Air quality,temperature and humidity measurement system with IOT in Iraq,wasit

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Abstract

Increasing air and noise pollution is a persistent nuisance and problem in today's world. We offer a system for measuring and monitoring environmental needs, as well as sending out alerts when The air quality and noise levels are both above the legal limit. Using the appropriate sensors, the system collects ambient gas and noise levels in a given area and delivers them to the NodeMCU microcontroller. . The data is now obtained and analyzed by the Blynk cloud platform, which is Wi-Fi credentials are used to connect to the MCU node, and then the security level is compared. When it comes to air pollution and noise pollution, variables surpass permitted limits, the Blynk cloud monitoring software sends out an alarm.. It may send emails or messages to Android devices to notify users, and it can also utilize the buzzer as an alarm. This information is constantly transferred and stored for later analysis. This cloud-based pollution control system is low-cost, dependable, and efficient, and it may be upgraded to meet future issues.

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1. Introduction

Pollution and poor air quality stymie urban development. People are locking themselves at home or working long hours in the age of technology, resulting in a sharp increase in loneliness.

Indoor air pollution has become a major cause of concern and action in recent years. Dangerous and hazardous commodities, as well as inadequate ventilation, contribute to poor air quality in homes, workplaces, and other enclosed locations. , and rising temperatures and humidity as a result of climate change Less air circulation and crowded living quarters and workplaces can lead to a variety of health problems, including chronic and acute respiratory illnesses. .

Long-term pollution exposure has been linked to certain types of lung cancer, according to experts. The Air Quality Index (AQI) is rated on a scale of 0-50, 51-100 fair, 101-200 fair, 201-300 poor, 301-400 very poor, and 401-good by the TSPCB (Telangana Pollution Control Board)). The number 500 is considered serious (see Table 1). The dangers to humanity's well-being are not limited to air pollution. ; there are numerous other sorts of pollution as well. WHO is the World Health Organization (WHO). Despite the fact that people exposed to high decibels are often sensitive to moderate noise levels or even deaf, noise pollution has received little attention. The competent authorities take actions to reduce noise and air pollution in the public interest. The hoofs aresensitive to moderate noise levels or even deaf, not much attention has been paid to noise pollution. In the general interest of the public, the competent authorities take steps to check noise and air pollution. Hoofs are an ongoing problem in recent surveys, and people living in these

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places are said to suffer from sleep disturbances, mental illness, mood swings and other health problems.

Many cities have fallen into this undesirable trap by getting too close to surveillance equipment that could detect these issues The Internet is a system of sensors, microcontrollers, and other devices that can communicate with one another. swiftly and efficiently collect and send data without the use of humans. interaction. . The Internet offers a variety of options that can be added and changed to suit the needs of a particular region [1].

Air pollution, temperature, and humidity are measured using MQ-135 and DTH22 air sensors in this study. The sensor connects with the MCU node , which analyses the sensor's data, uploads it to a web page, and compares the relevant parameter The allowed values are already listed in Table 1 . Blynk, a cloud-based platform, handles the processing. from The Wi-Fi module uploads the data to the Node MCU, analyzes the information and delivers value to the user. Alerts and emails are sent when air quality, temperature and humidity levels are exceeded. Alerts are sent to Android devices via email, message, or even beep for that specific parameter

2. Previous studies:

We have cited some journals dealing with similar topics to the Internet. The research paper "An Experimental Study of the Correlation between Noise and Air Quality Based on the Sensory Internet Platform Approach" by Majid Al-Owaidi, Ali Karim, Muhammad Al-Jafara and Abdul-Muttalib Al-Siddiq demonstrates the correlation between the two senses Parameters related to the Noise and air quality , according to the Internet. The article "Internet-based Intelligent Vehicle Noise and Pollution Monitoring System," written by Piyush Patil, offers a viable solution to air pollution and noise caused by high traffic and vehicle engines. .

A Raspberry Pi-based cloud-based air and sound pollution monitoring system with temperature and humidity data is presented by Arnab Kumar Saha, Sachet Sircar, Priyasha Chatterjee, Souvik Dutta, Anwesha Mitra, and Aiswarya Chatterjee. The study "IoT-based Bolt-based Real-time Indoor Air Quality Monitoring System" by Pallavi Asthana and Sumita Mishra looks at the problem of CO and CO pollution in enclosed and pressured areas. , where good and proper ventilation is terrifying. These detrimental effects have on gases of the environment and those who come into contact with them, monitoring air and noise parameters is necessary to assess the living conditions in the surrounding area and take necessary actions based on the retrieved data [3]. The Internet of Things (IoT) is an embedded system consisting of web-based microcontrollers, sensors, and communication devices that receive, transmit, and respond to data av

.ailable at a specific location. Internet-connected devices send processed data to a cloud platform, from where regulators (pollution control centers) can access or send it to Android devices. The collected data can also be streamed online for viewing or reading from Android devices [4].

