Smart Bluetooth-Controlled Obstacle Detection and Navigation Robot Using Arduino and ESP32

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Abstract: *This paper presents the design and development of a Bluetooth-controlled robotic system integrated with obstacle detection and alert mechanisms. The primary objective of the system is to enable efficient human-guided navigation using a mobile-based control interface, while enhancing operational safety through real-time proximity sensing. The robot is operated via a wireless car controller application, allowing directional movement such as forward, backward, left, and right through user commands transmitted over Bluetooth.*
The robot is also equipped with an ultrasonic sensor for obstacle detection. When an object is detected within a certain distance, a buzzer sounds to alert the user and help avoid collisions.
The overall design focuses on affordability and ease of use, using commonly available components and a straightforward control mechanism. This makes the robot suitable for educational purposes, beginner-level robotics projects, and basic real-world applications. The project demonstrates how combining wireless control with simple sensing techniques can result in an efficient and practical robotic system..

Keywords: Bluetooth Control, Obstacle Detection, Ultrasonic Sensor, Mobile Controlled Robot, Robotics