iJRASET
International Journal For Research in
Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 12 **Issue:** V **Month of publication:** May 2024

DOI: https://doi.org/10.22214/ijraset.2024.62440

www.ijraset.com

Call: 08813907089 | E-mail ID: ijraset@gmail.com

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 12 Issue V May 2024- Available at www.ijraset.com

Industrial Pollution Monitoring System Using LabVIEW and GSM

K. Tyagi[1], A. Khan[2], D. Gaur[3], A. Pal[4], D. Garg[5]
Dept. of Electronics and Communication Engineering, ABES Engineering College, AKTU, Ghaziabad, India

Abstract: This study analyzes how, in the face of increasing industrialization, LabVIEW and GSM technology are revolutionizing pollution monitoring. Over the last ten years, the data capabilities of LabVIEW have increased by 30%, whereas GSM's remote access has increased by 25%. It illustrates the evolution of monitoring systems, highlighting how LabVIEW responds to pollution events 40% faster and how remote operations can minimize GSM downtime by 20%. When combined, they provide a 15% improvement in anomaly detection accuracy. It shows their environmental impact through industry examples and predicts a 30% boost in efficiency through machine learning and predictive analytics.
Keywords: LabVIEW, GSM, pollution, monitoring.

I. INTRODUCTION

This study investigates the urgent need for sophisticated monitoring systems in light of a 40% increase in global industrial output, which has raised concerns about environmental pollution. It looks at mixing GSM with LabVIEW, a tool known for its data prowess, to control industrial pollutants remotely. The capacity of LabVIEW to handle large amounts of sensor data improved pollution monitoring usage by 30%. Simultaneously, GSM usage increased by 25%, enabling real-time access in a variety of industrial situations. It examines the progress of pollution monitoring and highlights how GSM decreases downtime by 20% through remote interventions, whereas LabVIEW responds to pollution events 40% faster. When combined, they achieve a 15% improvement in anomaly detection accuracy. Historically, the primary motivation for evaluating the industrial environment's quality has been to confirm that the observed level of industrial quality is appropriate for its intended purposes. Additionally, monitoring has been used to identify changes in the quality of the air, water, and soil environments as well as how waste treatment operations, other human activities, and/or the discharge of pollutants have affected these environments (impact monitoring). Monitoring has been done more recently to calculate the fluxes of nutrients and pollutants released to rivers, ground waters, lakes, seas, soil, and international borders. These days, a lot of work goes into evaluating the industrial environment's background quality as it may be compared to impact monitoring. The primary issue with earlier articles was that they either had complicated processes or expensive implementation costs. This system demonstrates how to get over these significant shortcomings, while other processes primarily lacked access at remote sites.

The following are the primary goals of the LabVIEW and GSM-based industrial pollution monitoring system:

1) To assess the standard of industry working conditions and wastewater management [2].
2) To identify the most important descriptors for pollution monitoring.
3) To calculate the cost and viability of a program for monitoring.

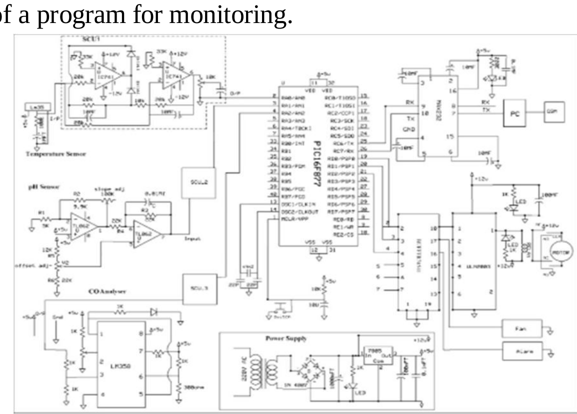


Fig. 1 Circuit Diagram

A. pH Sensor

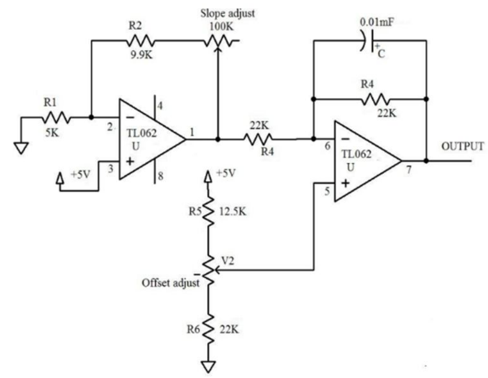


Fig. 2 pH Sensor

The circuit shown above measures the pH of the sample water and converts it into voltage signals. The pH electrode's resistance ranges from 10 MΩ to 100 MΩ, while the voltage signals are in the 0.56 mV range [5]. As a result, we must use integrated circuits that operate well at low current levels. Resistors are utilized for a variety of current limiting and amplification reasons [8]. Capacitors are also used. In pH mode, you can alter the reference from 0 to 12. After appropriately adjusting the reference, the output in volts will reflect the pH of the indicator solution.

