Journal for Technology and Science
Homepage : https://journal.antispublisher.com/index.php/IPTEKS/index
Email : admin@antispublisher.com

e-ISSN : 3047-4337
JOTECH, Vol. 2, No. 3, October 2025
Page 70-74

Recording Wastewater Treatment Plant Outlet Water Discharge Using Google Sheets

Muhammad Wildan Zamrowi[1], Jamaaluddin[2]
[1,2]Muhammadiyah University of Sidoarjo, Indonesia

DOI : https://doi.org/10.61796/ipteks.v2i3.429

Sections Info

Article history:
Submitted: September 15, 2025
Final Revised: September 25, 2025
Accepted: October 15, 2025
Published: October 31, 2025

Keywords:
Flowmeter IoT
IoT
Recording
Water discharge

ABSTRACT

Objective: *The use of IoT-based waste outlet flowmeters is increasingly growing in wastewater monitoring and management.* ***Method:*** *The Method employed in this context is that This technology allows users to monitor the volume and flow rate of waste water in real-time via the internet network.* ***Results:*** *The primary Results obtained are that Its main advantage is in providing accurate and direct data related to actual conditions on the ground, enabling efficient and effective monitoring and better analysis of usage trends.* ***Novelty:*** *Finally, the Novelty of this approach is that Integration with IoT systems also enables the adoption of advanced automation solutions, improving overall operational responsibility, reliability and efficiency.*

INTRODUCTION

Pressure on the environment is increasing as a result of a growing population. This type of pollution consists of solid waste and wastewater resulting from the daily activities of people and businesses [1]. Unlike solid waste, which is usually treated, wastewater mostly ends up in drains leading to rivers or contaminates shallow groundwater due to untreated disposal [2].

To process waste from industrial activities, a wastewater treatment plant (WWTP) is required as part of an organization's Environmental Management System implementation [3]. The purpose of a WWTP is to produce environmentally friendly waste while reducing the risk of liquid waste when it is discharged into the environment. The Environmental Risk Management method is one way to reduce this risk [4], [5].

In a wastewater treatment system, monitoring is carried out not only on the components used but also on the water being processed to ensure that the resulting effluent or outlet is clean and meets regulatory standards [6], [7], [7]. The effluent from the system also needs to be monitored to determine the amount of water that has been processed by the water treatment plant [8].

Manual monitoring is also carried out directly in the field according to established procedures. Manual recording of processed water discharge is also necessary to determine the discharge results that comply with regulations or according to manufacturing specifications [9]. However, manual recording is sometimes still not done due to negligence or other reasons, if the recording is not done according to procedure, it can impact the established quality standards [10]. This manual system is the basis for researchers to create a prototype of an automatic wastewater outlet discharge recording

tool. The creation of this tool aims to simplify work or time [11]. With this Google Sheets recording, it can be viewed anywhere flexibly, on many PCs or mobile phones. Therefore, the study entitled *Recording of Wastewater Treatment Plant Outlet Water Discharge with Google Sheets* was created to fulfill the automation system of Wastewater Treatment Plants (WWTP) [12].

RESEARCH METHOD

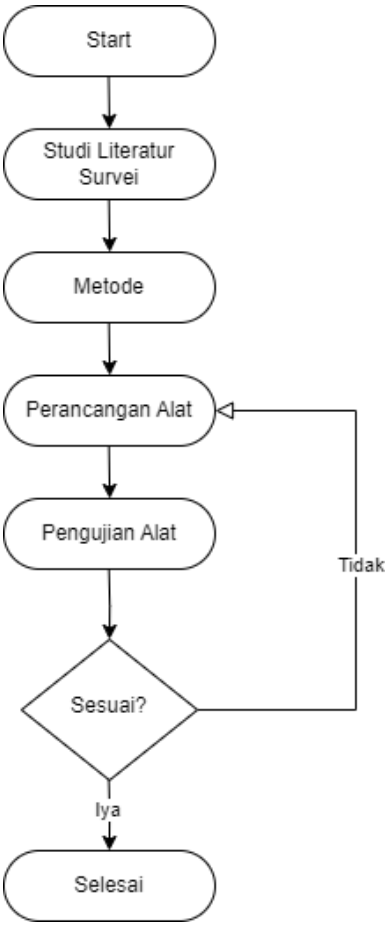


Figure 1. Research Flowchart.

Methods used with references obtained from journals, articles, and scientific works related to the research. The author also collected data by reading websites, notes, and digital books. Furthermore, the author also provided guidance or consultations with supervisors/lecturers to address issues encountered during the research and tool design. Then, In this study, we designed and developed a wastewater treatment plant automation system by creating a prototype [13]. This research required several steps to achieve the desired design. The design of this tool is based on the internet of things (IoT), so recording can be monitored remotely using an internet connection [14]. This was done using NodeMCU microcontroller programming [15] and Google Sheets becomes a place for data collection [16].

