



“CELL PHONE VOICE CONTROLLED ROBOTIC VEHICLE”

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ABSTRACT: The Wi-Fi Talking robot is an innovative integration of wireless communication and voice interaction technologies within the field of robotics. Designed to enhance human-machine interaction, this robot leverages Wi-Fi connectivity alongside speech recognition and synthesis capabilities to enable real-time, natural communication with users. The system architecture is built around a NodeMCU microcontroller integrated with a speech module, bluetooth (BT) kit, speaker, and essential robotic components such as motors, wheels, and a motor driver. The robot functions as an intelligent agent capable of receiving voice commands and responding through synthesized speech, creating a seamless conversational experience. The Wi-Fi module allows it to interface with online databases and services, significantly expanding its potential use cases across customer service, education, healthcare, and industrial automation. Among its key advantages are enhanced communication, increased operational efficiency.

Index Terms - Robotic Arm, NodeMCU, Robots, Studies, Ultrasonic sensors, Motors.

I. INTRODUCTION

In recent years, the field of robotics has seen a transformative evolution, largely driven by the convergence of wireless communication, artificial intelligence, and human-machine interaction technologies. Among the latest innovations in this domain is the development of a Wi-Fi Talking Robot—an intelligent system designed to connect to the internet via Wi-Fi and communicate with users using speech recognition and synthesis. This integration not only enhances the robot’s interactivity but also broadens its applicability across various industries and everyday environments. The development of the Wi-Fi talking robot is motivated by the increasing necessity for automated systems, the Wi-Fi Talking robot not only a significant step forward in the robotics domain to build interactive systems. It showcases a future where intelligent robots are not confined to industrial settings but become common place in our homes, schools, and workplaces, assisting us in various aspects of daily life through natural, voice-driven interaction. In this project, we will deliberate to control robot controlled by using Bluetooth module through Bluetooth application of an android mobile phone. The benefit of using robot controlled it can be used to reduce manual work. The robot is designed with a compact and efficient architecture, combining several key electronic and mechanical components that work in harmony to achieve its functionality. At the heart of this system lies the NodeMCU microcontroller, which serves as the central processing unit and facilitates Wi-Fi connectivity.

II. PROBLEM STATEMENT

In the current era of technological advancement, there remains a significant gap between machine interaction and natural, intuitive communication. Traditional robots and automated systems often rely on physical inputs such as buttons, keyboards, or touch interfaces, which limit accessibility for users with disabilities, the elderly, or those unfamiliar with technical interfaces. Moreover, many robotic systems operate in isolation, lacking real-time connectivity that could enable dynamic responses or online data retrieval. Various applications such as customer service, education, and personal assistance. The challenge lies in developing a robot that not only processes voice commands accurately but also leverage Wi-Fi connectivity to enhance its intelligence and functionality keeping the overall design affordable, scalable, and user-friendly. Addressing these problems will bridge the gap between emerging technologies and practical, real-world solutions for interactive robotics.

III. PROPOSED SYSTEM

The proposed block diagram outline the ESP8266 NodeMCU, a Wi-Fi-enabled microcontroller that acts as the central control unit. This sensor is connected to the top of the NodeMCU, Motor Driver & DC Gear Motor, and 12V battery, which supplies power to the NodeMCU and other components such as the motor driver and sensors.

