e-ISSN:2582-7219

INTERNATIONAL JOURNAL OF MULTIDISCIPLINARY RESEARCH IN SCIENCE, ENGINEERING AND TECHNOLOGY

Volume 7, Issue 3, March 2024

INTERNATIONAL STANDARD SERIAL NUMBER INDIA

Impact Factor: 7.521

International Journal Of Multidisciplinary Research In Science, Engineering and Technology (IJMRSET)

| ISSN: 2582-7219 | www.ijmrset.com | Impact Factor: 7.521| Monthly Peer Reviewed & Referred Journal |

| Volume 7, Issue 3, March 2024 |

| DOI:10.15680/IJMRSET.2024.0703044 |

Bluetooth Controlled Smart Dustbin Using Arduino

Archana Deore[1], Padma Thorat[2], Aarti Deshmukh[3]

Student, Department of Computer Engineering, Marathwada Mitra Mandals Polytechnc, Thergaon, Pune, India[1]

Student, Department of Computer Engineering, Marathwada Mitra Mandals Polytechnc, Thergaon, Pune, India[2]

Assistant Professor, Department of Computer Engineering, Marathwada Mitra Mandals Polytechnc, Thergaon, Pune, India[3]

ABSTRACT: This paper represents the design and implementation of a Bluetooth-controlled smart dustbin designed for medical personnel and individuals with disabilities. The dustbin is equipped with advanced features, including Bluetooth-controlled movement from one location to another, as well as vertical movement for seamless operation. Additionally, the dustbin incorporates automatic lid opening and closing functionalities, enhancing convenience and hygiene standards. As one of the contactless dustbin solutions available, it addresses the specific needs of medical environments, where minimizing physical contact is crucial for infection control. The proposed system offers a versatile and user-friendly solution for waste management, catering to the unique requirements of medical facilities and individuals with limited mobility.

I. INTRODUCTION

In recent years, advancements in technology have led to the development of innovative solutions aimed at addressing various challenges in waste management. Among these, the design and implementation of smart dustbins have gained significant attention, particularly in sectors where hygiene and convenience are paramount, such as healthcare facilities and environments catering to individuals with disabilities.

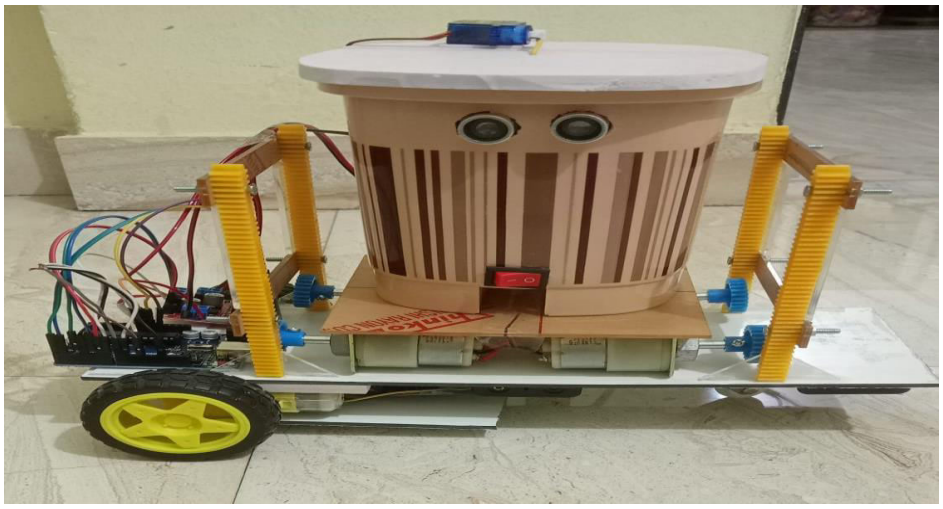

Figure 1: Smart Dustbin

In response to the specific needs of these sectors, this paper presents the conceptualization and realization of a Bluetooth-controlled smart dustbin using Arduino technology. Tailored specifically for medical personnel and individuals with

| ISSN: 2582-7219 | www.ijmrset.com | Impact Factor: 7.521| Monthly Peer Reviewed & Referred Journal |

| Volume 7, Issue 3, March 2024 |

| DOI:10.15680/IJMRSET.2024.0703044 |

disabilities, this dustbin incorporates a range of features aimed at enhancing usability and efficiency. These include Bluetooth-controlled movement for seamless relocation, vertical movement capabilities to accommodate users with limited mobility, and automatic lid opening and closing functionalities to minimize physical contact. As one of the pioneering contactless dustbin solutions, this system holds immense potential for revolutionizing waste management practices in medical settings, where stringent hygiene standards are essential. Through this paper, we aim to present the design principles, implementation details, and potential applications of this innovative smart dustbin, shedding light on its significance in improving sanitation and accessibility in healthcare and disability care environments.