RESULTS AND DISCUSSION

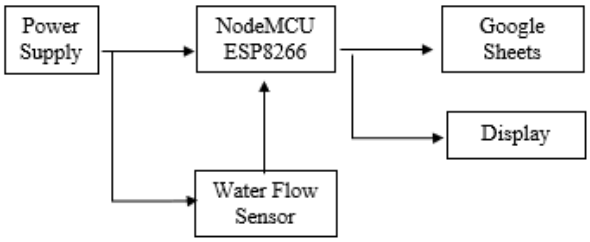
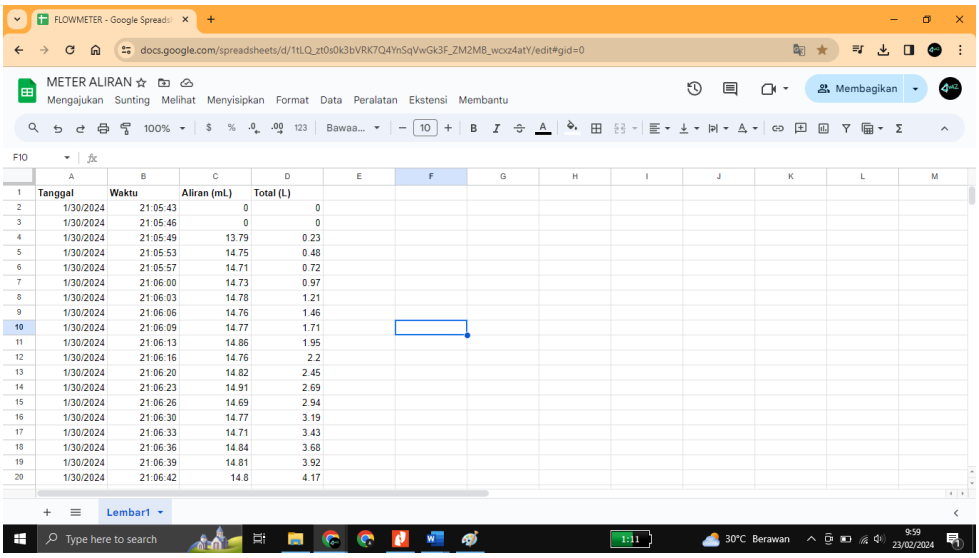


Figure 2. System Block Diagram.

A. Design

The device begins with the installation of a pre-assembled and programmed device which is then connected to a power supply as power and power ON to turn on the device or tool. NodeMCU accesses the internet and after that NodeMCU connects to GoogleSheets. Once connected to Google Sheets, the Water Flow sensor detects water flow and is read by NodeMCU which is then sent to GoogleSheets and read. Then GoogleSheets records the shipments sent by NodeMCU. The system will loop or continuously as described above. The device will turn off when the power is turned OFF.

B. Results



Tanggal	Waktu	Aliran (mL)	Total (L)
1/30/2024	21:05:43	0	0
1/30/2024	21:05:46	0	0
1/30/2024	21:05:49	13.79	0.23
1/30/2024	21:05:53	14.75	0.48
1/30/2024	21:05:57	14.71	0.72
1/30/2024	21:06:00	14.73	0.97
1/30/2024	21:06:03	14.78	1.21
1/30/2024	21:06:06	14.76	1.46
1/30/2024	21:06:09	14.77	1.71
1/30/2024	21:06:13	14.86	1.95
1/30/2024	21:06:16	14.76	2.2
1/30/2024	21:06:20	14.82	2.45
1/30/2024	21:06:23	14.91	2.69
1/30/2024	21:06:26	14.69	2.94
1/30/2024	21:06:30	14.77	3.19
1/30/2024	21:06:33	14.71	3.43
1/30/2024	21:06:36	14.84	3.68
1/30/2024	21:06:39	14.81	3.92
1/30/2024	21:06:42	14.8	4.17

Figure 3. Display of Reading Results Devices in Google Sheets.

Figure 4. Device Recording of Wastewater Outlet Water Discharge from IPAL

CONCLUSION

Fundamental Finding : Increasing environmental pressure caused by population growth has intensified pollution in the form of solid waste and wastewater from daily community and industrial activities, where untreated wastewater often flows into rivers or contaminates shallow groundwater. Wastewater treatment plants are therefore required as part of environmental management systems to reduce liquid waste risks and produce environmentally compliant effluent. Monitoring within wastewater treatment systems must cover both system components and processed water to ensure outlet water meets regulatory quality standards, and automated monitoring using an IoT-based prototype with NodeMCU and Google Sheets enables continuous, remote, and real-time recording of wastewater outlet flow rates, making operational work easier and more efficient. **Implication :** The implementation of an automatic wastewater outlet flow recording system supports compliance with environmental regulations by ensuring consistent monitoring of treated effluent while reducing reliance on manual field recording. The integration of internet-based monitoring allows data to be accessed flexibly from multiple devices and locations, thereby improving operational control, time efficiency, and ease of maintenance within wastewater treatment facilities. **Limitation :** Manual monitoring and recording practices are still commonly neglected due to human error or negligence, which can result in non-compliance with established quality standards, and this condition highlights the vulnerability of conventional systems that depend heavily on operator discipline and routine field procedures. **Future Research :** Further development of wastewater treatment monitoring systems can focus on refining automated prototypes, expanding sensor integration, and improving data reliability and scalability to enhance environmental risk management and support broader implementation of smart wastewater treatment automation systems.