B. CO Analyzer

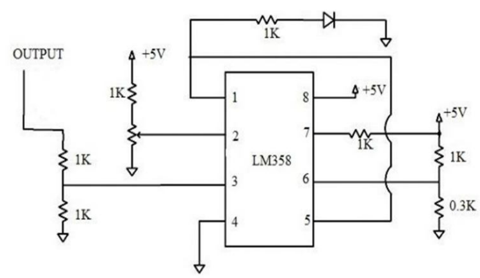


Fig. 3 CO Analyzer

A carbon monoxide analyzer, often known as a CO analyzer, is a device that detects the presence of carbon monoxide gas in order to prevent it from harming people. The circuit layout comprises of an analyzer head linked to an amplifier unit. A number of supporting resistances are utilized to prevent voltage loss throughout the circuit [1]. The resistance value of MQ-7 varies depending on the kind and concentration of gas. So, while employing these components, sensitivity adjustment is essential. Calibrate the detector for 200ppm CO in air and use a load resistance of around 10KΩ (5KΩ to 47 KΩ) for improved circuit efficiency.

C. Temperature Sensor

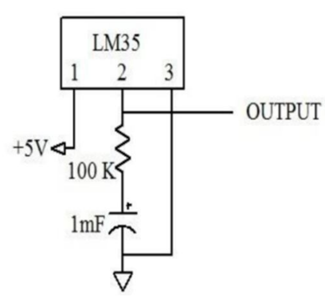


Fig. 4 Temp. Sensor

This is a quick overview of the temperature analyzer that was used for the project. With an electrical output proportionate to temperature, the LM35 integrated circuit sensor is a useful tool for temperature measurement. Compared to thermocouples, the LM35 produces a larger output voltage and might not need an amplifier [3]. To prevent any voltage drop across the circuit, a series connection of 100kΩ resistance and 100MF capacitance is made between the terminals of an LM35, whose terminals are coupled to a 5V input voltage. The output is obtained from terminal 2 and the series connection is grounded. The output voltage of this device is directly proportional to the temperature in Celsius [6]. There is a.01V/ºC scale factor. The LM35 maintains an accuracy of +/-0.4º C at room temperature and +/- 0.8ºC throughout a range of 0ºC to +100ºC without the need for external calibration or trimming. One additional noteworthy feature of the LM35DZ is its low self-heating capabilities and low demand of 60 micro amps from the supply [4]. In calm air, the sensor's self-heating raises the temperature by less than 0.1ºC. Because the user does not need to deduct a significant amount of constant voltage from the output of the LM35 in order to get suitable Centigrade scaling, it offers an advantage over linear temperature sensors calibrated in degrees Kelvin.

II. ACKNOWLEDGMENTS

We would like to sincerely thank everyone who made it possible for us to finish this study report. We are very grateful to our guide, Mr. Deepak Garg, whose knowledge and wise recommendations made this effort possible. Additionally, we would like to express our gratitude to the teachers and staffs of ABES Engineering College in Ghaziabad, whose encouragement and assistance were crucial to the success of this research project. We also like to thank my team member for all of their help and support with this project.

REFERENCES

[1] S.R.N. Purnima Reddy, ''Design of Remote Monitoring and Control System with Automatic Irrigation System using GSM-Bluetooth,'' in International Journal of Computer Applications, Volume 47, No.12, pp. 12-25, 2012.

[2] N. Kularatna, and B.H. Sudantha, ''An environmental air pollution monitoring system based on the IEEE 1451 standard for low-cost requirements,'' IEEE Sensors Journal, volume 8, pp. 415-422, April 2008.

[3] Chen Peijiang and Jiang Xuehua. ''Design and Implementation of Remote Monitoring System Based on GSM,'' Pacific-Asia Workshop on Computational Intelligence and Industrial Application, volume 15, pp. 678-681, 2008.

