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Review on Lorawan Iot Enabled Trash Bin Level Monitoring System Using Esp32

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ABSTRACT

Urban areas are facing a significant issue with Municipal Solid Waste Management (MSWM), leading to adverse environmental and health effects. In an attempt to tackle this problem, trash bins have been placed in various locations. However, these bins can become overwhelmed, causing environmental pollution and inconvenience to the public. To resolve this issue, a realtime remote monitoring system is required to alert municipalities or waste management companies when bins reach capacity. This paper proposes the development and validation of an IoT-TBLMS, a self-powered, LoRaWAN enabled Trash Bin Level Monitoring System, to efficiently manage MSWM. The system comprises Trash Bin Level Measurement Units (TBLMU) installed in each bin, which measure unfilled levels, geographical location, and transmit data to a LoRaWAN gateway. The gateway relays information to an IoT-TBLM server, where users can view and analyze data via a graphical user interface. The study examined the accuracy, wireless range, current consumption, life expectancy, charging time, and cost of the system.

INTRODUCTION

In this project, we are developing a real time monitoring system which enables the municipality or authority to get notify about the level of garbage in trash bin. We create a monitoring system with ESP32 as the microcontroller, which helps to transmit the message to certain authorities who have access to the receiver. This project mainly focuses on the reduction of garbage on roadside and other public areas. In most cases, the Garbage can gets filled and authority won't get noticed. This leads to the overfilling of garbage. So to reduce such conditions, this project will be Helpful. ie, the monitoring system will alarm when the trash bin is full and authority can get notified easily. Apart from these, an additional work has been set up to this monitoring system. Ie, waste separation and streetlight system. Waste separation has been set to separate the mixed waste into metal, plastic and bio waste. In that manner, it would be easy to collect and dispose in accordance with the idea of their nature. A streetlight system has been set mainly to provide light to people during night. .

LITERATURE REVIEW

"An Integrated Sensing Systems and Algorithms for Solid Waste Bin State Management Automation" proposed by Hassan Basr, Mahammad A. Hannan, Member, IEEE, Aini Hussain, Member, IEEE, and Abdulla Al Mamun"

AN Intelligent solid waste bin operates to ensure the efficient measurement of its status while consuming Waste. The developed automatic system offers the real time bin status data from three sensing systems: lid status sensing, waste level sensing and weight sensing. Becomes an excessive wastage of resources when bins are collected that are filled up partially. The functional structure of the lid status sensing system is implemented for tracking the initialization of waste loading and unloading Bin. Waste Filling Level Sensing The sensing of waste filling level inside a bin is based on the measurement of the time-of-flight i.e. the complete return trip time . Estimating the status with waste level and weight

of waste inside bins help to optimize collection routes and improve collection efficiency . A SWM system having static scheduling and routing to collect waste demands more operating costs, longer hauling distances and increased labor hours compared to a system with dynamic scheduling and routing attitude . For a truly dynamic and automatic system, it is important to know the current and actual fill level of a bin rather than a prediction relays on historical fill level data, which arises questions as 'when will the bin be at an enough fill level to stick up for collection?' So, to implement a SWM system with dynamic scheduling and routing for waste collection, it is very useful and important to get real time data about the bin status e the bin filling level by capturing and processing bin's image. The system can capture the image when the waste collection vehicle reached in the vicinity of the bin. As the control center does not get the real time bin status data, it depends on the historical data for the collection route.

S. K. Memon, F. K. Shaikh, N. A. Mahoto, and A. A. Memon, "lot based smart garbage monitoring & collection system using wemos& ultrasonic sensors," in 2019 2nd International Conference on Computing Mathematics and Engineering Technologies (iCOMET). IEEE, 2019, pp. 1-6.

System explains the monitoring and collection of garbage from waste bin placed at different locations. Dustbin equipped with ultrasonic sensor and that sensor is connected to WeMos D1 mini Which is used to transfer sensor data to garbage monitoring system. According to the monitored data garbage collection truck can be notified to collect garbageFrom particular dustbin. Here having a transmission side and receiver side. Transmission side is the trash bin and Receiver side is the municipality. The simulation results have been monitored at smartphone showing sensor values and theStatus of dustbin either full or empty.

"Real Time Solid Waste Bin Monitoring System Framework Using Wireless Sensor"IEEE conference paper. This system presents a new framework that enables the remote Monitoring of solid waste bin in real time. Via ZigBee-PRO and GPRS, To assist the solid waste management process. The system is designed to monitor the status of the bin as soon as someone throw waste insight it. The system framework is based on a wireless sensor network, contains three levels: smart bin, gateway and control station that stores and analyze the data for further use.

RiffaHavianiLaluma , Ade GeovaniaAzwar , Ronny Permana Halim , "Smart Trash Monitoring System Design Using NodeMCU-based IoT " 2019 IEEE

The Smart Trash monitoring system consists of NodeMCU as a central setting, ultrasonic sensor as a data retrieval tool, and LED lights as indicators or markers when the garbage collection bin is full or exceeds capacity. The three devices are connected into a series that functions to retrieve the high and low data of the garbage collection tank which will be used as a source of information to determine the state of the garbage collection tank. NodeMCU which has been used in the proposed research is NodeMCU v3 Lolin which bundles with the ESP8266 microcontroller. This is a development board that r] P. Marques,

D. Manfroi, E. Deitos, J. Cegoni, R. Castilhos, J. Rochol, E. Pignaton, and R. Kunst, "An iot-based smart cities infrastructure architecture applied to a waste management scenario," Ad Hoc Network.

