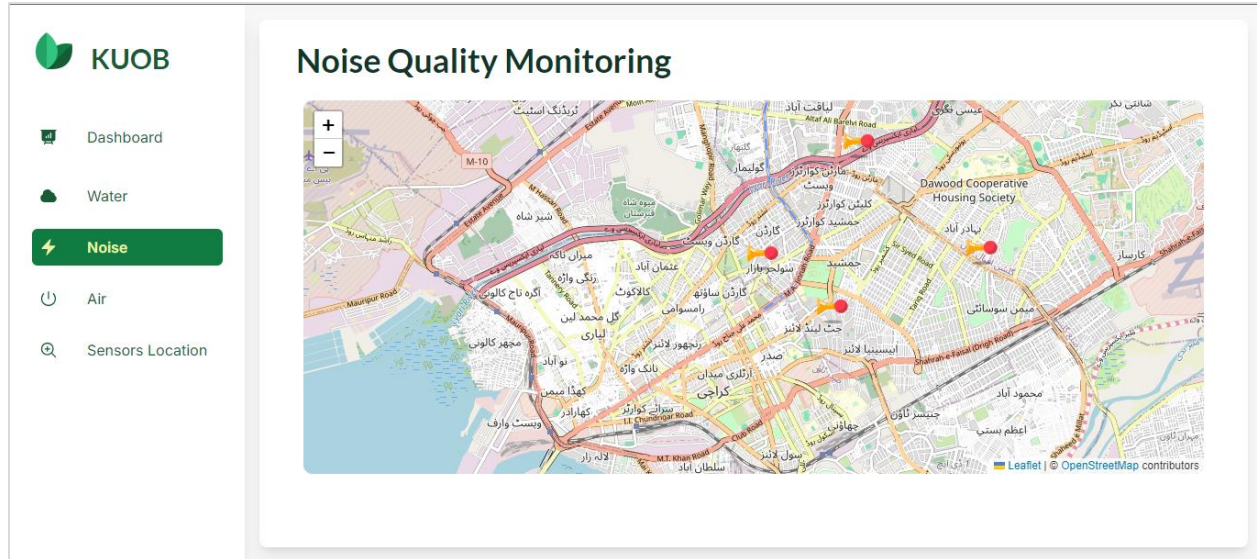


Figure 11: Noise Device Location

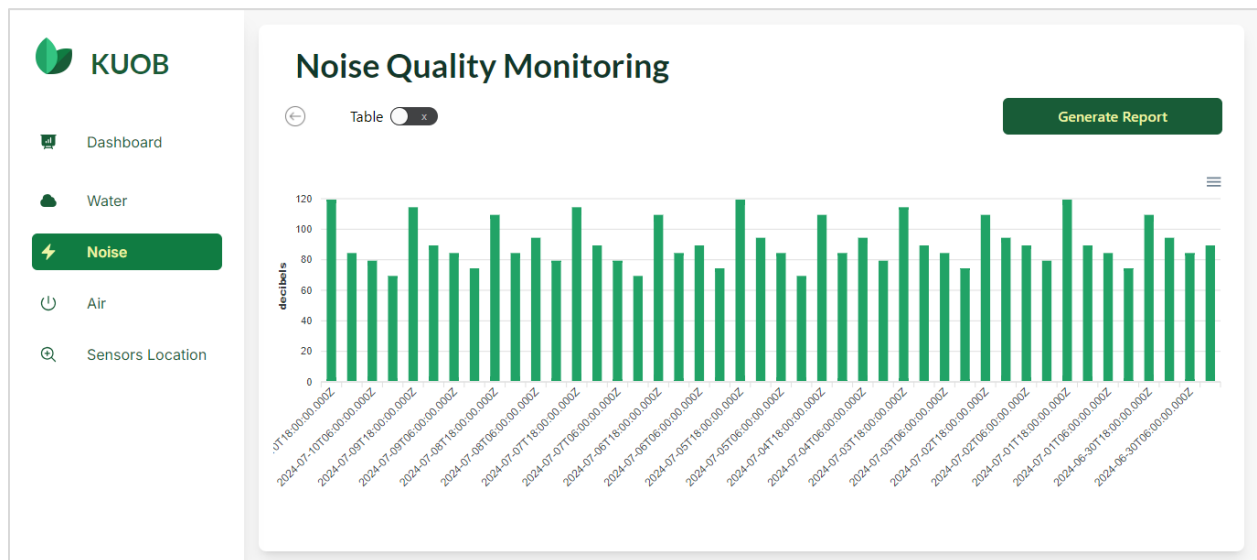


Figure 12: Noise Data Graphical Representation