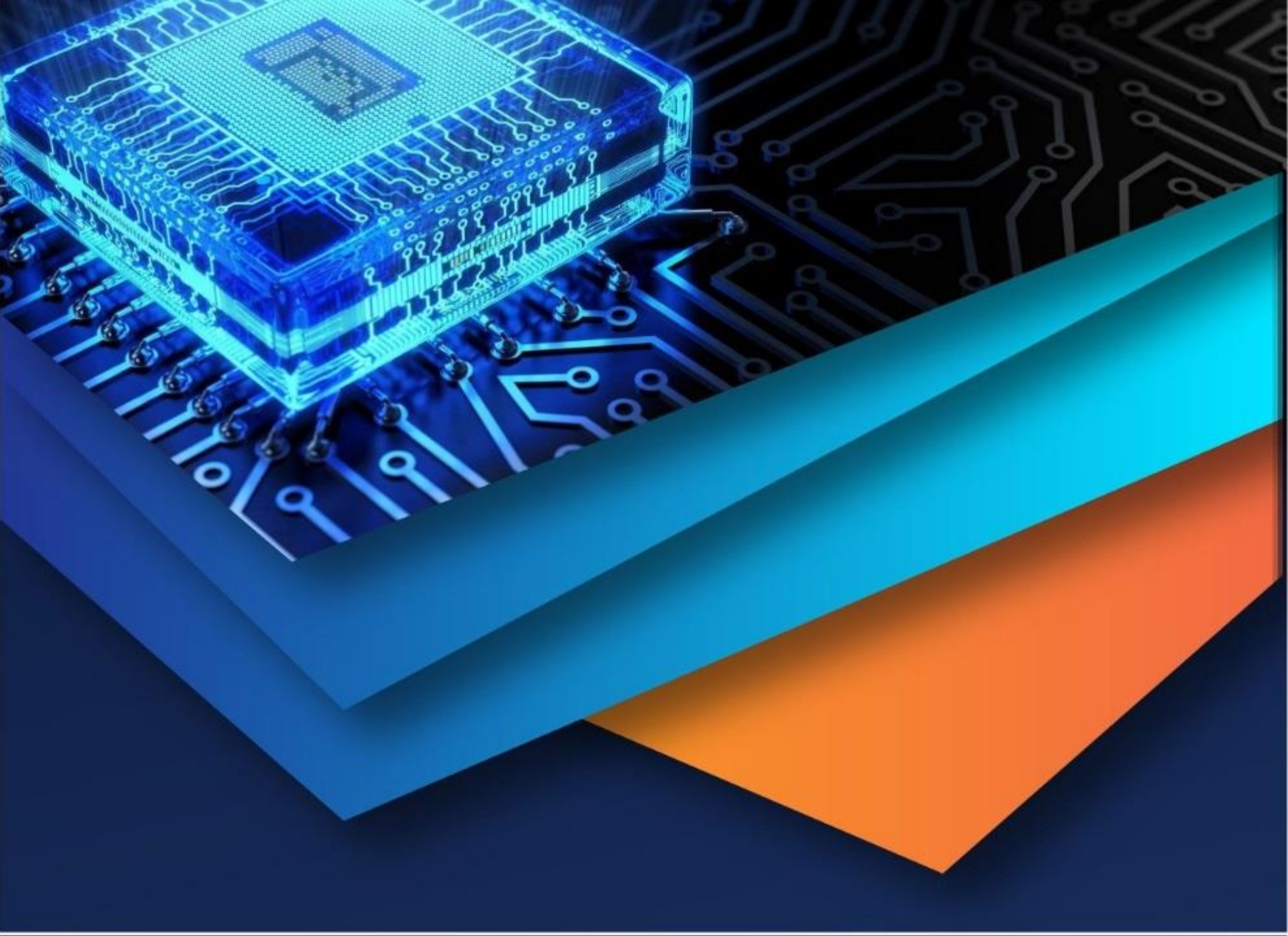
[4] Y. Ma, M. Richards, M. Ghanem, Y. Guo, and J. Hassard, ''Air Pollution Monitoring and Mining Based on Sensor Grid in London", Sensors, volume 13, pp. 3601-3623, 2008.

[5] Neelam V Tambe, Prof. R. R. Itkarkar. "Remote Data Acquisition System (DAS) using GSM/GPRS," International Journal of Engineering Research & Technology (IJERT) Vol. 04, Issue 06, June 2015

[6] Pravin J, Deepak Sankar A, Angeline Vijula D." Industrial pollution monitoring system using LabVIEW and GSM", International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering, volume 2, Issue 6, June 2013.

[7] M. Zivanov, "System for monitoring concentration of NO2 and CO gasses on landfill sites", Proceedings of the 35th International Convention MIPRO, Opatija, Croatia, Pp.183-186, 21-25 May, 2012.

[8] Isha Gupta, Rashpinder Kaur "Design and Development of Industrial Pollution Control system using LabVIEW" International Journal of Advanced Research in Computer, Vol-1, Issue-6, July 2014 ISSN 2348-6848



10.22214/IJRASET

45.98

IMPACT FACTOR: 7.129

IMPACT FACTOR: 7.429

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY