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# Multi-Purpose Robot Car System using IoT

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**ABSTRACT:** By fusing cutting-edge robotics with Internet of Things (IoT) technology, the "Multi-Purpose Robot Car System Using IoT" offers a novel way to improve healthcare delivery. Wireless charging, voice and remote control, line-following, obstacle detection, smoke detection, and alcohol monitoring are just a few of the activities that this system is made to automate. Additionally, it has real-time accident detection and alarm systems that guarantee prompt emergency responses. Through the use of sensors, microcontrollers, and Internet of Things platforms, the system seeks to lessen the strain of medical personnel, freeing them up to concentrate on important medical duties while the robot takes care of everyday activities. This research demonstrates how robots and the Internet of Things may revolutionize healthcare settings by enhancing patient safety and productivity. The system's capacity to do a variety of tasks on its own makes it a vital instrument in a variety of settings where automation may improve operational efficacy, safety, and productivity.

**KEYWORDS:** IOT(internet of things), wireless charging, embedded systems, emergency alert system, obstacle detection, gps and gsm modules.

## I. INTRODUCTION

The use of robots in healthcare has become a game-changer in recent years as a way to meet the growing demands for efficiency, safety, and individualized care in caring settings. The "Multi purpose robot car system using IOT". monitoring by being able to carry out a numbe activities remotely and autonomously. Automation has emerged as a critical component of contemporary care systems, helping to alleviate the strain on medical personnel and improve patient well-being as the world's population ages and the need for healthcare assistance increases.

The advanced robotic care system proposed in this research may perform a variety of tasks that enhance patient safety, aid, and monitoring. Wireless charging, voice control, remote control, line-following capabilities, obstacle detection, smoke detection, and alcohol sensor monitoring are just a few of the essential characteristics that the robot incorporates. It also has an IoT-based smart accident detection system, which guarantees that any accidents or emergencies are reported in real time.

The creation of such systems aims to increase overall operational efficiency in healthcare settings in addition to enhancing caregiving services, and multi-tasking duties, freeing up healthcare workers to concentrate on vital medical procedures that call for human involvement. Furthermore, seamless connectivity is made possible by the incorporation of cutting-edge technology like the Internet of Things (IoT) into healthcare robots. This permits real-time data exchange and communication between the robot, medical personnel, and family members. By giving continuous

information on patient status, ambient variables, and possible threats, this connectedness improves decision-making processes.

## II. LITERATURE SURVEY

The concept of intelligent accident detection and rescue systems has progressed notably with the integration of IoT, microcontrollers, and real-time communication technologies. Dr. V.G. Nasre et al. [1] proposed the Intelligent Accident Detection and Ambulance Rescue System (IADR), utilizing IoT and machine learning algorithms to ensure rapid accident detection and efficient dispatch of emergency aid. Dr. R. Prasanthi et al. [2] implemented an Arduino-based solution using GPS and GSM modules to detect vehicle collisions via vibration sensors and send real-time SMS alerts with location data to emergency contacts. Gowshika et al. [3] addressed the growing concern of accident-related fatalities and inadequate emergency responses by designing a GPS-GSM-based alert system aimed at bridging the gap in real-time assistance.

A. Ranga Rao et al. [4] expanded on prevention techniques through a multipurpose robot car integrated with IoT, which delivers audio-visual messages to the driver, thereby reducing accident likelihood by providing timely warnings. An early IEEE project [5] utilized GPS to monitor vehicle speed and trigger alarms upon abnormal deceleration, providing a short window to cancel false alarms before notifying rescue services. Another IEEE effort in 2017 [6] used accelerometers and gyroscopes to analyze orientation angles and detect collisions, automatically sending GPS coordinates to hospitals and family members when thresholds were exceeded. Complementing these advancements, D. Vijendra Babu et al. [7] introduced a line-following robot that navigates using a PID controller and detects obstacles independently, showcasing how autonomous navigation technologies can contribute to accident prevention and smart transportation systems.

