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Analysis Of IOT Based Wireless Sensors for Environmental Monitoring

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***Abstract*—**Environmental monitoring is the monitoring of the quality of environment and to control the risk of pollution. The evolution of new chemicals and industries process has come the introduction or elevation of pollutants in the atmosphere as well as the environmental research and regulations increasing the demand for air quality monitoring .Now-a-days air pollution are one of the most important concerns of the world. Most of the major cities in developing countries and most cities of the developed countries are suffering from it. Thus to develop a real time air quality and pollution monitoring system is critical.

Here we propose an idea for monitoring and predicting air quality based on IOT which combined a small-sized, minimum-cost sensor to an arduino unit. It is affordable, user-friendly, low-cost and minimum-power requirement hardware which is appropriate for mobile measurement, as well as comprehensible data collection. It has processing software able to analyze, collected quality data with high precision. Machine learning algorithm is used to improve the accuracy both in monitoring and predicting values and also improves real time decision making. Whenever there is a change in the normal range of the air pollutant present in the atmosphere, the warning messages are sent via email a text messages using SMTP protocol.

***Keywords*—** Environmental monitoring, IOT, Machine learning algorithm, SMTP protocol etc.

I. INTRODUCTION

The recent changes in climate have increased the importance of environmental monitoring. The main objective of this is to provide environmental parameters that include the effect and exact status of how global warming has been affected in certain areas. In this we use temperature, humidity , CO2 and NO2 sensors which is connected to ARDUINO. They automatically collect the values of the sensors and stores this in cloud by using Wi-Fi and transmitted through nearby control station.

By using SVM machine learning algorithm to the values stored in cloud, we can predict whether the air quality, temperature, soil moisture, salinity , rainfall, atmosphere pressure, light intensity, air quality is good or not in that certain areas.

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In the current context of the Internet of Things (IoT), the possibility to develop smart and context aware applications in different environments (rural, urban, and industrial) is a reality enabled by autonomous wireless sensors (AWS). Autonomous wireless sensors represent the core of the Wireless Sensor Networks (WSN). They must deliver data with high reliability, must exhibit high energetic performance as well as autonomy. Current technology allows the development of a large spectrum of sensor-based applications in various fields, from military to bioengineering and from industry to education.

The increased complexity of the sensors' behavior raises new challenges regarding reliability, availability, accuracy, energy consumption, security, and data transfer efficiency, in an extremely complex environment. Such complexity spawns the development of simulation test beds that facilitate the decision process in the hardware and software design of the next generation AWSs.

For each AWS parameter, it is important to identify its variation range and the cross correlation with other parameters. The AWS architecture refers to components and their organization, illustrating the subsystem inferences. Thus, in the case of power sources, the storage system should simultaneously satisfy the application demands: Both for basic power and short-term power variation. The informational aspect will mainly influence the transceiver choice and the protocol with which is endowed. In Figure 1, the main components of the optimization process are revealed.

II. EXISTING SYSTEM

In the existing system 3 different IOT based wireless sensors are used for environmental monitoring. They are UD based Wi-Fi communication, HTTP and Bluetooth smart communication. All of these presented systems provide the possibility of recording data at remote locations and reusualizing them from every device with an internet connection only after a particular period of time. This increases the risk of data loss.

The data is not protected completely. One of the main disadvantage of the existing system is the algorithm that they are used KNN. The KNN algorithm also known as lazy learner.

A. Disadvantages Of Existing System

- It only records the data and stores it in cloud.
- No layer architecture – It does not specify any number of layers.
- Data loss – The information is destroyed by failures,

neglected in storage, transmission or processing.

III. PROPOSED SYSTEM

In the proposed system we propose a low cost air quality environmental monitoring and real time prediction system based on IOT. This system can be implemented inside or outside the chemical industries or factories to monitor and detect the amount of gases and chemicals that are releasing into the atmosphere. For that we are using 4 sensors i.e, temperature, humidity,CO2 and NO2.