REFERENCES

[1] Y. Setyadi, D. Hamdani, U. Siber Asia, and J. Selatan, "Penerapan Manajemen Lingkungan dan Keamanan Sosial pada Perkantoran, Hunian dan Taman serta Berbagai Fasilitas Tower 3 Ciputra International," 2024.

[2] J. Harahap, T. Gunawan, S. Suprayogi, and M. Widyastuti, "A review: Domestic wastewater management system in Indonesia," in *IOP Conference Series: Earth and Environmental Science*, IOP Publishing Ltd, Apr. 2021.

[3] A. Wahid and S. Adiyaksa Fazrian, "Evaluasi Kinerja IPAL PT. SPK Sidoarjo," 2024.

[4] Y. Simamora and N. Kurniati, "ANALISIS RISIKO PADA INSTALASI PENGOLAHAN AIR LIMBAH (IPAL) PT AJINOMOTO BERDASARKAN KONSEP MANAJEMEN RISIKO LINGKUNGAN."

[5] R. Rizal, "RANCANG BANGUN MODEL TEKNOLOGI INSTALASI PENGOLAHAN AIR LIMBAH (IPAL)," 2016.

[6] Tri Pasetia A, Devi Nurkhasanah S, and Priya Sudarminto H, "PROSES PENGOLAHAN DAN ANALISA AIR LIMBAH INDUSTRI DI INSTALASI PENGOLAHAN AIR LIMBAH (IPAL)," vol. 6, no. 2, pp. 491–498, 2020.

[7] S. Sulistia, A. Cahaya Septisya, P. Teknologi Lingkungan -BPPT dan Program Studi Analisis Kimia Sekolah Vokasi, and I. Pertanian Bogor, "ANALISIS KUALITAS AIR LIMBAH DOMESTIK PERKANTORAN," *Analisis Kualitas Air…. JRL*, vol. 12, no. 1, pp. 41–57, 2019.

[8] A. A. Zahrah, D. Euis, N. Hidayah, and K. Kunci, "Indeks Kualitas Air Menggunakan Metode Indeks Pencemaran Pada Kawasan Industri di Jawa Timur," 2023.

[9] F. Elga Bahctiar, R. Kokoh Haryo Putro, P. Studi Tenik Lingkungan, and J. Timur, "Pemantauan dan Optimasi Instalasi Pengolahan Air Limbah Unit Lamella Clarifier dengan Penentuan Dosis Koagulan dan Flokulan," 2022.

[10] P. Paryanto and R. Subarkah, "Perancangan Prototype dan Evaluasi Alat Pemantauan Air Limbah Industri Berbasis IoT," 2022.

[11] H. Jurnal, H. Muhammad, A. Ahfas, and S. D. Ayuni, "SISTEM MONITORING KUALITAS AIR DAN PAKAN IKAN OTOMATIS BERBASIS IOT DENGAN SISTEM KENDALI APLIKASI BLYNK," vol. 3, 2023.

[12] R. F. Ashari *et al.*, "Prototype Celengan Uang Kertas dengan Monitoring Google Sheet," 2022.

[13] J. M. S. Waworundeng, M. Tombeng, F. B. Cliff[3], and R. Maria, "E-Water System: Prototipe Pemantauan Debit Air Berbasis Android E-Water System: Prototype of Monitoring Water Discharge Based on Android," *Cogito Smart Journal |*, vol. 5, no. 2, 2019.

[14] B. Setya Kusumaraga, S. Syahrorini, D. hadidjaja, and I. Anshory, "Monitoring Kualitas Air Akuarium Berbasis Internet Of Things," 2021.

[15] M. A. Hailan, B. M. Albaker, and M. S. Alwan, "Transformation to a smart factory using NodeMCU with Blynk platform," *Indonesian Journal of Electrical Engineering and Computer Science*, vol. 30, no. 1, pp. 237–245, Apr. 2023.

[16] V. A. Kusuma, M. I. A. Putra, and S. S. Suprapto, "Sistem Monitoring Stok dan Penjualan Minuman pada Vending Machine berbasis Internet of Things (IoT) Menggunakan Google Sheets dan Kodular," *Jurnal Sistim Informasi dan Teknologi*, pp. 94–98, Aug. 2022.

Muhammad Wildan Zamrowi
Muhammadiyah University of Sidoarjo, Indonesia

***Jamaaluddin (Corresponding Author)**
Muhammadiyah University of Sidoarjo, Indonesia
Email: jamaaluddin@umsida.ac.id