GreenGlow Monitors

IoT-Based Smart Waste Bins for Campus Beautification

Campus Problem Overview

- Overflowing hostel/common-area bins → hygiene issues & foul odor.
- Maintenance staff manually check bins → **wasted time & effort.**
- No real-time visibility → bins stay full for hours.

Need for Intervention

- Reduce manual checking and unnecessary trips.
- Improve aesthetics & cleanliness across campus.

Proposed Solution

- IoT-based bin that **detects fill level**, glows **RED** when >80% full.
- Sends **instant SMS alerts** to staff when >80% bin full.
- Ensures faster response & cleaner surroundings.

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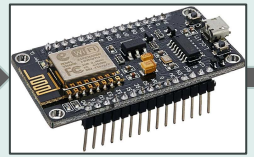
Core Technology & Implementation

System Architecture

HC-SR04 Ultrasonic Sensor
(measures waste-fill distance)



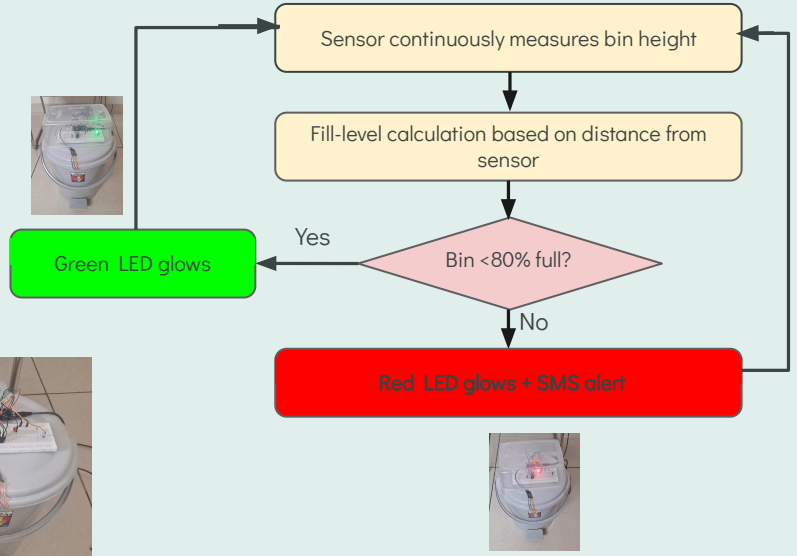
NodeMCU ESP8266
(WiFi-enabled microcontroller)

Red/Green LEDs
(visual status)

CircuitDigest SMS API

Maintenance Staff (SMS)

Flow Chart

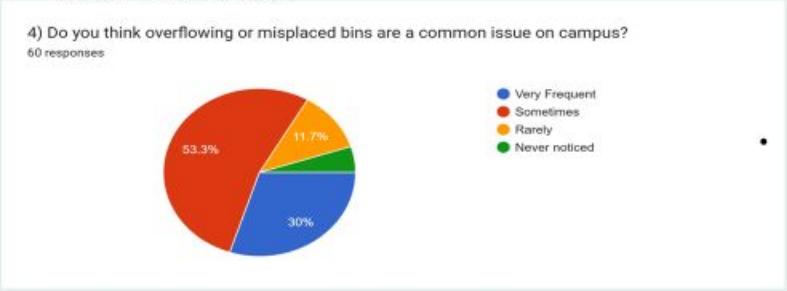


Key Features: One-time SMS per fill cycle (prevents spam). Staff notified instantly → quicker waste disposal.

