



## IoT BASED VOICE CONTROLLED ROBOT USING ARDUINO

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### Abstract

A new age of human-machine interaction has begun with the creation of robots using voice control technology in conjunction with Arduino. This thorough analysis explains the critical role that Arduino plays as an approachable and flexible platform by examining the state-of-the-art in the field of voice-controlled robots utilizing Arduino. Review topics include a thorough analysis of the Arduino platform, voice recognition technologies, integration difficulties, a range of applications, and potential future developments. This paper presents a comprehensive overview of the current state of the field, identifies obstacles, and provides insights into the possible future development of voice-controlled robots utilizing Arduino by combining the results of important studies. The purpose of this review's synthesis is to educate scientists, engineers, and hobbyists about the developments and opportunities at this exciting nexus of voice control and robotics technology.

Keywords— Arduino, Voice controlled robots, IoT

### I. INTRODUCTION

The combination of voice control technology and the Arduino platform has become a game-changing paradigm in the rapidly developing field of robotics, ushering in a new era of human-robot interaction. In this work, we explore the rich field of Voice-Controlled Robots with Arduino, exploring the complex relationship between voice commands' intuitiveness and Arduino's accessibility. This thorough analysis seeks to clarify the essential elements that characterize this mutually beneficial interaction as the channels of innovation come together.

The open-source electronics platform Arduino has been significant in democratizing robotics by providing developers and hobbyists with an unmatched level of flexibility while exploring the world of automation. The addition of voice control to this environment gives human-robot interfaces a more organic and user-friendly feel. Exploring this dynamic integration, we find that the combination of Arduino and voice control not only accelerates the democratization of robotics but also improves the usability of robotic systems in a variety of contexts.

This study covers a wide range of topics, including an overview of the Arduino platform, the complexities of speech recognition technologies, the difficulties that arise during integration, and the numerous applications that can be made possible by this combination. We hope to provide readers a thorough understanding of the state-of-the-art by giving a broad overview, establishing the groundwork for further advancements in the field of Arduino-powered voice-controlled robots.

### II. LITERATURE REVIEW

Voice-activated robots, which take advantage of the Arduino platform's versatility, are becoming a more interesting area of robotics. The goal of this review of the literature on voice-controlled robot is to summarize and evaluate the current research while delving into the essential elements, difficulties, and uses of Arduino-powered voice-activated robots.

In their research Maddileti et al. (2019) conclude that voice-activated automobiles with Arduino and Bluetooth modules highlights how important these technologies are to the development of engaging and easy-to-use interfaces for vehicle operation. The expanding corpus of knowledge in this sector is facilitated by the versatility of Arduino, the dependability of Bluetooth, improvements in voice recognition algorithms, and useful applications in real-world circumstances. To realize the full potential of voice-activated cars, future research should concentrate on improving algorithms,



broadening vocabularies, and tackling new problems as technology develops.

In the proposed framework Srivastava et al. (2020) demonstrates that, however, a mechanism for measurement that typically uses Bluetooth for management. The voice dominant orders unit of measurement are successfully transmitted via Bluetooth innovation, and the intended actions are also successfully completed. By doing this, human efforts are reduced in areas or situations where human intervention would otherwise be difficult.

Saravanan et al. (2020) proposed that Android smart phone's microphone is used to identify human voice. Artificial Intelligence software and the Android operating system codes are used to analyze this voice and translate it into English words. The interdisciplinary area of computational linguistics that is known as "speech recognition" creates the methods and tools necessary for computers to understand spoken language and convert it into text. It goes by the names speech to text (STT), computer speech recognition, and Automatic Speech Recognition (ASR). It incorporates research and knowledge from the domains of electrical engineering, computer science, and linguistics.

Because this project is simple to implement, the robot will improve the life of the human. The Voice controlled Robot is helpful for both monitoring and disabled individuals. It is simple to use and operates via voice command. It is helpful in I places that are inaccessible to people. i This robot's small size allows us to use it for spying purposes. It's suitable for monitoring purposes. This robot can have a webcam installed for security reasons. The software used for voice recognition is accurately identifying voice commands and has a high sensitivity to i background noise.

In their research Chaudhary et al. (2019) proposed the idea of controlling a robot with a human voice. A Voice Controlled Robot is a real-world example of how to direct the movements of a basic robot with everyday voice commands. The android app serves as a conduit in this system to send human commands to the microcontroller. The UART protocol can be used to interface a controller with the Bluetooth module. The voice module processes the speech after it is received by the Android app. Text is then created from voice. After processing this text further, the microcontroller will control the robot appropriately.

The goal is to create a robotic automobile that can be operated by I voice commands for basic motions like turning left or right or forwarding. The ATmega Arduino board is the hardware development board used in this instance.iThe software is created using Embedded C in the Arduino IDE. Both software porting and hardware implementation are completed. In general, the cost of using some type of module for human voice recognition is prohibitively high.

Andrew et al. (2019) mentioned that this robot needs voice commands through a smartphone app in order to operate on its own. The project's objective is to enable voice commands from a distance to operate the robotic vehicle. The robotic car can perform the following tasks based on the outcome. It has the ability to go forward, backward, turn left or right, and stop when it detects an obstruction. Thanks to Bluetooth innovation, voice command commands are effectively communicated, and the necessary actions are completed.

Elderly people and people with disabilities will be able to experience the freedom of independent mobility in a car once the voice control robot prototype is significantly expanded. In areas or circumstances where human intervention presents challenges, it also lessens human efforts. It might therefore find application in the current global industry. Future developments for the voice control robot could involve using a wider range of signals and other electronic features to give the robot instructions, making it useful for both military and home security applications.

### III. PROPOSED WORK

#### 1. Platform Arduino:

A thorough investigation of the Arduino platform is necessary to comprehend the basis of voice-activated robotics. The main characteristics of Arduino, its programming environment, and the different Arduino boards that are frequently used in robotics are covered in this section. It also covers how Arduino's flexibility and modularity make it a great option for creating voice-activated robotic



systems.

## 2. Technologies for Voice Recognition:

The voice recognition technology used in voice-controlled robots is essential. The Speech Recognition Module, EasyVR, and Google's Speech Recognition API are a few of the well-known voice recognition modules and algorithms that are compatible with Arduino that are reviewed in this section. Evaluation standards, precision, and practical uses of these technologies are covered.

## 3. Integration Challenges:

Even with the advancements in voice-activated robots, a number of issues still need to be resolved. This section deals with problems pertaining to limited vocabulary recognition, real-time processing constraints, and noise interference. The literature's suggested tactics and fixes for resolving these issues are evaluated critically.

## 4. Application:

Voice-controlled robots have a wide range of applications due to their adaptability. This section examines the variety of applications, such as entertainment, educational materials, assistive technology for people with disabilities, and home automation. Case studies and success stories from the real world illustrate the usefulness of voice control integration with robots built on Arduino platforms.

## 5. Future Directions:

The potential for voice-activated robots increases with the advancement of technology. Potential future developments are described in this section, such as enhanced sensor integration, better voice recognition algorithms, and greater environment adaptability. The importance of artificial intelligence in the development of voice-activated robotic systems is emphasized.

## 6. Conclusion:

In summary, the combination of voice control technology and Arduino-based robots has created new opportunities for accessibility and innovation in the robotics industry. This review paper has given a thorough overview of the state, difficulties, and potential future directions of Arduino-powered voice-activated robots. This technology is expected to have a huge impact on everyday life and a number of industries as it develops.

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