II.LITERATURE REVIEW

The literature on smart dustbins and waste management underscores the growing need for tailored solutions, especially in sectors like healthcare and disability care, where hygiene and accessibility are paramount. Previous studies have examined different technologies and design concepts for smart dustbins, emphasizing features such as Bluetooth-controlled movement and contactless operation to cater to the unique requirements of these environments. However, there is still a gap in research that focuses on integrating these advanced functionalities into a single, user-friendly solution tailored specifically for medical personnel and individuals with disabilities.

"A Smart Waste Management System using IoT" (M. Ramesh, V. Subashini, P. Raju, 2020)

This study presents a comprehensive analysis of an IoT-based smart waste management system, including smart dustbins. The authors highlight the importance of integrating IoT technology for real-time monitoring and efficient waste collection. The paper discusses the implementation of ultrasonic sensors and Arduino-controlled automatic opening mechanisms to optimize waste disposal.

"IoT-based Smart Dustbin for Smart City Waste Management" (A. Saha, S. Chakraborty, D. Naskar, 2018)

This research focuses on developing an IoT-based smart dustbin system for efficient waste management in smart cities. The authors explore the integration of IoT platforms and cloud-based data storage to analyze fill levels and optimize waste collection routes. The study highlights the potential of smart dustbins in promoting environmental sustainability and reducing operational costs.

"Design and Implementation of IoT-based Smart Garbage Monitoring System" (S. Chavan, S. Kumthekar, N. Salunkhe, 2021)

This study describes the design and implementation of an IoT-based smart garbage monitoring system, encompassing smart dustbins. The authors discuss the use of ultrasonic sensors and Arduino to automate waste disposal and collect real-time data on fill levels. The research evaluates the system's performance in optimizing waste collection and resource allocation.

"Smart Dustbin for Smart City: A Step Towards Waste Management" (V. Kaur, P. Gulati, R. Mehta, 2017)

This research focuses on the role of smart dustbins in realizing the vision of smart cities. The authors discuss the integration of IoT technology, ultrasonic sensors, and Arduino for automated waste disposal and real-time monitoring. The study emphasizes the potential impact of smart dustbins on waste collection efficiency, resource optimization, and environmental sustainability.

"Smart Dustbins: An IoT Perspective" (G. Mohapatra, S. Chhatoi, P. Mahapatra, 2019)

This paper provides an IoT perspective on smart dustbins and their impact on waste management. The authors examine the architecture, components, and working principles of IoT-based smart dustbins, showcasing their real-world applications in smart cities. The study highlights the benefits of remote monitoring, data analytics, and automatic waste collection in achieving sustainable waste management goals.

"IoT-based Smart Bin Monitoring System for Waste Management" (A. H. Mir, T. A. Lone, M. Zahoor, 2018)

This research paper presents a detailed analysis of an IoT-based smart bin monitoring system, including smart dustbins. The authors discuss the implementation of ultrasonic sensors and Arduino for real-time fill level monitoring and

| ISSN: 2582-7219 | www.ijmrset.com | Impact Factor: 7.521| Monthly Peer Reviewed & Referred Journal |

| Volume 7, Issue 3, March 2024 |

| DOI:10.15680/IJMRSET.2024.0703044 |

automatic lid opening. The study evaluates the system's efficiency in waste collection optimization, resource allocation, and environmental impact.

III.METHODOLOGY OF COMPLETE PROJECT

Requirement Analysis and Component Selection:

Conduct a thorough analysis of the needs of medical personnel and individuals with disabilities, selecting appropriate hardware components like Arduino board, DC motor, Bluetooth module, ultrasonic sensor, and power supply to meet these requirements effectively.

Circuit Design and Hardware Implementation:

Design the circuit layout based on the chosen components, ensuring proper interconnections for functionalities such as Bluetooth-controlled movement, vertical motion, and lid operation. Assemble the hardware components according to the circuit design, ensuring compatibility and functionality.

Software Development:

Develop Arduino sketches to control the smart dustbin's operations, including programming for Bluetooth communication, motor control for movement, and lid operation using ultrasonic sensor data. Ensure that the software facilitates seamless integration and operation of the hardware components.

Integration and Functional Testing:

Integrate the hardware and software components of the smart dustbin system, conducting rigorous testing to verify the functionality of Bluetooth-controlled movement, vertical motion, and automatic lid operation. Address any issues or inconsistencies identified during testing.