3. The effort is a minor step toward reducing pollution and creating a pollution-free environment. This web project not only analyzes the temperature, humidity, and decibel levels of the environment, but also assesses air quality by detecting dangerous substances in the air. The fast expanding problem of air and noise pollution is highlighted in this study, motivating society to employ internet technology to create greener, greener cities.

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4. System components

4.1 NodeMCU

is an encrypted microcontroller that is free and open-source (see Figure 1). It comes in several versions and includes a prototype board for creating programming. A NODE MCU is made up of a "node" and a "MCU," as the name implies (microcontroller). This firmware and prototyping board design are non-proprietary software. Node MCU is firmware, not another development kit. ESP8266 is the CPU of the node MCU. The ESP8266 open source community created the Node MCU. XTOS is the operating system used by Node MCU. The firmware is written in LUA, which is a scripting language. The written code for retrieving required data and storing obtained information is stored in 128MB RAM and 4MB flash memory on the node MCU. The ESP8266 is a system on chip (SOC) that features an integrated TCP/IP protocol and allows seamless Wi-Fi connectivity. Any microchip can connect to the Internet using this TCP/IP stack. .

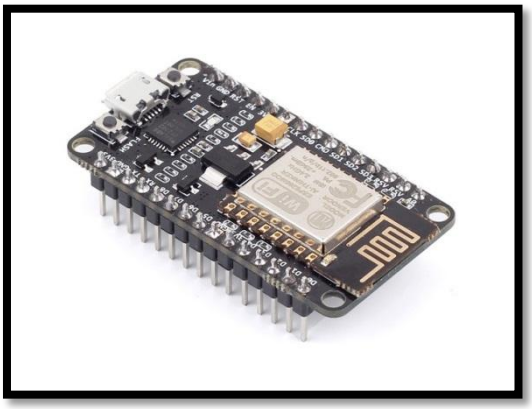

Fig. (1) ESP8266

4.2 Dht22

A low-cost digital temperature and humidity sensor is the DHT22 AM2302 digital temperature and humidity sensor module. It monitors ambient air with a capacitive humidity sensor and a thermistor and produces a digital signal on a data pin (no analog input pins required). It's simple to use, but getting the data takes perfect timing. The only disadvantage of this sensor is that it only provides new data every 2 seconds. As a result, when utilizing our library, sensor readings can take up to 2 seconds. Simply connect the device's first pin to 3-5V, then the device's second pin to the data ground on the far right. Despite the fact that it sends data via a single wire, it is not compatible with the Dallas One Wire! Multiple sensors should have their own data pins if you want to use them. The external sensor's construction is shown in Figure 2.

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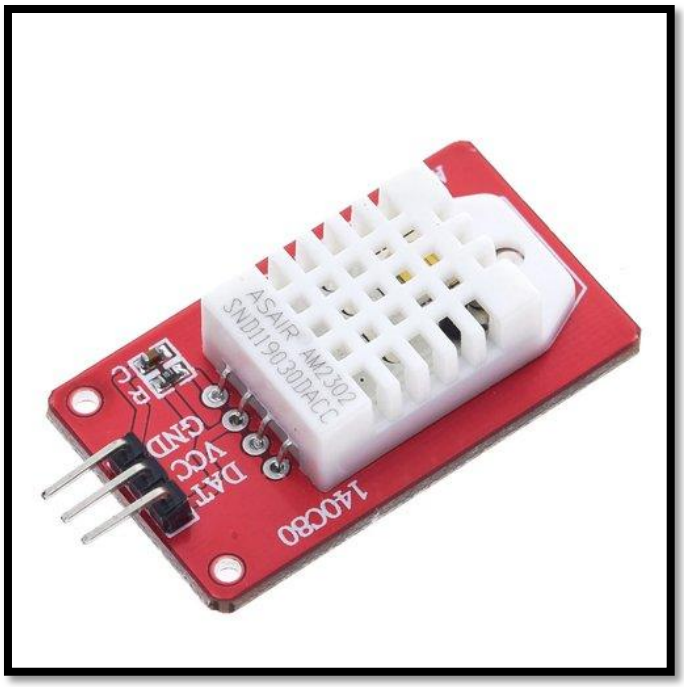