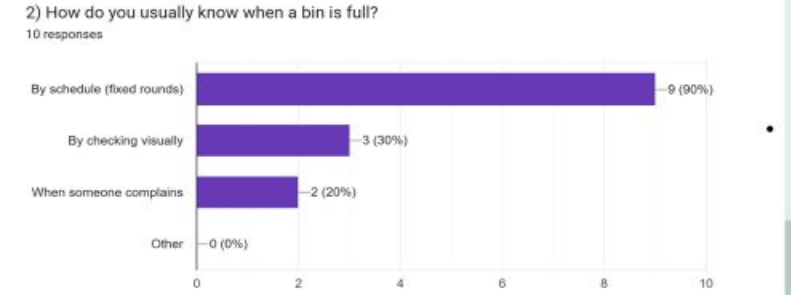
Sense → Alert → Action

Hostel and Staff Quantitative Survey Results

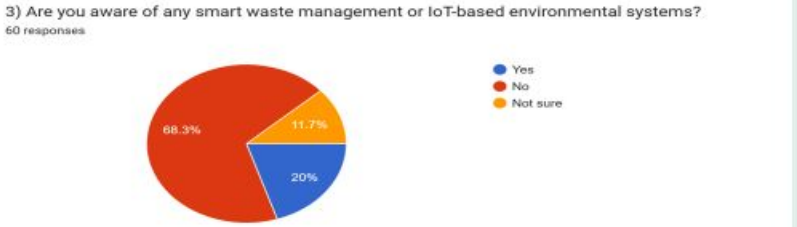
- We conducted a comprehensive survey among students, faculty/staff, and maintenance personnel across all majority hostels,
- The respondent pool was highly representative: **88.3% students, 6.7% faculty/staff, and 5.0% maintenance** personnel. The results provide robust, data-driven evidence for our conclusions.

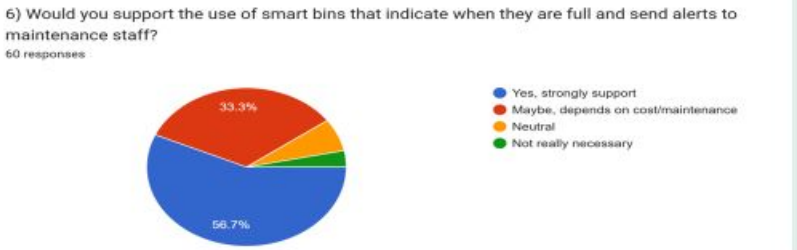


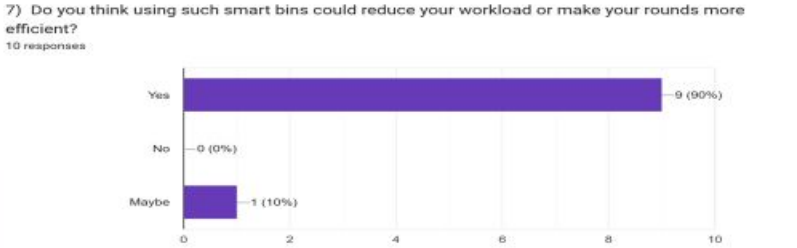
53.3% of total people believe that overflowing bins are common issue in campus



- The first pie chart highlights significant unawareness of smart waste management, **confirming the novelty and innovation of our proposed solution.**
- The second pie chart shows that students and staff members will strongly support the use of smart bins if implemented properly.
- The left bar graph highlights that Hostel Supervisors currently rely only on **fixed, scheduled rounds** to determine when a bin is full.
- The right bar graph strongly suggests that the implementation of our smart bins will significantly reduce the workload of supervisors and staff.

