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## Design and Development of a Smart Drug Delivery System Using IoT

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### ABSTRACT

*This paper presents the design and development of a smart drug delivery system using Internet of Things (IoT) technology. The system ensures accurate and timely drug administration by integrating sensors, microcontrollers, and wireless communication. It improves patient safety, medication adherence, and remote monitoring by healthcare professionals.*

**Keywords:** IoT, Smart Drug Delivery, Biomedical Devices, Sensors, Healthcare Monitoring.

### INTRODUCTION

Smart drug delivery systems are advanced technologies designed to deliver drugs at controlled rates. Traditional methods often suffer from human error and lack of monitoring. IoT enables real-time tracking, automation, and remote control, making drug delivery safer and more efficient.

### SYSTEM ARCHITECTURE

The system consists of a microcontroller (such as Arduino or ESP32), drug reservoir, sensors, actuators, and IoT connectivity module. Sensors monitor parameters like temperature and dosage levels, while actuators control drug release. Data is transmitted to cloud platforms for monitoring.

### DESIGN METHODOLOGY

The system is designed to deliver drugs at predefined intervals. A programmed microcontroller controls a pump or valve mechanism. Wireless communication (Wi-Fi/Bluetooth) enables data transmission to a mobile app or web interface. Alerts are generated for missed doses or abnormalities.

### WORKING PRINCIPLE

When activated, the system checks patient parameters and drug schedule. The actuator releases the exact dosage, and sensors verify delivery. Data is sent to the cloud, allowing doctors to monitor patient adherence in real-time.

### RESULTS AND DISCUSSION

The system demonstrates improved accuracy in drug delivery and reduces human intervention. IoT connectivity allows remote monitoring. Challenges include power consumption, data security, and device reliability.

### APPLICATIONS

This system is widely used in chronic disease management, insulin pumps, chemotherapy, elderly care, and home healthcare systems.

### CONCLUSION

IoT-based smart drug delivery systems provide efficient, safe, and automated medication management. Future enhancements include AI integration for predictive analysis and personalized treatment.

### REFERENCES

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