VISVESVARAYA TECHNOLOGICAL UNIVERSITY, BELAGAVI-590018

Mini Project Report On

"Arduino-based Obstacle Avoiding Robot with Voice and Bluetooth Control"

A report submitted in partial fulfillment of the requirements for

MINI PROJECT

In

Computer Science and Engineering (IOT , Cyber Security including Blockchain Technology)

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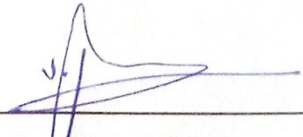
CERTIFICATE

This is to certify that the Project entitled **"Arduino-based Obstacle Avoiding Robot with Voice and Bluetooth Control"** has been successfully completed by

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the bonafide students of **Department of Computer Science & Engineering (IOT , Cyber Security including Blockchain Technology)**, Alva's Institute of Engineering and Technology in **DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING (IOT , CYBER SECURITY INCLUDING BLOCKCHAIN TECHNOLOGY)** of the **VISVESVARAYA TECHNOLOGICAL UNIVERSITY, BELAGAVI** during the year 2023–2024. It is certified that all corrections/suggestions indicated for Internal Assessment have been incorporated in the report deposited in the departmental library. The project report has been approved as it satisfies the academic requirements in respect of project work prescribed for the Bachelor of Engineering Degree.

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ABSTRACT

In today's digital age, robotics and automation play a pivotal role in various fields such as assistive technology, industrial automation, and personal convenience. This project explores the design and implementation of an Arduino-based obstacle-avoiding robot with voice and Bluetooth control, providing an innovative solution to enhance mobility and user interaction. The integration of Bluetooth and voice commands is chosen for its versatility, accessibility, and ability to streamline user control.

The project focuses on developing a robotic system that navigates autonomously while responding to voice and Bluetooth commands. The robot employs an ultrasonic sensor to detect obstacles in its path, ensuring safe navigation. The Arduino microcontroller processes input from the ultrasonic sensor and voice or Bluetooth commands, enabling precise motor control for movement. This dual control mechanism enhances flexibility, allowing users to operate the robot via voice commands or a Bluetooth-enabled device such as a smartphone.

Comprehensive testing is conducted to validate the robot's functionality. Obstacle avoidance testing demonstrates the robot's ability to halt or change direction upon detecting obstacles, ensuring safety. Voice control testing confirms accurate response to predefined voice commands, while Bluetooth communication is validated for reliability and range. Performance analysis highlights the robot's efficiency in real-time navigation and responsiveness under varying conditions. Additionally, the project addresses challenges like noise interference in voice commands and signal delays in Bluetooth communication by implementing robust filtering techniques and optimizing the control logic.

The project also emphasizes low-cost implementation, making the system accessible for educational and hobbyist purposes. The results showcase the robot's potential applications in areas such as assistive technology for visually impaired individuals, warehouse automation, and home automation.

In conclusion, this project successfully demonstrates the practicality and effectiveness of an Arduino-based obstacle-avoiding robot with voice and Bluetooth control. It lays a foundation for further exploration into integrating additional sensors and AI capabilities to enhance the robot's functionality, paving the way for advanced, user-friendly robotic systems in the digital era.