Fig (2) DHT22

4.3 MQ-135

The gas sensor's MQ135 sensitive substance is SnO2, which has a reduced conductivity in clean air. When a target pollutant gas is present, the sensor's conductivity increases as the gas concentration rises. Users can translate the conductivity change to match the gas concentration output using a simple circuit. . The MQ135 gas sensor (shown in Figure 3) has a high sensitivity to ammonia, sulfides, and gasoline chain fumes, as well as the ability to monitor flammable gases such as smoke It can detect a wide range of dangerous gases and can be used as a low-cost sensor in a variety of applications. . It gives both digital and analog results. A NodeMCU or a microcontroller can easily be connected to the MQ135 sensor. .

Fig.(3) MQ-135

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4.4 Blynk

In our project, Blynk is used as a cloud platform or a local private server. Blynk is a completely free service. app that works on both iPhones and Android devices. Blynk makes It's easy to use the internet to connect and control embedded devices like Arduino, Node MCU, ESP8266, Raspberry Pi, and others. It's a well-known IoT platform for connecting embedded devices to the cloud and creating apps for them. control and manage them. Blynk enables devices to connect to cloud apps and communicate with one another in a a safe manner These clouds are used to assess time data from IoT devices. Several gadgets, as well as any number of messages, processes, and connections to endpoints, can be safely and securely supported by the platform-as-a-service. or other devices. In this scenario, data is processed to present information and delivered to a weather station, where it is used to make reports, charts, and notifications.

5.System Configuration

The Arduino IDE free source software is used in our project. It's a code-writing environment that incorporates a text editor. Once developed, NodeMCU may connect to the cloud platform and integrate with other sensors, collecting data and manipulating physical outputs such as buzzers, motors, and lights. A pin for analog input, 17 general purpose digital input and output pins (of which only 9 can be used for this), a built-in ADC (analog to digital converter), and a built-in Wi-Fi module that connect embedded devices devices to the Internet on the ESP8266 NodeMCU board. The ADC converts the related sensor data to its digital value and analyzes the suitable temperature/humidity/air/noise characteristics based on this value after connecting the Sensors MQ-135 and DTH22 The NodeMCU's firmware has been loaded. A low-cost The performance of a server-based automatic weather station is being evaluated. Data from sensors deployed in a specified region is retrieved. The web server receives the examined data automatically. , Temperature (°C) is detected via DHT22 sensor. and humidity ,gas sensor MQ-135 detects the air quality or pollutant concentration (ppm) in this area, if it exceeds the threshold, it will perform corresponding control actions, d. H. A specific buzzer alarm sound is activated when the corresponding parameter is exceeded, a notification is sent to the smartphone, and an email is sent to the designated address about the specific parameter that has been compromised, as shown in the schematic diagram Our embedded device communicates to our Blynk app on our smartphone via a cloud computing platform by entering the needed Wi-Fi credentials, i. H. Verification code, Wi-Fi name, and password. .

The app analyzes and periodically provides graphical data and numerical displays of changes in When sound intensity, air quality, temperature, and humidity (which tells us where the sensor is in that specific location) are met, the sensor sends emails and warnings. User-defined levels are written above, along with information about the current condition of other parameters. When any of the defined parameter limits are surpassed and the user's cell phone is not nearby, , the buzzer will work by default and play a sound linked with or peculiar to a specific parameter to assist the user in identifying that parameter and taking precautions in response to sensor-detected parameter levels that are too high or unsafe. Figure (5) shows the shape of the final system.

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5. Results

Built-in sensors collect data about air quality and noise intensity, which is sent to a cloud-based web server automatically, in this example the local Blynk server. Information stored in the cloud is used for a variety of functions, including air quality measurement, temperature and humidity control, sound intensity control, and continuous monitoring via graphic and digital displays. As a result, the app can assess temperature, humidity, noise intensity, and air quality trends over time for a given location (real-time, hourly, every six hours, days, weeks, months, etc.). 7, 7 and 8) and generated by the Blynk app on our smartphones, it indicates the current state of air quality levels by displaying data collected from multiple sensors in the form of a graph (high and low). When the collected data exceeds a user-defined limit, the application sends emails and alerts (as shown in Figure 9), and the notification message also includes information about the current values of other parameters. When any specified parameter limit is exceeded without the user's phone nearby, the buzzer will automatically ring and play a unique tone associated with the parameter or unique to allow the user to select that the parameter is not engaged without viewing the message level's safety. The user may act in reaction to or in light of the sensor's sensed parameter's high or unknown value.

