SMART WATER-LEVEL MONITORING SYSTEM FOR TANKS & DRUMS

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Problem

In Kampala & Its surrounding urban communities such as Kira, Mukono, and Wakiso, Water storage is commonly done using rooftop or ground-level tanks due to intermittent water supply from NWSC. However, many households lack efficient means of monitoring water levels in these tanks. As a result, tank overflows frequently go unnoticed, leading to water wastage and structural damage, or run dry, leaving residents without water during peak usage times.

Project Objectives

- Develop a real-time water-level monitoring system for storage tanks
- Alert users of critical water level to prevent overflows or dry tanks.
- Improve water management in areas with irregular supply (e.g. Kira)
- Reduce manual checks in apartments, schools, and clinics.
- Provide simple, accessible user alerts (SMS/display).

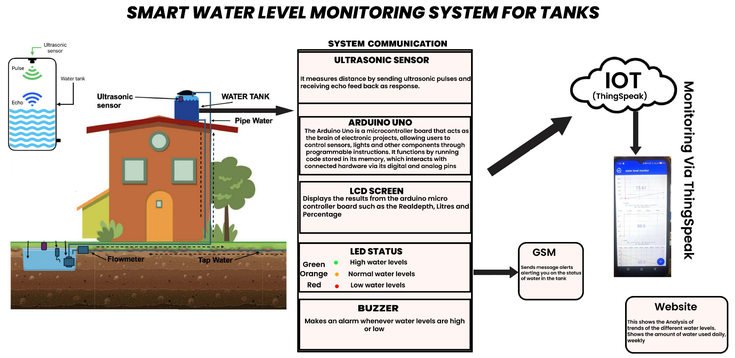
Project Requirements

- Arduino Uno microcontroller, , 9V Battery, GSM Module
- HC-SR04 Ultrasonic Sensor (Generic), USB-A to B cable
- Breadboard, DC-DC Stepdown Buck Converter, DC Female
- 5mm LED: (Green, Orange, Red)
- Buzzer
- Male to Female, Male to Male Jumper Wires.
- 16*2 LCD with I2C for Arduino

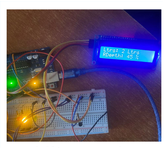
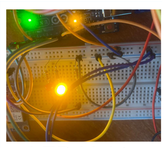
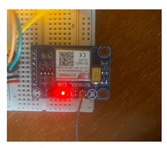
Target Users

1. **Households**	2. School & Clinic Administrators	3. Landlords & Apartment Managers
• To automate water-level tracking and reduce manual checks or guesswork • To avoid dry tanks, and save water by preventing unnoticed overflows	• To ensure reliable water access for sanitation, & support H/Safety	• To prevent tank overflows, schedule timely refills, reduce water bills and handle tenant complaints efficiently

Project Design



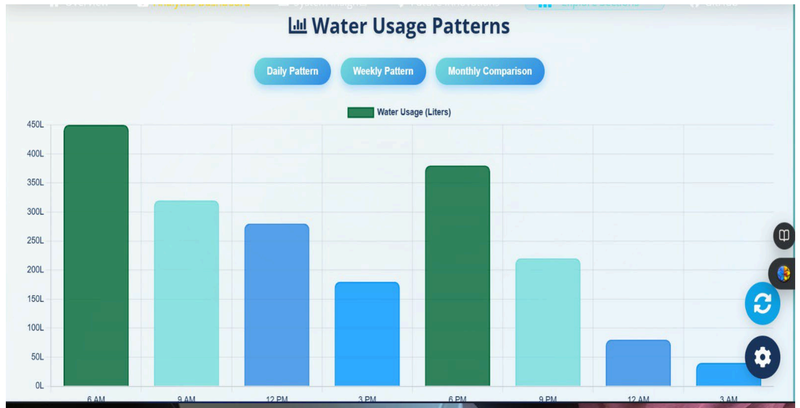
Results

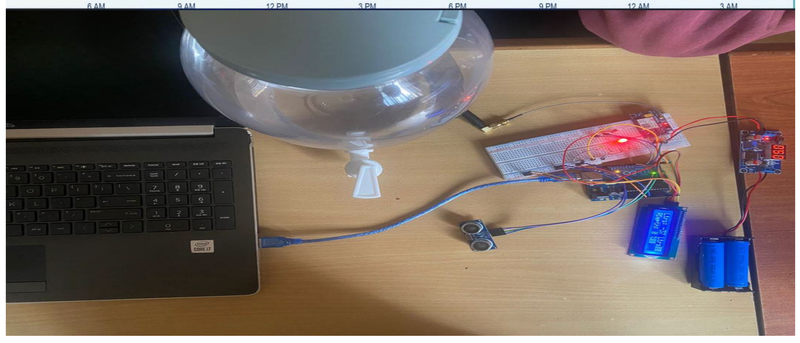
Step 1	Step 2	Step 3	Step 4
			
• Arduino uno • LCD Screen • LED Lights • Buzzer	Ultrasonic sensor sends the readings to the LCD sreen	LED Lights display according to the low, norma & High	Information is sent to the GSM that later sends alert messages to the user

Future Work

- Need of a pressure sensor for accurate and stable water levels
- Need of a dedicated mobile application for more interactive dashboard, real time push notifications.
- Automated pump control integration by implementing logic to automatically control a water pump based on water level thresholds.
- Enhance Security measures to improve security for API key managements to possibly use server –side authentication or data encryption.
- Local data storage with the SD card by adding an SD card module for local data logging during network outages.

Results





Conclusion

- The Smart Water Level Monitoring System effectively addresses critical water management challenges by providing real-time monitoring and timely alerts for water storage tanks. Leveraging Arduino Uno, ultrasonic sensing, and GSM communication, our system offers a cost-effective and efficient solution for preventing water wastage and mitigating shortages.

References

- [1] J. Dhillon et al., "IoT based Water Level Monitoring and Motor Control System," Proc. 4th Int. Conf. Recent Dev. Control, Autom. Power Eng., 2021.
- [2] A. Johari et al., "Tank water level monitoring system using GSM network," Int. J. Comput. Sci. Inf. Technol., vol. 2, no. 3, pp. 1114-112, 2011.
- [3] P. R. Kumar and S. L. Reddy, "Design and implementation of ultrasonic sensor based water level monitoring system using Arduino," Proc. Int. Conf. Adv. Comput. Commun. Technol., Feb. 2017.