In order to fuse the values of these 4 sensors support vector machine algorithm is used. It achieves the immediate prediction of the concentration of 4 Sensors. After the fusion we upload these data into cloud using node MCU through Wi-Fi module By using python code we retrieve the values in the cloud.. These values can predict whether the air quality is good or not. This is the output. This is the output we can read them and can be publically display by creating a webpage. Then the predicted output can be created in a text file. By using php html code.

If there is a chance in the quality of air, along with displaying the values on the webpage, warning messages are produced and by using SMTP protocol, warning messages can be sent via email or Text messages.

A. Advantages Of Proposed System

- Low power consumption.
- Easy to monitor the value of the particular areas environmental range.
- SVM algorithm is more reliable.
- Fast transmission of data.
- Low cost.
- High performance.
- Secured communication.

IV. SYSTEM ARCHITECTURE

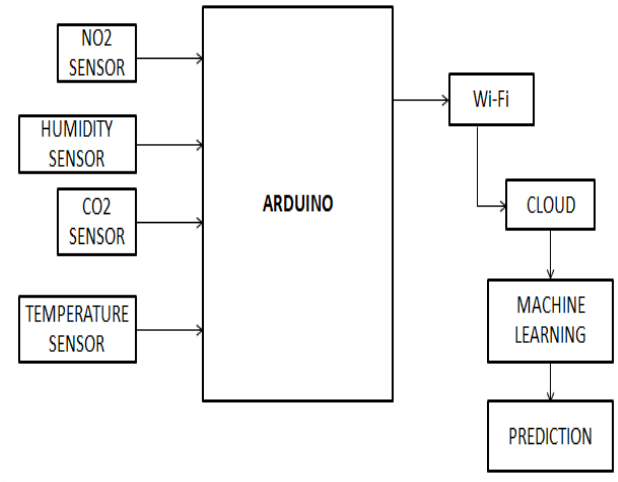

Fig 1: System Architecture

A. Modules

- Collection of values.
- Storing
- Prediction
- Publishing

B. Collection of values

The 4 sensors – temperature,humidity,CO2 and NO2 reading is serially monitored. Serial monitor is the tether between computer and Arduino.it is used to Sends and receive the text messages.

C. Storage

By using the Wi-Fi module we can store the reading in the cloud. A Wi-Fi module is connected from arduino. The value collected by arduino is stored in the cloud by using node MCU. By using the python code we can retrieve the values stored in cloud and save each of them in fields. ie Field 1, field 2, field3, Field 4.

D.Prediction

We can retrieve the values/reading using SVM machine learning. In order to fuse the values of these 4 sensors Support Vector Machine (SVM) is used. It acheives the immediate prediction of the concentration of four sensors. Machine learning algorithm is used to improve the accuracy both in monitoring and predicting values and also improves real time decision making.
After the fusion we upload these data into cloud using NOD MCU through WiFi. By using python code we retrieve the values in the cloud. This values can predict whether the air quality is good or not and this is the output.

E. Publishing

All the collected data is published publically by a creating website. Then the predicted output can be created in an text file. By using php html code we can read them and can be publically display by creating a webpage. If there is a change in the quality of air along with displaying the values on the webpage, Warning messages are produced by using SMTP protocol through Email or text message.

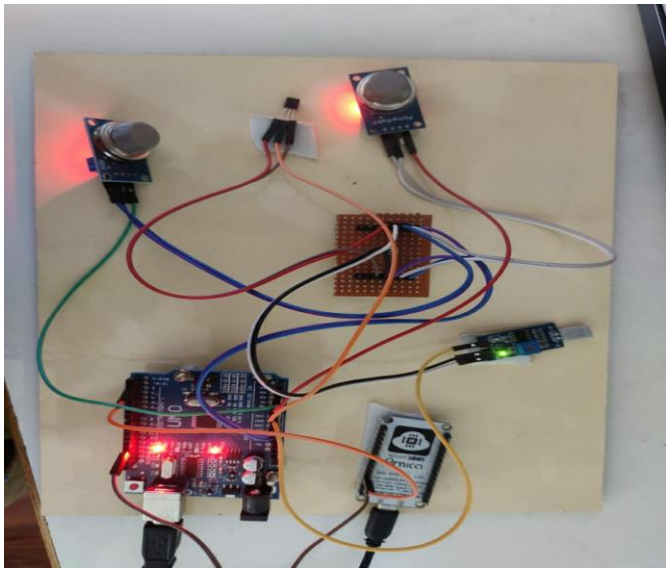

Fig 2: Output

V.CONCLUSION

It is proposed as a low cost air quality environmental monitoring and real time prediction system based on iot. In the proposed system machine learning algorithm is used because based on the past details we can predict the future. The analysis present in the paper represent a starting point for the selection of a direction in the implementation of iot based environmental based applications.