[5] P. Marques, D. Manfroi, E. Deitos, J. Cegoni, R. Castilhos, J. Rochol, E. Pignaton, and R. Kunst, "An iot-based smart cities infrastructure architecture applied to a waste management scenario," Ad Hoc Networks, Studies estimate that by 2050 two thirds of the world population will be leaving in urban areas, what leads to the necessity of intelligent services to meet the needs of the cities residents. An emerging solution to deal with this scenario is the convergence of information and communication technologies through the implementation of the concepts of smart cities and Internet of Things to provide solutions in diverse fields like infrastructure, transportation, and surveillance.

Considering this challenging scenario, in this article a multilevel IoT-based smart cities infrastructure architecture is proposed and the waste management problem is used as a case study to evaluate the performance of the proposed solution. Results proved the concept of the architecture, showing that it is able to manage up to 3902 garbage bins simultaneously. These bins are able to correctly separate organic and recyclable waste in both indoor and outdoor scenarios, presenting low response times, what leads to a good quality of experience to the users of the system.

PROPOSED METHODOLOGY

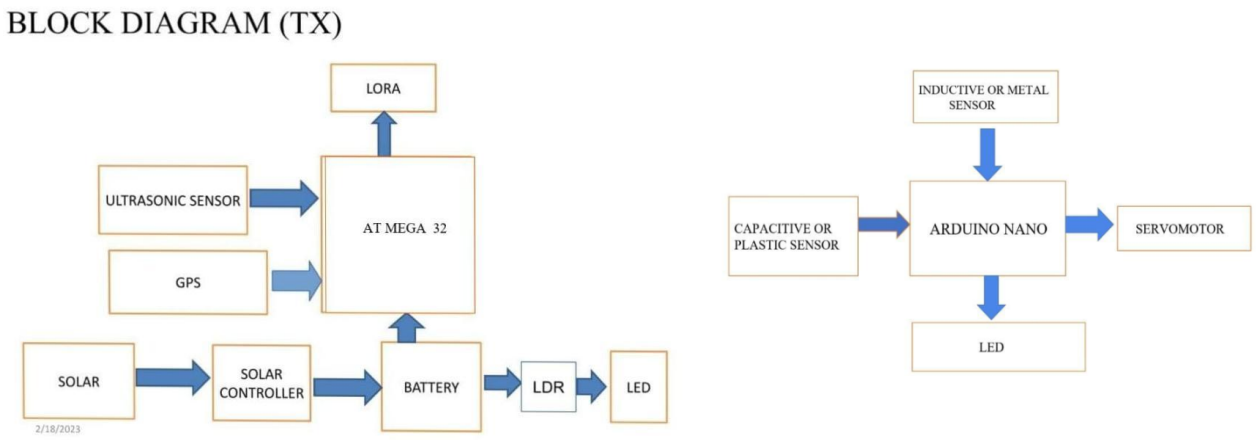

Fig 1: Transmitted Side

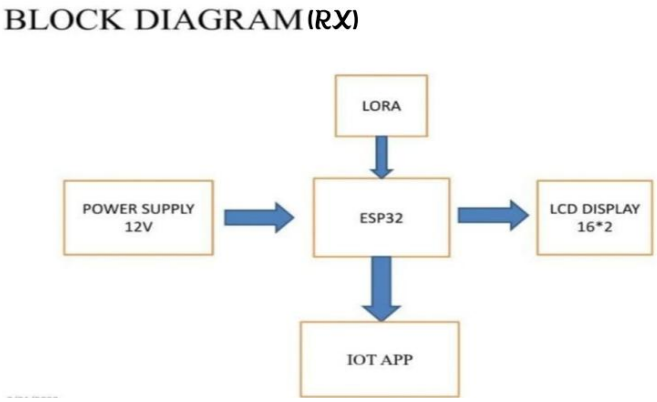

Fig 2: Receiver Side

In this project, we monitor the garbage bins and informs about the level of garbage collected in the garbage bins Using Lora Module and Ultrasonic Sensor. This project have two sides ,Transmission side and Receiver Side .transmission side is made up of ultrasonic sensor, Lora, GPS ,LCD display ,solar, battery ,capacitive sensor, inductive sensor ,servomotor . and the receiver side is made up of power supply, Lora, esp32 ,LCD display, and IOT app . The IOT app used in here is BLINK .And use Inductive sensor and Capacitive Sensors for to the separation of waste on the basis of plastic and metal. The capacitive sensor detect plastic and inductive sensor detect metal .also a streetlight system is built on here .

CONCLUSION

This paper presented the development and validation of an IoT system to monitor the trash level and geolocation of trash bins efficiently. All aspects of an IoT system includes the design of a TBLMU (trash bin level monitoring system) , long range data transmission, long-time data storage, and visualization of trash bin level have been developed. Finally, the developed system was validated by evaluating the accuracy of the sensor employed, maximum transmission distance between a TBLMU and a gateway, life expectancy of a TBLMU, battery charging time and cost. Based on the results obtained, the proposed IoT system is suitable for Municipality or Municipal Solid Waste Management Companies to manage municipal solid waste efficiently. Future work in this discipline, developing a deep learning algorithm to analyze the geolocation coordinates of almost filled and partially filled bins to create an optimized truck route.

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