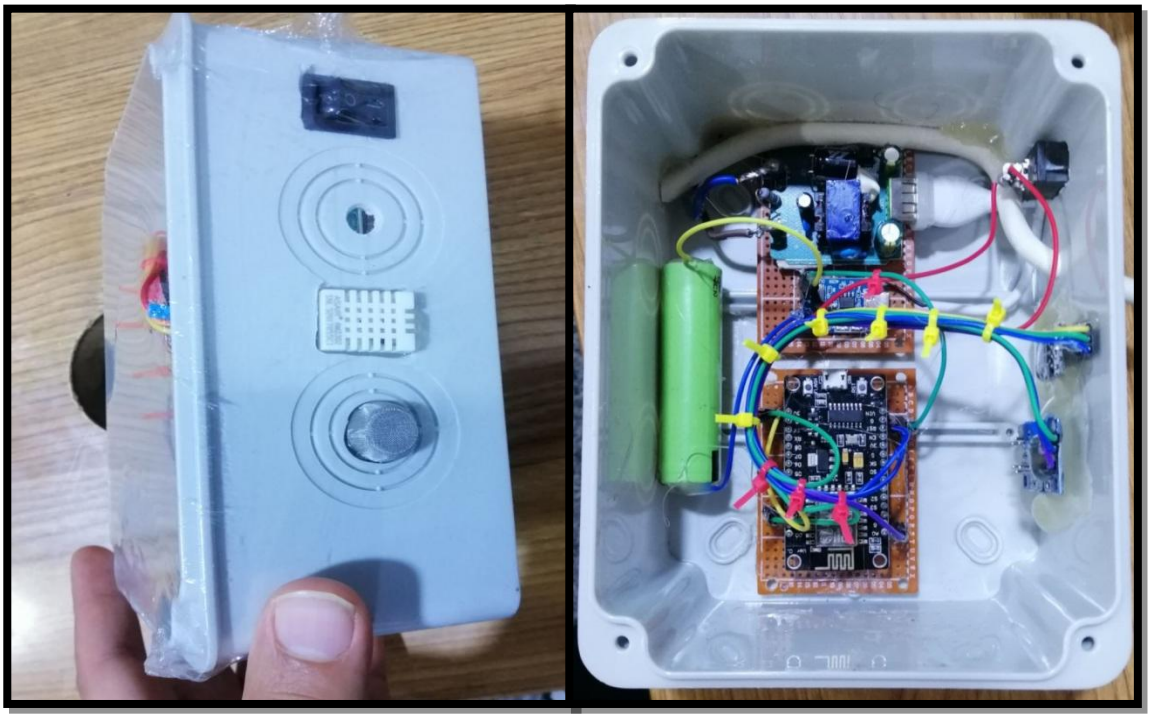

Fig.(5) system shape

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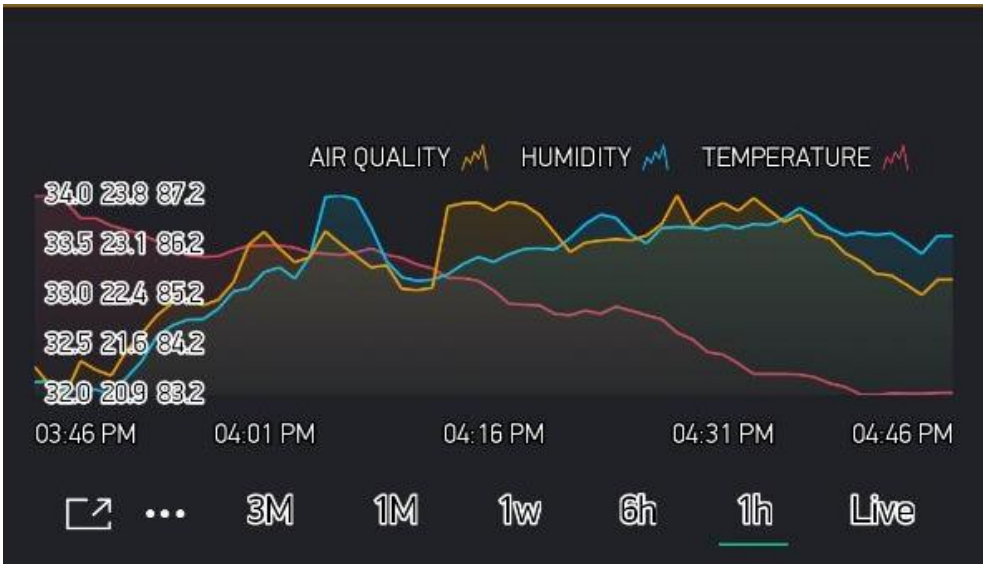