The four sensors we used make the air quality data more stable and accurate. The experimental results show that our system can monitor and measure the gas concentration.

Sensors have long life and less cost. Compared to other air quality monitoring equipment the cost of our proposed system can be reduced by atleast 10% with the same observation accuracy.

REFERENCES

[1] Jawad, H.; Nordin, R.; Gharghan, S.; Jawad, A.; Ismail, M. Energy Efficient Wireless Sensor Networks for Precision Agriculture: A Review. Sensors 2017, 17, 1781.
[2] Sánchez-Álvarez, D.; Linaje, M.; Rodríguez-Pérez, F.J. A framework to design the computational load distribution of wireless sensor networks in power consumption constrained environments. Sensors 2018, 18.
[3] Elkhodr, M.; Shahrestani, S.; Cheung, H. Emerging Wireless Technologies in the Internet of Things: A Comparative Study. Int. J. Wirel. Mob. Netw. 2016, 8.
[4] Yelamarthi, K.; Aman, M.S.; Abdelgawad, A. An application-driven modular IoT architecture. Wirel. Commun. Mob. Comput. 2017.
[5] Razaque, A.; Elleithy, K. Energy-Efficient Boarder Node Medium Access Control Protocol for Wireless Sensor Networks. Sensors 2014, 14, 5074–5117.
[6] Garcia, C.G.; Ruiz, I.L.; Gómez-Nieto, M.A. State of the Art, Trends and Future of Bluetooth Low Energy, Near Field Communication and Visible Light Communication in the Development of Smart Cities. Sensors 2016, 16, 1968.
[7] Fisher, R.; Ledwaba, L.; Hancke, G.; Kruger, C. Open hardware: A role to play in wireless sensor networks? Sensors 2015, 15, 6818–6844.
[8] Aguilar, S.; Vidal, R.; Gomez, C. Opportunistic Sensor Data Collection with Bluetooth Low Energy. Sensors 2017, 17, 159.
[9] Hortelano, D.; Olivares, T.; Ruiz, M.; Garrido-Hidalgo, C.; López, V. From Sensor Networks to Internet of Things. Bluetooth Low Energy, a Standard for This Evolution. Sensors 2017, 17, 372.
[10] Tosi, J.; Taffoni, F.; Santacatterina, M.; Sannino, R.; Formica, D. Performance Evaluation of Bluetooth Low Energy: A Systematic Review. Sensors 2017, 17, 2898.
[11] Curiac, D.I. Wireless Sensor Network Security Enhancement Using Directional Antennas: State of the Ar and Research Challenges. Sensors 2016, 16, 488.
[12] Sahoo, P.K.; Pattanaik, S.R.; Wu, S.L. A reliable data transmission model for IEEE 802.15.4e enabled wireless sensor network under Wi-Fi interference. Sensors 2017, 17.
[13] Yu, F.; Chang, C.C.; Shu, J.; Ahmad, I.; Zhang, J.; Maria de Fuentes, J. Recent Advances in Security and Privacy for Wireless Sensor Networks. J. Sens. 2017, 3.
[14] Senouci, M.R.; Mellouk, A. Deploying Wireless Sensor Networks Theory and Practice; Elsevier, ScienceDirect: Amsterdam, The Netherlands, 2016.
[15] Darroudi, S.M.; Gomez, C. Bluetooth Low Energy Mesh Networks: A Survey. Sensors 2017, 17, 1467.
[16] Tomi´c, I.; McCann, J.A. A Survey of Potential Security Issues in Existing Wireless Sensor Network Protocols. IEEE Internet Things J. 2017, 6, 1910–1923.