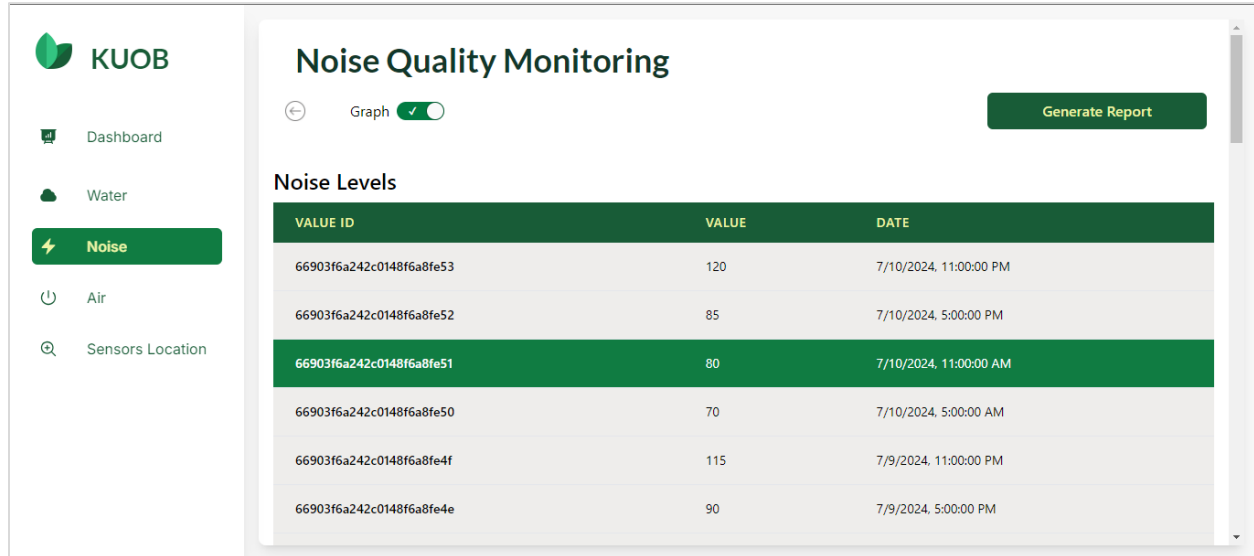


Figure 13: Noise Data Tabular Representation

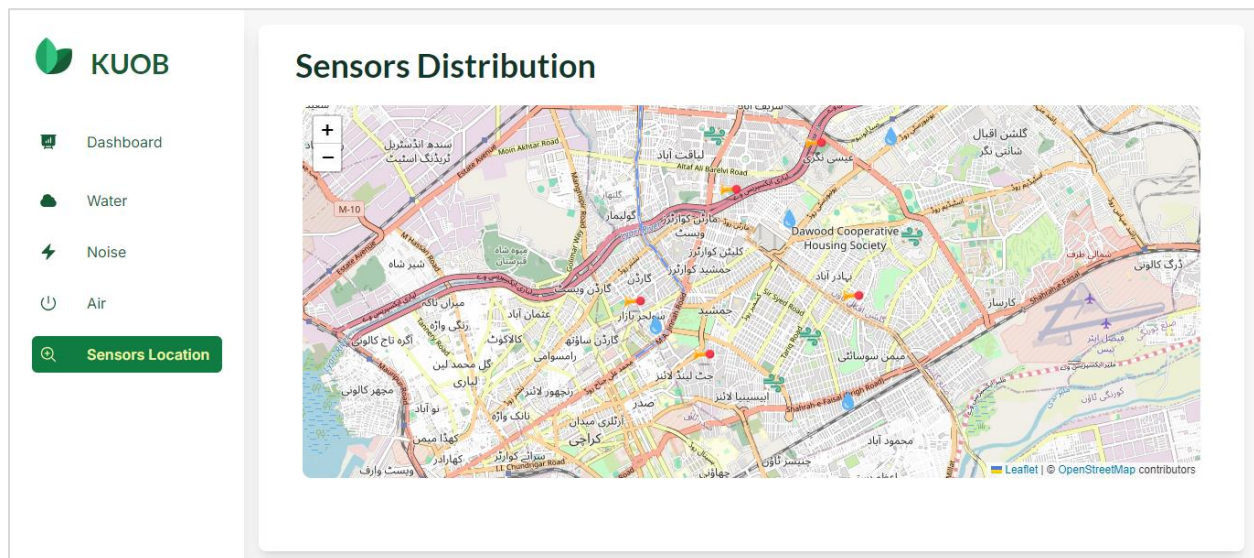


Figure 14: All Sensors Location