## III. METHODOLOGY

The Multi-Purpose Robot Car organized technique that combines software and hardware elements to guarantee effective operation. An Arduino microcontroller serves as the system's primary processing unit and manages a number of sensors and connectivity components. The project integrates a number of sensor-based features, such as the use of infrared and ultrasonic sensors for obstacle detection, the MQ-3 sensor for alcohol and smoke detection, and the DHT-11 sensor for temperature and humidity monitoring. The system also has real-time accident detection and alerting capabilities via GPS and GSM modules, guaranteeing timely alerts in the event of an emergency. The system provides voice command operation through a smartphone app, remote control via Bluetooth (HC-05 module), and autonomous lane-following via infrared sensors for navigation and control. Sensor startup and safety checks are the first steps in the workflow, which is based on an organized flowchart. After choosing a navigation mode—either manual Bluetooth control or autonomous lane-following—the system keeps an eye out for obstructions.

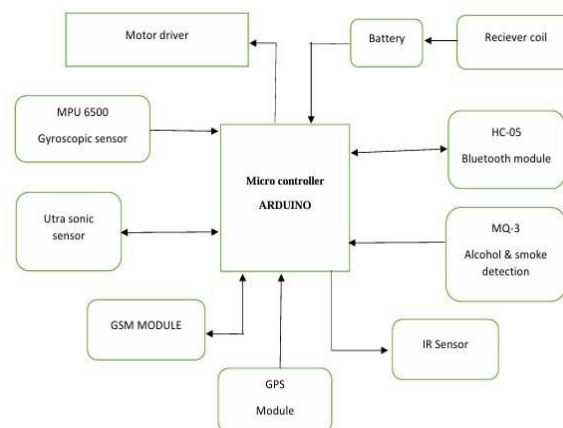


Fig. 1 (a) Block diagram

It consist of multiple sensors like ir sensor, ultrasonic sensor, hc-05 sensor, mq-3 sensor, dht-11 sensor and gsm and gps module with micro controller Arduino



#### **IV. EXPERIMENTAL RESULTS**

The Multi-Purpose Robot Car System Using IoT was successfully developed and tested, demonstrating efficient real-time monitoring, autonomous navigation, and remote control capabilities. The system effectively performed its primary functions, including obstacle detection and avoidance using IR and ultrasonic sensors, alcohol and smoke detection via the MQ-3 sensor, and temperature and humidity monitoring through the DHT-11 sensor. The lane-following navigation system accurately followed a predefined path, while the Bluetooth (HC-05) module enabled seamless remote and voice control. Additionally, the IoT-based accident detection system efficiently transmitted real-time emergency alerts using GSM and GPS modules, ensuring prompt responses in critical situations.

The implementation of wireless charging allowed the system to operate continuously without manual intervention, further enhancing its usability. The results indicate that the robotic system is highly efficient in performing multiple tasks with minimal human intervention. The integration of IoT technology ensured that real-time alerts and notifications were sent without delay, making the system highly effective for emergency response applications. The use of multiple sensors significantly improved its ability to detect hazards, navigate autonomously, and monitor environmental conditions. However, certain limitations were observed during testing. The Bluetooth connectivity range was restricted to approximately 10 meters, limiting remote control functionality over longer distances.

#### **V. CONCLUSION**

The "Multi-Purpose Robot Car System Using IoT" was effectively created and put into use to carry out a number of clever activities that improve convenience, automation, and safety. The robot incorporates a number of technologies, including speech recognition, Bluetooth connectivity, obstacle detection, environmental monitoring, and real-time alarm systems based on the Internet of Things. One of the main characteristics of the system is that it can be operated with both voice commands and a Bluetooth remote control, which gives it versatility and accessibility for a range of users. By employing ultrasonic and infrared sensors to identify and avoid obstacles along a predetermined course, the robot may also function independently. Using MQ-series gas sensors, the system also effectively detects alcohol, smoke, and fire and sends out notifications to stop dangerous circumstances. The accident detection and alarm system is one of the project's main features. The robot can detect possible collisions and provide emergency messages with position coordinates to pre-specified contacts by utilizing accelerometer, GPS, and GSM modules, guaranteeing prompt aid.

#### **VI. ACKNOWLEDGEMENT**

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