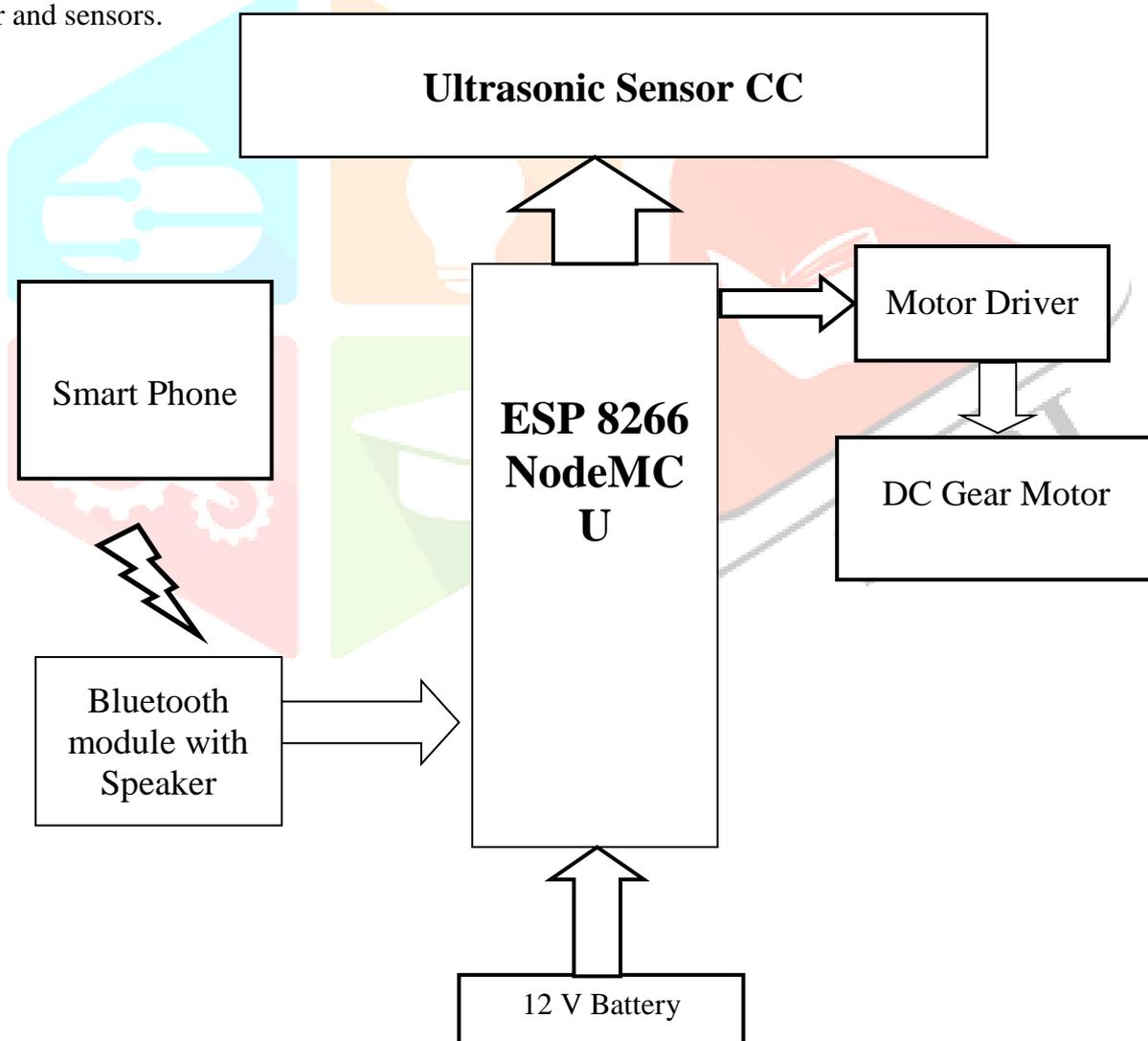


Figure1: Block Diagram of the proposed model

IV. SYSTEM COMPONENTS

- Version :DevKit v1.0
- Breadboard Friendly
- Light Weight and small size.
- 3.3V operated, can be USB powered.
- Uses wireless protocol 802.11b/g/n.
- Built-in wireless connectivity capabilities.
- Built-in PCB antenna on the ESP-12E chip.
- Capable of PWM, I2C, SPI, UART, 1-wire, 1 analog pin.
- Uses CP2102 USB Serial Communication interface module.
- Arduino IDE compatible (extension board manager required).
- Supports Lua (alike node.js) and Arduino C programming language.