Fig.(6) shows the temperature, humidity and air quality on the Blynk platform

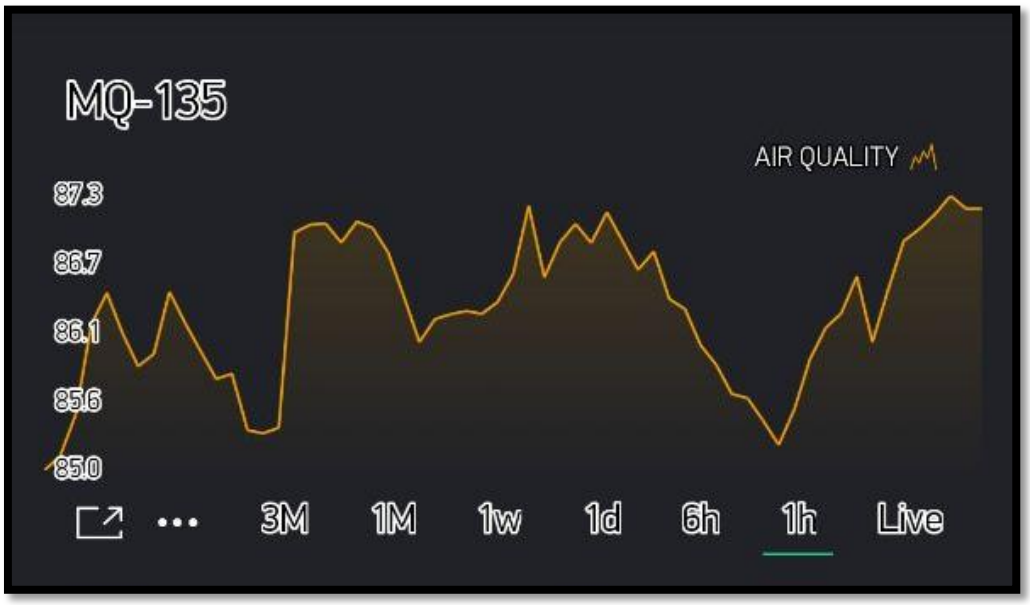

Fig.(7) Estimating the air quality of the MQ-135 . sensor

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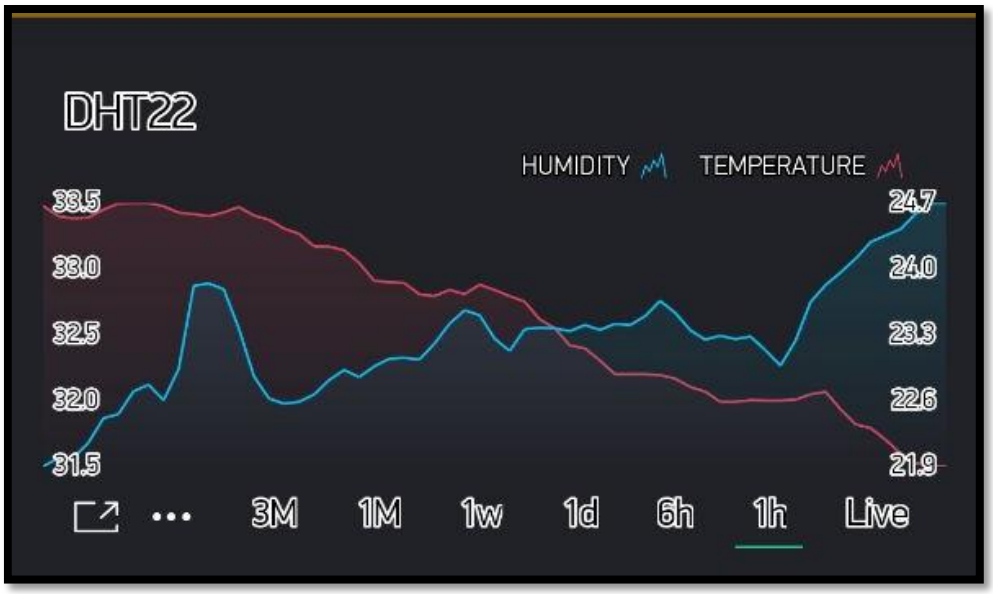

