International Journal on Orange Technologies (IJOT)

e-ISSN: 2615-8140
p-ISSN: 2615-7071

Volume: 7 Issue: 3 | September 2025
https://journals.researchparks.org/index.php/IJOT

Article

Recording Wastewater Treatment Plant Outlet Water Discharge Using Google Sheets

Muhammad Wildan Zamrowi[1], Jamaaluddin[2]

1. Electrical Engineering Study Program, Muhammadiyah University of Sidoarjo, Indonesia
2. Electrical Engineering Study Program, Muhammadiyah University of Sidoarjo, Indonesia

* Correspondence: jamaaluddin@umsida.ac.id

Abstract: The use of IoT-based waste outlet flowmeters is increasingly growing in wastewater monitoring and management. This technology allows users to monitor the volume and flow rate of waste water in real-time via the internet network. 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. Integration with IoT systems also enables the adoption of advanced automation solutions, improving overall operational responsibility, reliability and efficiency.

Keywords: FlowmeterIoT; IoT; Recording; Water discharge

Citation: Zamrowi, M. W & Jamaaluddin. Recording Wastewater Treatment Plant Outlet Water Discharge Using Google Sheets. International International Journal on Orange Technologies (IJOT) 2025, 7(3), 127-130.

Received: 10th Feb2025
Revised: 11th Mar 2025
Accepted: 24th Apr 2025
Published: 27th May 2025

1. Introduction

The pressure on the environment is increasing due to the continuously growing population. This type of pollution consists of solid waste and wastewater originating from the daily activities of the community or companies [1].Unlike solid waste, which is usually processed, most wastewater will end up in drainage channels leading to rivers or contaminating shallow groundwater due to untreated disposal [2].

To process waste from industrial activities, a wastewater treatment plant (IPAL) is needed as part of the organization to implement an Environmental Management System[3].The purpose of the Wastewater Treatment Plant (IPAL) is to produce environmentally friendly waste while also reducing the risk of liquid waste when it is disposed of into the environment. The Environmental Risk Management Method is one way to reduce risk[4][5].

From the wastewater treatment plant installation system, monitoring is conducted not only on the components used but also on the processed water to ensure it produces clean and quality-compliant effluent or outlet according to regulatory standards[6],[7].The effluent from the system also needs to be monitored to determine the amount of water that has been processed by the wastewater treatment facility[8].

Manual monitoring is also carried out directly in the field according to the established procedures. Manual recording of the processed water discharge is also necessary to determine whether the effluent meets regulations or production specifications[9].But manual recording is sometimes still not done due to negligence or other reasons; if the recording is not done according to the procedure, it can affect the established quality standards[10].The manual system underlies the researchers' creation of a prototype for an automatic wastewater outlet flow recording device. The creation of this tool aims to simplify work or save time[11].With this Google Sheets recording, it can be viewed anywhere flexibly, on many PCs or mobile phones. Therefore, the research titled "Recording the Outlet Water Flow Rate of the Wastewater Treatment Plant Using Google

Sheets" was created to fulfill the automation system of the Wastewater Treatment Plant (IPAL)[12].

2. Materials and Methods

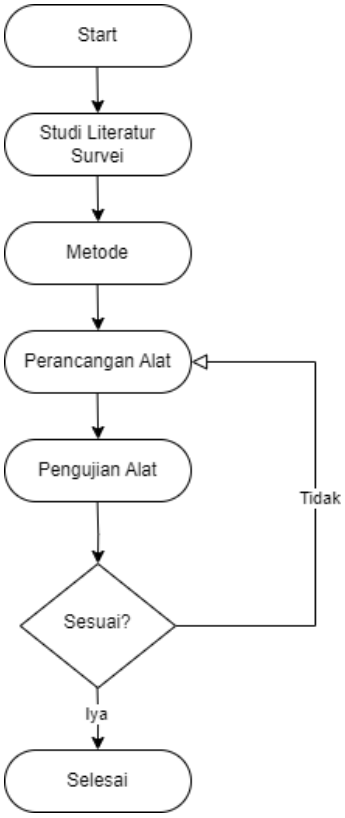

Figure 1. Research Flowchart

Method Which is used with references obtained from journals, articles, and scientific works related to the research. Additionally, the author collected information data by reading websites, notes, and digital books. In addition, the author also conducted guidance or consultation with supervisors/lecturers to address issues that arose during the research and tool design. Which then in this research involves designing and developing an automated system for wastewater treatment installations by creating a prototype of the device[13].This research requires several steps to achieve the desired design. The design of this tool is based on the Internet of Things (IoT), allowing data recording to be monitored remotely using an internet connection[14].With the programming of the Node MCU microcontroller [15] and Google Sheets as the data recording platform[16].

