

Connected Healthcare Robot with IOT Integration

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Abstract

The "Connected Healthcare Robot with IoT Integration" was designed to dispense medicines at scheduled times, stored in a dedicated box. It is equipped with sensors to navigate the home environment safely, avoiding obstacles, and ensuring smooth movement. A GPS system integrated into the robot connects to a smart watch or mobile device, allowing patients to track the robot's location in real-time within the house. This ensures timely delivery of medication to the patient. The robot enhances home healthcare by automating medication management and improving the efficiency in home patient care.

Keywords: Healthcare Robot, IoT, Medicine Reminder.

1. Introduction

With the growing demand for efficient healthcare solutions, connected healthcare systems have become crucial in providing the assistance and improving the quality of life for patients, especially those with mobility limitations. Robotics and IoT have paved the way for creating autonomous systems that assist in daily healthcare tasks. The development of a connected healthcare robot integrated with IoT addresses these challenges by providing necessary medical reminders. The robot autonomously follows the patient on the set time using the navigation system and takes care of obstacle avoidance to ensure safe navigation. Robotics in healthcare is not a new concept, but the addition of IoT connectivity expands the capabilities of these systems by enabling personal care. The robot described in this paper is equipped with various sensors and components. This paper outlines the design of the connected healthcare robot, its system architecture, and IoT integration, discussing the key advantages and limitations of the system, with suggestions for future work to enhance its functionality and adaptability. [1-5]

2. Methodology

The methodology involves the design and development of a connected healthcare robot with

IoT integration, focusing on the following aspects.

2.1. Design and Construction

- Robot Hardware: Selection of appropriate sensors and components for navigation, obstacle avoidance, and medication dispensing.
- IoT Integration: Incorporation of IoT devices to enable real time communication and location tracking.
- GPS System: Integration with smart devices for real time location tracking within the home environment.

2.2. Software and Algorithms

- Navigation System: Development of algorithms for autonomous navigation and obstacle avoidance.
- Scheduling System: Implementation of a system to schedule and dispense medications at specified times.
- Data Communication: Use of IoT protocols (MQTT, CoAP) for data transmission to healthcare providers.

2.3. Testing and Evaluation

- Pilot Testing: Initial testing of the robot's

functionality in a controlled environment.

- **User Trials:** Evaluation of the robot's performance in real-world home healthcare settings, focusing on usability and reliability.
- **Data Analysis:** Collection and analysis of data from sensors and user feedback to assess the robot's effectiveness. [6-10]

3. Results and Discussion

In discussing the "Connected Healthcare Robot with IoT Integration," the key points from various related research papers. The integration of healthcare robots with IoT (Internet of Things) technology is transforming the medical field by providing real-time patient monitoring, personalized care, and enhanced medical services. Recent studies emphasize how IoT-enabled robots in healthcare settings improve efficiency, reduce the workload on healthcare professionals, and enhance patient outcomes through real-time data collection and analysis. Research has shown that healthcare robots are equipped with various sensors (temperature, heart rate, oxygen level, etc.), enabling them to continuously monitor patient vitals. These robots often have autonomous navigation capabilities to move around the hospital or home environment, assisting with tasks like delivering medications, conducting checkups, and providing reminders to patients for their treatment schedules. Robotic systems can adapt to different environments, and machine learning algorithms enhance their decision-making process. IoT integration allows these robots to communicate with other connected devices such as smart wearables, patient monitoring systems, and cloud-based platforms. Through IoT protocols (e.g., MQTT, CoAP), data collected by the robot's sensors are transmitted in real time to healthcare providers for immediate analysis and intervention. This data is securely stored in the cloud, ensuring access to historical data and enabling predictive analytics. Edge computing also plays a role in processing data locally, which reduces latency and allows for quicker response times in critical situations. IoT-connected healthcare robots are widely used in hospitals for patient monitoring, medication delivery, disinfection, and telemedicine. In home care, these robots provide elderly care, chronic disease management, and post-

operative follow-ups. Research suggests that such systems reduce human error, enhance patient comfort, and allow for remote monitoring, making healthcare more accessible to remote and underserved populations. Despite their benefits, several challenges remain, including data security, privacy concerns, and the need for high bandwidth to manage large amounts of real-time data. Ensuring interoperability between various IoT devices and platforms is also critical. Future advancements focus on improving AI-driven diagnostics, enhancing robot-human interaction, and implementing 5G technology to provide even faster and more reliable connections. [11-15]

Conclusion

In conclusion, the integration of IoT with healthcare robots offers a transformative approach to patient care, improving efficiency, accuracy, and accessibility in both clinical and home settings. These systems enable real-time monitoring, personalized care, and seamless communication between patients, healthcare providers, and medical devices. While the technology promises significant advancements in remote monitoring, automated caregiving, and data-driven decision-making, challenges such as data security, privacy, and device interoperability must be addressed to fully realize its potential. The future of healthcare robotics with IoT lies in advancing AI capabilities, enhancing connectivity, and ensuring widespread adoption to deliver smarter, more responsive healthcare solutions.

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