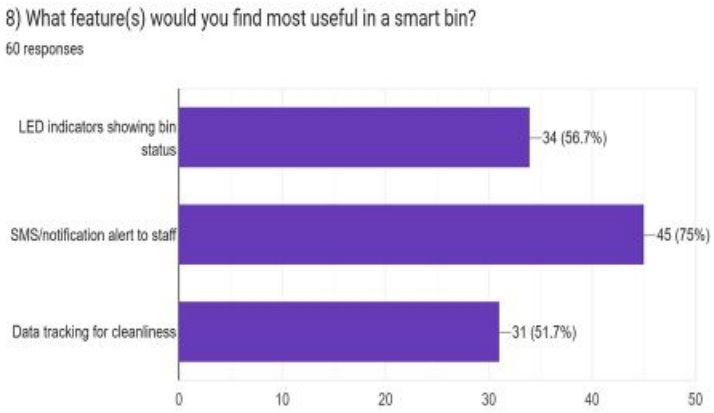




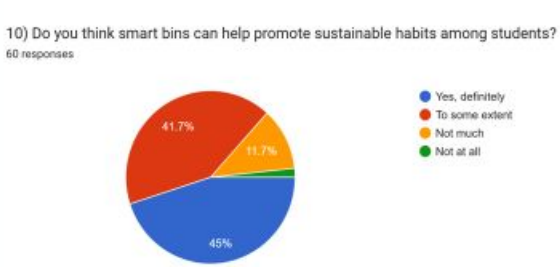


User Feedback and Refinements

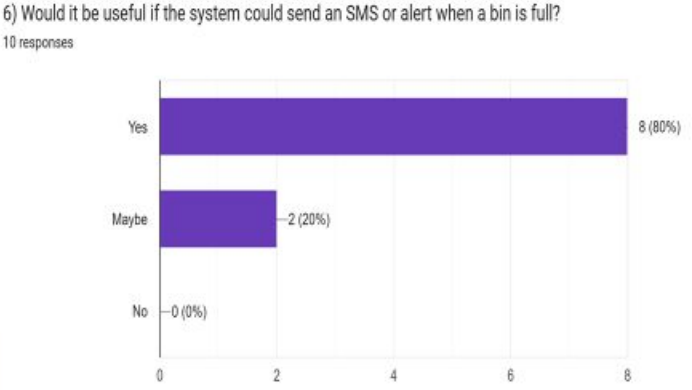
- Beyond the quantitative data, our survey included an open feedback section, allowing responders to share their perspectives and suggest critical refinements for our V2.0 solution.



- The open feedback section of our survey provided crucial qualitative data and suggestions.
- Responders highlighted logistical issues, noting that bins are often too far from student rooms, necessitating the placement of more accessible bins on each floor.
- To ensure operational continuity, it was suggested that SMS updates be sent directly to Supervisors, addressing **accessibility challenges for some workers without immediate phone access**.
- The community strongly supported the initiative, recognizing its potential for promoting timely disposal, maintaining cleanliness, and preventing disease outbreak.



- Furthermore, the long-term success of the smart bins hinges on their affordability and sustained maintenance.
- On the crucial topic of habit formation, as observed from the pie chart, a combined **86.7% (45% definitely and 41.7% to some extent**) believe our idea can cultivate sustainable habits, especially if the monitor is used to provide daily conditioning messages on cleanliness.



- As seen from two bar graphs Supervisors found the **SMS alert feature** most impressive, but suggested key operational enhancements.
- Alerts must be expanded to include **senior officials and maintenance staff**, requiring a **stable internet connection** for reliability. They advised that the monitoring device should be **installed near the dustbin, not inside it**, and the bin itself must be **fixed properly** for durability.
- The system's benefit is seen as extending **beyond hostels** (campus-wide).
- Authorities also stressed the need to address **student discipline** and guide them on **gentle bin usage**, suggesting the system could potentially help manage student behavior issues.

Future Scope & Conclusion

Scaling Beyond Single Prototype:

- Expand to **multiple bins across campus.**
- All bins connect to a **single centralized web dashboard;** real-time monitoring of fill levels.
- Smarter route planning → **optimizes manpower and efficiency.**

Future Enhancements:

Predictive Analytics	GPS Integration	Solar-Powered Units	Mobile App Integration
Use historical data to forecast fill times and predict peak waste generation zones.	Displaying location of the bill along with the SMS sent.	Reduce dependence on external power supply.	Staff notifications, route mapping & maintenance logs on a mobile app.

Conclusion:

- The smart waste monitoring system is **scalable, technically feasible, cost-effective, and impactful.**
- Strong foundation for building a **cleaner, data-driven campus waste management.**

Thank You!