



Hackathon HIGH / LOW

Participation Rules:

- Each team must bring their own robotics equipment.
- The total cost of all equipment must not exceed 10,000 BDT.
- On the event day, participants will be provided with a dedicated workspace for a total of 4 hours to build their projects.
- Teams must carry and manage all equipment themselves.
- Only team members, volunteers, and judges are allowed inside the project room during the building period.
- After 4 hours, judges will enter the room to evaluate the projects based on the defined criteria.
- Each team must solve any one of the following challenges within the specified timeframe.
- Junior Low age limit 7-12 years old and Junior High age limit 13-18 years old.

Evaluation Criteria (Total: 100 Marks):

- Solution Statement – 20% Practicality, innovation, and feasibility of the proposed solution.
- Functional Demonstration – 35% Successful operation of the core system, clear demonstration of results, and effectiveness. (~12% on each requirement fulfillment)
- Financial Viability – 15% Cost-effectiveness and sustainability of the project.
- Design – 20% Aesthetic, functional, and ergonomic aspects of the prototype.
- Future Expansion – 10% Scope for future improvement, scalability, and real-world implementation.



🤖 The Challenge of Invisible Air Pollution: A Smart Broadcast and Health Alert System

Bangladesh is currently facing a severe environmental crisis due to **critically high levels of air pollution**, often ranked as the country with the **worst air quality in the world** [1]. This invisible threat significantly shortens the lifespan of its citizens; studies estimate that exposure to air pollution **reduces the average life expectancy** of people in Bangladesh by several years [2].

The core danger comes from tiny particles called **PM2.5**, which travel deep into the lungs and bloodstream. This directly leads to an increase in major diseases, including **Respiratory Illnesses** (like aggravated asthma), **Cardiovascular Problems** (like heart attacks and strokes), and even **Mental Health Issues** (like depression) [3, 4].

In major urban centers like Dhaka, the Air Quality Index (AQI) frequently hits "Unhealthy" or "Very Unhealthy" categories. While official monitoring stations exist, the public, especially those in smaller communities and schools, **do not have access to real-time, hyperlocal air quality information** necessary to protect themselves.

The challenge for students is to **design and prototype a simple, low-cost technological solution to measure local air quality (AQI/PM2.5), broadcast alerts, and offer actionable health suggestions to residents in real-time.**

Your system must meet the following requirements:

1. **Real-time Monitoring:** Use accessible sensors to measure local pollutant levels and continuously send this data to an IoT platform.
2. **Broadcast and Alerting:** Utilize the IoT platform to convert sensor data into a simple, **AQI status** (Good, Moderate, Unhealthy) and automatically **trigger alerts** when pollution crosses a hazardous threshold.
3. **Actionable Suggestions:** Based on the pollution level detected, the system must display or broadcast a **specific, protective recommendation** to residents (e.g., "Air is Unhealthy: Close windows and wear a mask outdoors" or "Air is Hazardous: Avoid all outdoor exertion").



The Challenge of Urban Drainage Blockages: A Smart Detection and Alert System

The mega-city of Dhaka faces recurring catastrophic **waterlogging and flooding** during the monsoon season primarily because the urban drainage systems are constantly blocked [5]. This widespread problem is fundamentally caused by unchecked solid waste, plastic, and cooking grease disposal into the city's drains and canals [6]. The sheer volume of waste generated, over **4,220 metric tons daily** in Dhaka North City Corporation (DNCC) alone [7], means that uncollected waste frequently chokes the drainage network.

When the drains are blocked, the city's stormwater has nowhere to go. This failure has severe consequences, from creating **mosquito breeding sites** that spread **Dengue fever** [8], to allowing **untreated sewage to contaminate** public areas, leading to **waterborne illnesses** [9].

Currently, city authorities often only discover a blockage when waterlogging has already begun, leading to slow and inefficient response times.

The challenge for students is to **design and prototype a simple, low-cost technological solution to detect drain blockages, identify their location, and immediately alert the relevant city authority.**

Your system must meet the following requirements:

- **Blockage Detection:** Use sensors to accurately determine when water is pooling due to an obstruction, indicating a blockage is forming.
- **Location Reporting:** Integrate a method to transmit the exact location of the problematic drain.
- **Real-time Alerting:** Utilize an IoT platform to visualize the data and trigger an automatic alert when a blockage threshold is crossed, allowing for rapid and precise maintenance before a major flood occurs.



References

- [1] Bangladesh Ranks 2nd out of 138 countries in World Air Quality Report by IQAir (For Bangladesh's Air Quality Ranking)
iqair.com/world-most-polluted-countries
- [2] Bangladesh Ranks 1st out of 252 countries in Energy Policy Institute at the University of Chicago (EPIC) - Air Quality Life Index (AQLI) (For Life Expectancy Impact)
aqli.epic.uchicago.edu/countryPage/Bangladesh
- [3] World Health Organization (WHO) / European Environment Agency (EEA) & Scientific Literature (For specific physical diseases like COPD, Heart Disease, and Stroke)
who.int/teams/environment-climate-change-and-health/air-quality-energy-and-health/health-impacts
- [4] World Bank Report: Breathing Heavy: New Evidence on Air Pollution and Health in Bangladesh (For Mental Health Impact)
worldbank.org/en/news/press-release/2022/12/03/high-air-pollution-level-is-creating-physical-and-mental-health-hazards-in-bangladesh-world-bank
- [5] Dhaka Water Supply and Sewerage Authority (WASA) / Local Urban Planning Reports (For Waterlogging Cause)
- [6] Uncollected waste ending up in drains & Canals (For Solid Waste being the root cause)
https://asef.org/wp-content/uploads/2021/11/ASEFSU23-Background-Paper_Waste-Management-in-Bangladesh.pdf
- [7] Dhaka North City Corporation (DNCC) Waste Report (For Daily Waste Generation Statistics)
dncc.portal.gov.bd/sites/default/files/files/dncc.portal.gov.bd/annual_reports/6693c776_0dde_49da_b85b_1928d398a7f4/2020-07-07-15-04-0388efe51e61d331efb81045a0648dd2.pdf
- [8] Waste-filled drains, canals, ineffective chemicals plague mosquito control efforts (For Dengue Fever Risk)
tbsnews.net/bangladesh/health/waste-filled-drains-canals-ineffective-chemicals-plague-mosquito-control-efforts
- [9] Unsafe containment: Public health risks of septic tanks discharging to drains in Dhaka Bangladesh (For Waterborne Illnesses and Sewage Contamination)
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