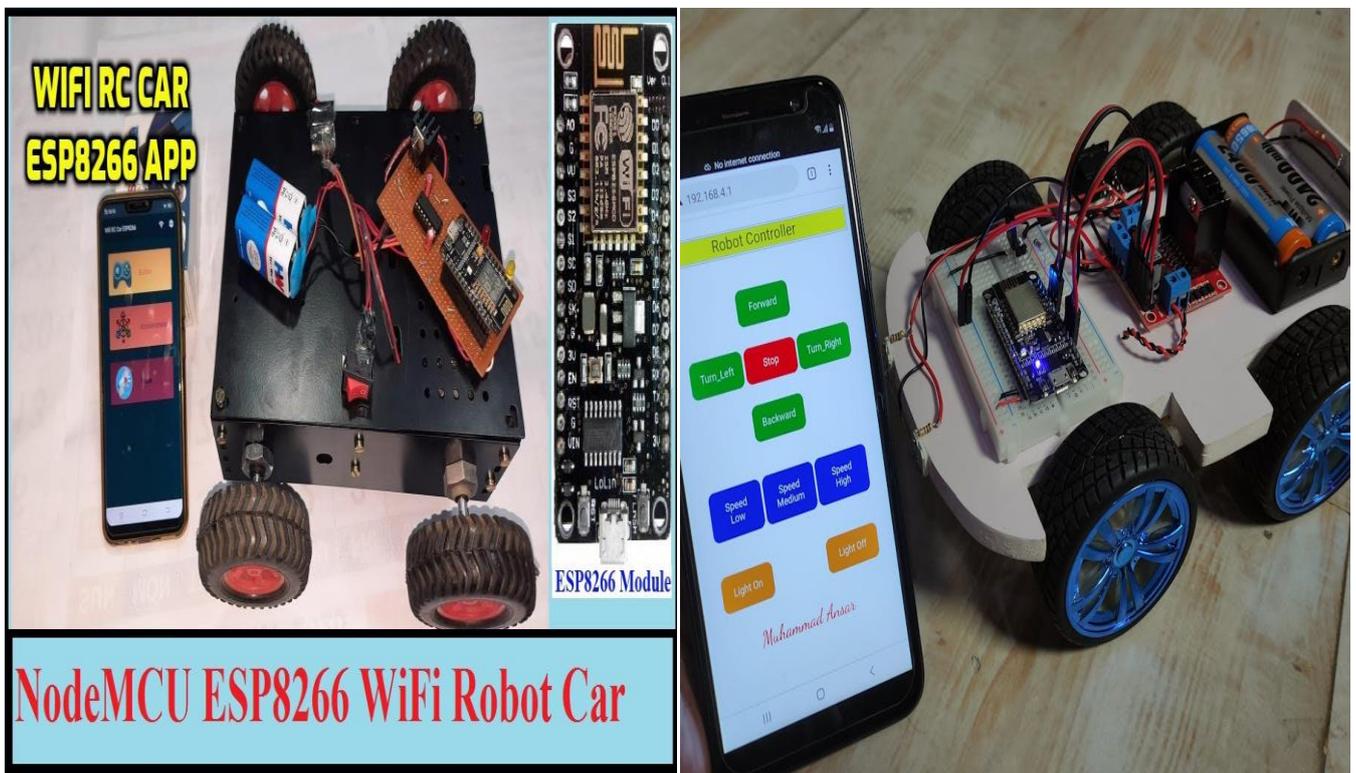
Categories	Items	Values
WiFi Paramters	WiFi Protocdes	802.11 b/g/n
	Frequency Range	2.4GHz-2.5GHz (2400M-2483.5M)
Hardware Paramaters	Peripheral Bus	UART/HSPI/I2C/I2S/Ir Remote Contorl
		GPIO/PWM
	Operating Voltage	3.0~3.6V
	Operating Current	Average value: 80mA
	Operating Temperature Range	-40°~125°
	Ambient Temperature Range	Normal temperature
	Package Size	16mm*24mm*3mm
	External Interface	N/A
Software Parameters	Wi-Fi mode	station/softAP/SoftAP+station
	Security	WPA/WPA2
	Encryption	WEP/TKIP/AES
	Firmware Upgrade	UART Download / OTA (via network) / download and write firmware via host
	Ssoftware Development	Supports Cloud Server Development / SDK for custom firmware development
	Network Protocols	IPv4, TCP/UDP/HTTP/FTP
	User Configuration	AT Instruction Set, Cloud Server, Android/iOS App

V. WORKING MODULES

At the heart of the system is the ESP8266 NodeMCU, a Wi-Fi-enabled microcontroller that acts as the central control unit. It processes input signals from various components and controls the output devices accordingly. Ultrasonic Sensor this sensor is connected to the top of the NodeMCU and is used for obstacle detection or distance measurement. It sends data to the NodeMCU, allowing the robot to avoid collisions or perform path adjustments. Motor Driver & DC Gear Motor on the right side, the NodeMCU is interfaced with a motor driver circuit, which controls the DC gear motors. These motors drive the robot's movement. The NodeMCU sends control signals to the motor driver, which then powers the motors to move forward, backward, or turn as required. Bluetooth module with speaker on the left side, the NodeMCU communicates with a bluetooth module connected to a speaker. This module receives voice commands from a smart phone and outputs voice responses from the robot. It enables two-way audio communication for the talking feature of the robot. Smartphone the user uses a smartphone to send voice commands to the robot via bluetooth. This interaction allows the robot to perform functions like answering questions, moving, or executing programmed responses. 12V Battery at the bottom, the system is powered by a 12V battery, which supplies power to the NodeMCU and other components such as the motor driver and sensors.