Fig.(8) shows the temperature and humidity of the DHT22 sensor

6. **Conclusion**:

In our cities, monitoring using gadgets like IoT-based weather stations will boost self-defense and safeguard the environment. . By using this type of sensor in our home, we can communicate with similar technologies over the internetThe data and analytical results are subsequently given to appropriate authorities, such as pollution commissions. , Other online users, such as NGOs. In our project, we use a low-cost model to provide an effective way for monitoring urban pollution. This information can be used for a variety of purposes, including future reference and trend research. , etc. The concept could be expanded to track the development of cities and industrial areas in order to reduce pollution. Additionally , our projects provide communities with a cost-effective solution to track pollution and maintain public health and much-needed industrial growth. In the future, this inexpensive weather station could be widely used in small towns that are expanding into cities. Environmental standards allow developing cities to expand. This strategy protects developing cities from the issues that cities like Delhi and Mumbai are currently experiencing. . The proposed weather monitoring system can be easily installed and moved to remote locations. These weather stations are becoming an essential part of monitoring pollution in our metropolitan areas, thereby protecting public health and nature (i.e. smart environments). IoT-based weather stations can be further improved by adding more parameters, such as poison gas sensors, light sensors, and pressure sensors.

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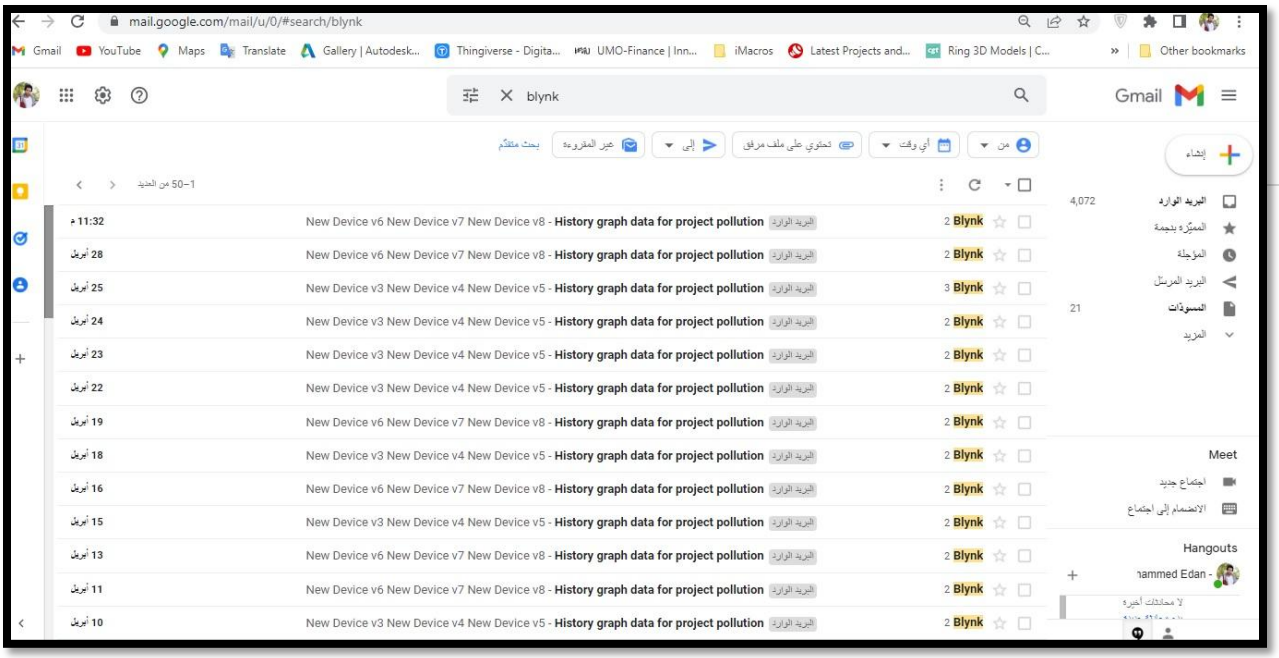

Fig.(9) shows the receipt of information from the Aplank platform via email

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