3. Results

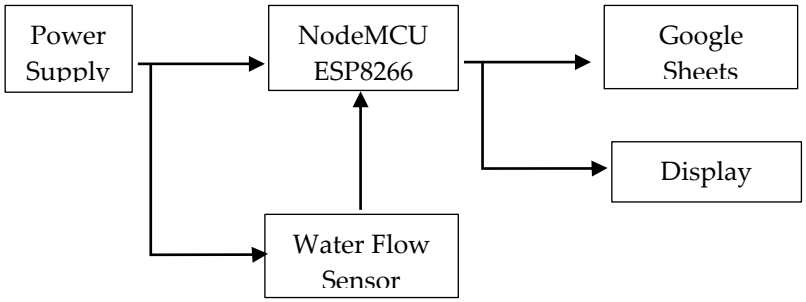

Figure 2. System Design Block Diagram

Design

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

Result

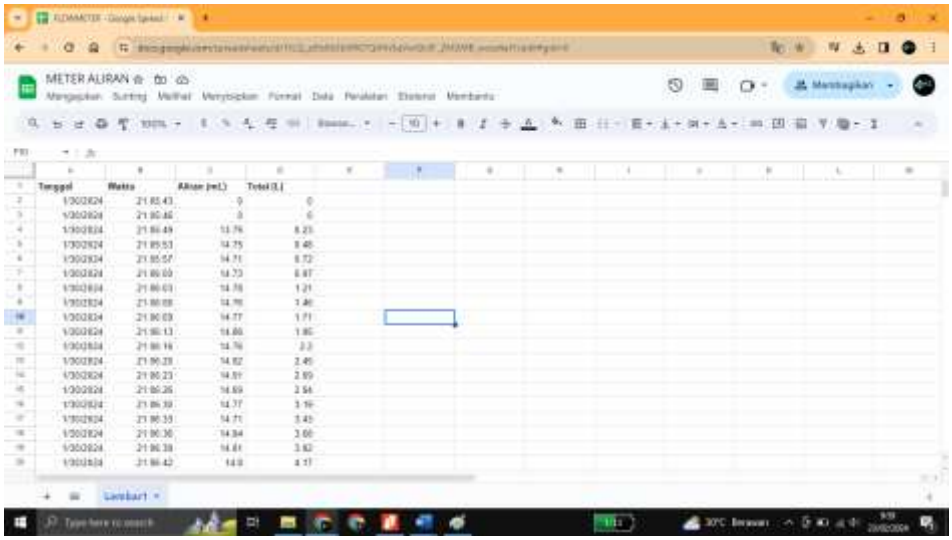

Figure 3. Display of Device Reading Results in Google Sheets

Figure 4. Wastewater Treatment Plant Outlet Water Flow Recording Device

4. Discussion

The designed system demonstrates an effective integration between hardware components and cloud-based data logging. By utilizing NodeMCU as the microcontroller, the system is capable of establishing a stable internet connection and communicating with Google Sheets for real-time data monitoring. The Water Flow sensor functions as the primary input, detecting the flow of water and relaying the information to NodeMCU, which in turn transmits it to Google Sheets. This setup allows for continuous and automated data collection without manual intervention. One of the key advantages of this

design is its ability to operate in a loop, ensuring up-to-date tracking of water flow as long as the system remains powered. However, system performance depends heavily on stable internet connectivity and consistent power supply. Future improvements could include adding data backup in local storage or implementing notification alerts for specific flow thresholds to enhance system reliability and responsiveness.

5. Conclusion

Based on the analysis, research, design, and implementation of the device in the field, the device can facilitate work because it can be controlled and monitored from a distance and anywhere.The maintenance and upkeep of the device are also considered easy.

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.