VI. RESULT

When the voice-controlled NodeMCU is connected to the power supply, the gets initialized. At the initial stage we have connect the bluetooth module with mobile application. Once it connected, we will start the commanding the by voice. We have four basic commands which send to microcontroller through bluetooth which uses mobile application. Mobile application will process the input data converted into commanding signal. This signal is processed by NodeMCU then signals the motor driver. Gear motors will start rotates according to signal received from motor driver. Voice-controlled robotic vehicles have been an area of active research and development in recent years. The technology has the potential to revolutionize the way we interact with machines, particularly in environments where hands-free operation is required or where manual controls may be difficult to use. Several studies have been conducted to evaluate the performance of voice-controlled robotic vehicles, and they have shown promising results. These vehicles have been shown to be effective in a variety of scenarios, including industrial settings, military applications, and consumer products. One key advantage of voice-controlled robotic vehicles is that they can be operated without the need for physical input devices, such as joysticks or keyboards. This makes them particularly useful in situations where hands-free operation is required, such as in hazardous or sterile environments, or when the operator needs to focus on other tasks.



VII. OBSERVATIONS

The objective of this project is to design and develop a Wi-Fi-enabled talking robot capable of understanding and responding to voice commands using speech recognition and synthesis technology. The primary goal is to create an interactive robotic platform that can engage with users in real-time through natural language communication. To achieve this, the robot must be able to connect to a Wi-Fi network for internet-based functionalities, including data retrieval and remote communication. Another key objective is to utilize cost-effective and readily available components such as the NodeMCU, bluetooth kit, speaker, and motor controller, ensuring that the design remains affordable and replicable for educational and personal use. The project also aims to integrate mobility, enabling the robot to navigate its environment in response to user commands. In addition, the system should be adaptable for various applications such as customer service, assistance, and automation. Ultimately, this project seeks to demonstrate how accessible technologies can be combined to build a smart, voice-interactive robot that enhances the human-machine interaction experience.

VIII. MERITS

- The Wi-Fi Talking Robot offers several notable advantages that make it a practical and innovative solution in the field of interactive robotics.
- It provides a hands-free, voice-controlled interface, allowing users to communicate with the robot naturally and effortlessly.
- This is especially beneficial for individuals with physical disabilities or elderly users who may struggle with traditional input methods.
- The robot to retrieve information online or be controlled from anywhere within network range, making it suitable for educational purposes, hobby projects, and small-scale commercial applications.
- Additionally, the robot's mobility, supported by the motor driver and DC gear motors.
- As we are using smart phone which is attach to the robot so it will capture video which will be used for security.
- Cost of system is low as we are using smart phone which is nearby available to everyone.
- The robot promotes accessibility, interactivity, and expandability, bridging the gap between low-cost hardware and intelligent automation.

IX. CONCLUSION

In conclusion, the Wi-Fi Talking Robot represents a significant step toward making intelligent, interactive robotic systems accessible and practical for a wide range of users. By integrating voice recognition, speech output, mobility, and Wi-Fi connectivity through the ESP8266 NodeMCU platform, the robot demonstrates effective human-machine interaction in a low-cost and scalable format. Its ability to receive and execute voice commands, interact via bluetooth, and perform real-time tasks using internet connectivity highlights its potential in both educational and service-based applications. The design emphasizes simplicity, affordability, and modularity, making it an excellent prototype for further development in the fields of automation and assistive technology. Additionally, adding GPS for outdoor navigation or IoT-based control for smart home integration could expand its functionality even further. As technology evolves, this Wi-Fi Talking Robot can serve as a foundational model for more complex and intelligent service robots in homes, industries, and public environment.

X. REFERENCES

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