Letter Box with Letter Counting Facility

Jijai Sanjay Dhumal, Akshata Dinkar Patil, Sharad Namdev Patil,
Abhijeet Balasaheb Gaikwad, Miss Pallod P. G.

Students, Department of Electronics & Telecommunication Engineering
Professor, Department of Electronics & Telecommunication Engineering
Vishweshwarayya Abhiyantriki Padvika Mahavidyalaya, Almala, India

Abstract: *This paper presents the design and implementation of a smart letter box system integrated with a letter counting facility. With the rise of automation in routine systems, this project aims to modernize traditional postal services by offering a solution to monitor and track physical letters in real time. The system utilizes an IR sensor to detect incoming letters and displays the total number on an LCD. This innovation ensures better accessibility, convenience, and reliability in letter collection processes for post offices, residential buildings, and offices.*

Keywords: Letter box automation, IR sensor, letter counting system, embedded systems, smart postbox

I. INTRODUCTION

In the digital age, although communication has shifted to online platforms, physical letters and documents still hold value in official and formal contexts. Traditional letterboxes, however, lack any feedback or monitoring mechanism. Users remain unaware of incoming mail until physically checking the box. This leads to frequent and sometimes unnecessary trips to the mailbox. Moreover, important mail could be delayed or lost due to negligence or manual errors. To address these issues, this project proposes an automated solution—a letter box with a letter counting facility—to make letter collection smarter, more reliable, and efficient. This project aims to provide users with instant feedback about the presence of new letters, thus eliminating guesswork and saving time.

II. LITERATURE REVIEW

Several studies and projects have focused on automating traditional systems to enhance efficiency and reduce manual effort. Smart post boxes integrated with GSM and IoT modules have been explored to send alerts to users. However, many of these models are complex or costly. Previous research has also investigated the use of sensors for intrusion detection and environmental monitoring. This project draws inspiration from such existing technologies while simplifying the hardware and maintaining affordability, focusing specifically on accurate letter detection and count display.

System Design and Architecture

The design consists of both hardware and software components. The main functional unit is a microcontroller-based system connected to an IR sensor and an LCD display. The IR sensor detects when a letter is inserted. Upon detection, the microcontroller processes the input and increments the count stored in memory. The updated count is displayed in real time on the LCD. The system is powered through a regulated power supply and mounted inside a traditional letter box casing.
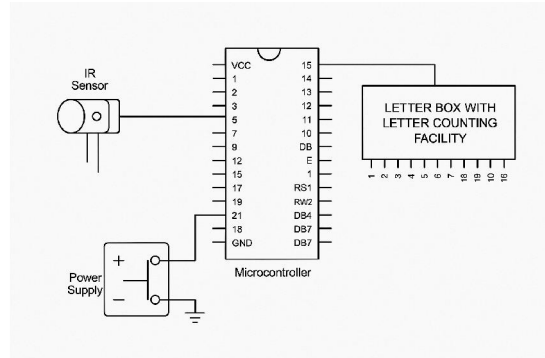
Block Diagram Description:

IR Sensor → Microcontroller → LCD Display

608
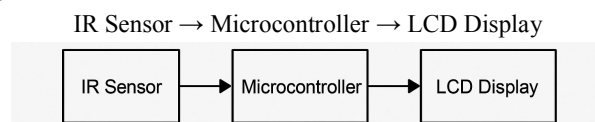
Power Supply Unit → All Components

Circuit Diagram

The architecture is kept simple, efficient, and modular to allow easy replication and maintenance.

III. METHODOLOGY

1. Selection of suitable microcontroller and IR sensor based on cost and performance.
2. Circuit design using simulation software.
3. Assembling hardware components on a breadboard for prototype testing.
4. Writing embedded code to read sensor signals and display results.
5. Testing and troubleshooting the system for accuracy and reliability.
6. Finalizing the layout for integration into a physical letter box.

V. IMPLEMENTATION

The circuit was built using an Arduino Uno microcontroller and a standard IR sensor module. A 16x2 LCD was connected to display the count. A custom enclosure was created using a wooden box to simulate a real-world letter box. The IR sensor was carefully positioned to detect interruptions without generating false positives. The microcontroller was programmed using the Arduino IDE, and EEPROM memory was used to preserve the count in case of power failure.

VI. RESULTS AND DISCUSSION

The proposed model was successfully implemented in prototype form. During the testing phase, the IR sensor accurately detected every incoming letter without requiring physical contact, enhancing the durability of the system. The LCD display was responsive and accurately updated the count in real time. Tests under different lighting conditions and letter sizes showed consistent performance. This verifies the reliability and robustness of the setup, even under slight environmental variations. Additionally, the modular nature of the design allows for easy upgrades or maintenance.

VII. CONCLUSION

The "Letter Box with Letter Counting Facility" is a practical and innovative solution to improve conventional mail collection systems. It bridges the gap between digital tracking and physical mail by providing real-time information. The project is simple, cost-effective, and easily deployable in various environments. With potential upgrades in communication and automation, this system can significantly enhance postal and correspondence management in the near future.

VIII. ACKNOWLEDGMENT

REFERENCES

[1] S. M. Metev and V. P. Veiko, Laser Assisted Microtechnology, 2nd ed., Springer-Verlag, 1998.

[2] J. Breckling, The Analysis of Directional Time Series: Applications to Wind Speed and Direction, Springer, 1989.

[3] S. Zhang et al., "A novel ultrathin elevated channel low-temperature poly-Si TFT," IEEE Electron Device Lett., vol. 20, pp. 569–571, Nov. 1999.

[4] M. Wegmuller et al., "High resolution fiber distributed measurements with coherent OFDR," in Proc. ECOC'00, 2000, paper 11.3.4, p. 109.

[5] R. E. Sorace et al., "High-speed digital-to-RF converter," U.S. Patent 5 668 842, Sept. 16, 1997.