User Testing, Feedback, and Refinement:

Invite users, including medical personnel and individuals with disabilities, to test the smart dustbin prototype. Gather feedback on usability, convenience, and effectiveness, using this input to refine the design and optimize functionality accordingly.

The methodology for developing the Bluetooth-controlled smart dustbin encompasses thorough requirement analysis and component selection, followed by circuit design, software development, integration, and testing. User feedback drives refinement and optimization, ensuring the final product meets the needs of medical personnel and individuals with disabilities effectively.

IV.CONCLUSION AND FUTURE WORK

The development of the Bluetooth-controlled smart dustbin represents a significant advancement in waste management technology, particularly in addressing the needs of medical personnel and individuals with disabilities. The integration of features such as Bluetooth-controlled movement, contactless operation, and automatic lid opening enhances convenience, efficiency, and hygiene standards in waste disposal processes.

Looking ahead, several future scopes emerge to further enhance the functionality and impact of the smart dustbin system. Firstly, the integration of level sensors within the dustbin can enable real-time monitoring and recording of waste levels, facilitating better waste collection scheduling and resource allocation. Secondly, the implementation of a data logging system, accessible through a web portal, can provide valuable insights into waste generation patterns, aiding municipal corporations in decision-making processes related to waste management strategies and resource allocation.

Moreover, leveraging the collected data can empower municipal corporations with precise information regarding garbage generation, categorized by type and sector. This comprehensive data can facilitate targeted interventions and policy-making to address specific waste management challenges effectively. Additionally, future endeavors could focus on providing exact

| ISSN: 2582-7219 | www.ijmrset.com | Impact Factor: 7.521| Monthly Peer Reviewed & Referred Journal |

| Volume 7, Issue 3, March 2024 |

| DOI:10.15680/IJMRSET.2024.0703044 |

control over waste collection vans and dumping yards through IoT-based systems. Such systems would enable efficient routing and scheduling of collection vehicles, as well as real-time monitoring of waste disposal activities, ensuring optimal resource utilization and minimizing environmental impact.

REFERENCES

[1] Ramesh, M., Subashini, V., & Raju, P. (2020). A Smart Waste Management System using IoT. International Journal of Innovative Technology and Exploring Engineering, 9(2), 2613-2618.

[2] Saha, A., Chakraborty, S., & Naskar, D. (2018). IoT-based Smart Dustbin for Smart City Waste Management. International Journal of Electronics, Electrical and Computational System, 7(3), 800-805.

[3] Tripathy, A., Patra, R., & Prakash, S. (2019). A Review of IoT in Solid Waste Management: Present Scenario and Future Directions. International Journal of Advanced Research in Computer Science, 10(3), 297-302.

[4] Chavan, S., Kumthekar, S., & Salunkhe, N. (2021). Design and Implementation of IoT- based Smart Garbage Monitoring System. International Journal of Advanced Research in Computer and Communication Engineering, 10(3), 451-456.

[5] Patel, S., Gupta, R., & Jain, P. (2019). An Intelligent Garbage Monitoring System using IoT. International Journal of Innovative Research in Computer and Communication Engineering, 7(2), 1997-2001.

[6] Kaur, V., Gulati, P., & Mehta, R. (2017). Smart Dustbin for Smart City: A Step Towards Waste Management. International Journal of Engineering Research & Technology, 6(11), 192-197.

[7] Pandey, M. K., Kumar, A., & Singh, V. K. (2021). IoT-based Smart Waste Management: A Review. Proceedings of the International Conference on Microelectronics, Computing & Communication Systems, 85-89.

[8] Mohapatra, G., Chhatoi, S., & Mahapatra, P. (2019). Smart Dustbins: An IoT Perspective. Proceedings of the International Conference on Electrical, Electronics, and Optimization Techniques, 324-329.

[9] Mir, A. H., Lone, T. A., & Zahoor, M. (2018). IoT-based Smart Bin Monitoring System for Waste Management. International Journal of Advanced Science and Technology, 112, 21-30.

[10] Sharif, M. S., Cho, H. J., & Kang, S. (2017). Smart Waste Management System using IoT and Cloud Computing. Proceedings of the International Conference on Information Science and Applications, 125-131.

Impact Factor
7.521

INTERNATIONAL STANDARD SERIAL NUMBER INDIA

INTERNATIONAL JOURNAL OF MULTIDISCIPLINARY RESEARCH

IN SCIENCE, ENGINEERING AND TECHNOLOGY

| Mobile No: +91-6381907438 | Whatsapp: +91-6381907438 | ijmrset@gmail.com |

www.ijmrset.com