Designing of voice-controlled drone using BT -voice control for Arduino

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Abstract

The hand-free drone project aims to create a drone that can be controlled through voice commands, eliminating the need for remote control or gestures. The system uses voice recognition technology to process the commands and act accordingly, using code to control the motors and achieve the desired outcome. This technology can be used in various applications, including military, surveillance, photography, gaming, and more.

Keywords: Drone, BtVoice Control, Arduino

1 INTRODUCTION

The proposed drone technology aims to overcome the challenges faced by current drones, such as limited battery life and communication issues. This is done by implementing precise charging techniques and using lightweight and compact software solutions, such as SATCOM. The drone consists of two pairs of motors that generate lift through their rotation, with the mobility of the drone controlled by adjusting the thrust of each motor. Additionally, the drone can be controlled through voice recognition technology. A voice and text database is created and new voice and text editing models are developed to accommodate specific requirements. The operator inputs voice commands, which are transmitted to the flight controller and processed through a code directing the motors to perform their functions. The flight controller also ensures the leveling and stability of the drone. The proposed drone aims to provide a faster and more accurate way of controlling drones by using voice recognition. This paper aims to develop a drone that is fully controlled by voice commands, demonstrating stability during flight and

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clarity in executing the input voice command. The advancements in voice technology provide a growing opportunity for further development in this field. The potential for a more intuitive and efficient method of controlling drones is realized by creating a drone operated by voice control.

2 LITERATURE REVIEW

The movements of the Quadcopter can be controlled by adjusting the speed of its four propellers. The user can control the drone using voice commands to set the throttle, pitch, yaw, and roll settings. The flight controller (KK2.1.5) helps maintain stability and balance during flight by using onboard sensors such as accelerometers and gyroscopes. The drone's components include an Arduino UNO, electronic speed control units (ESC), a LI-PO battery, and DC motors (BLDC). The model was developed using software such as XCTU, Arduino (IDE), and the XBEE 2.4GHz Zigbee module. Note that there may be a delay in the drone's response to signals in case of a transmission loss. The transmitter section of the system consists of a microphone, a voice recognition module, an Arduino, and an Xbee (Co-Ordinator). The receiver section includes an Xbee, an Arduino, a flight controller, an electronic speed control unit (ESC), and motors. Depending on the requirements, the system can be designed to work independently or with user input. The microphone captures the user's voice commands, which are then processed by the voice recognition module. The processed commands are then sent to the receiver section via the Xbee (Co-Ordinator) and received by the Xbee. The received signals are processed by the Arduino and the flight controller, which control the ESC and motors to achieve the desired flight movements (1)

A voice-controlled drone that the user's voice commands can guide a system that consists of a transmitter section with a microphone, voice recognition module, Arduino, and Xbee (Co-Ordinator), and a reception section with Xbee, Arduino, flight controller, ESC, and motors. The Quadcopter uses a flight controller to balance and level itself in flight. This project aims to advance the technology of voice control in drones and contribute to the research of smart autonomous systems. (2)

High-end drones can be easily controlled using a controller with buttons, switches, and sticks or through voice commands using a Bluetooth system connected to an app running on a mobile device. The app uses the Nuance voice recognition platform and the DJI Mobile SDK for iOS development to recognize and execute commands. The system was tested using a DJI Phantom 4 drone. (3)

Controlling a quadcopter without a remote control using LabView is discussed in (4). The system utilizes image and voice processing techniques, such as image recognition and voice recognition, to control the drone. Image recognition is achieved by matching a reference image and voice recognition is by converting spoken words into text using sound input and processing the speech using Fast Fourier Transform (FFT) and Mel frequency cepstral coefficients (MFCC). The operator can see the output gestures before operating the drone at full capacity. This approach aims to eliminate manual errors associated with traditional remote control methods

The development of a voice control system for a quadrotor drone has also been carried out. The system uses the Pocketsphinx for ROS as a speech decoding engine on the Ubuntu platform. The speech technology used is based on the Hidden Markov Model. The system is tested using the Gazebo Simulator in ROS. The results of the simulation show the effectiveness of the voice control system, which also has an adaptation block to allow the speaker to adapt their voice. (5)

3 OBJECTIVES

The motive is to layout and put into effect an unmanned aerial car managed with voice recognition. In the proposed system, voice instructions are given to the Quadcopter to manipulate it autonomously. The thought is to build and check a low-priced quadcopter that combines a speech attention engine working in real-time, in noisy acoustic conditions. It tries to document all the techniques keeping it as open as possible to make the project reproducible in the future. The simple structure consists of a four-legged plastic structure that is lighter in weight. The battery creates a proper relationship with the structure's weight to supply ample power. The digital pace controllers send alerts that keep the speed of the motors. The Arduino board essentially consists of the microcontroller. It is versatile and extensively used in several fields like robotics, networks, sensors, and information acquisition.

4 METHODOLOGY

4.1 WORKING OF VOICE-CONTROLLED QUADCOPTER

The quadcopters are essentially operated using the RC approach. The Quadcopter is navigated by manually setting the throttle, pitch, yaw, and roll settings in response to the transmitter's input. This sort of transmitter control results in transmission loss, causing the Quadcopter to take longer to reply to the signal. Aside from the traditional way, the quadcopters may also be operated using voice commands and a Bluetooth module to send data. The design and assembly

of the Quadcopter are the stages of construction. A sensor detects the balancing and leveling situation during flight.

4.2 BLOCK DIAGRAM

The transmitting module comprises the user voice commands, which are the input to the vehicle. The voice commands are converted into signals using voice recognition module.

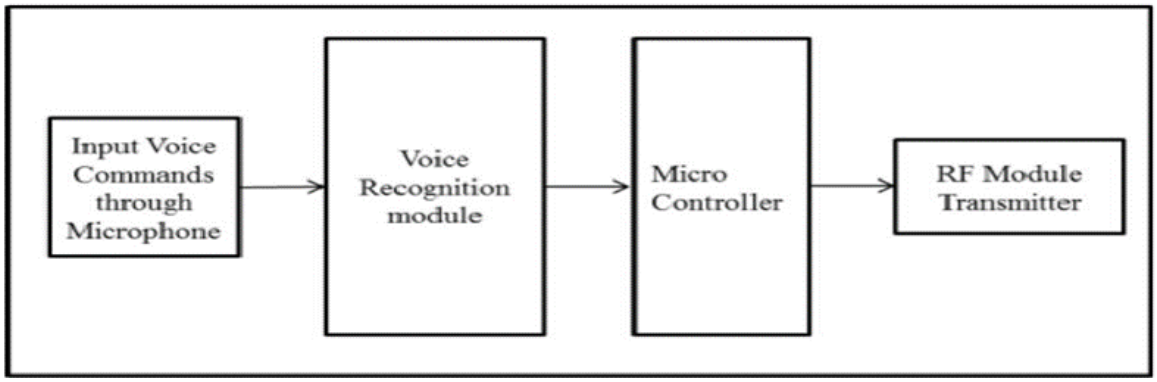

FIGURE 1

BLOCK DIAGRAM FOR TRANSMITTING MODULE [3]

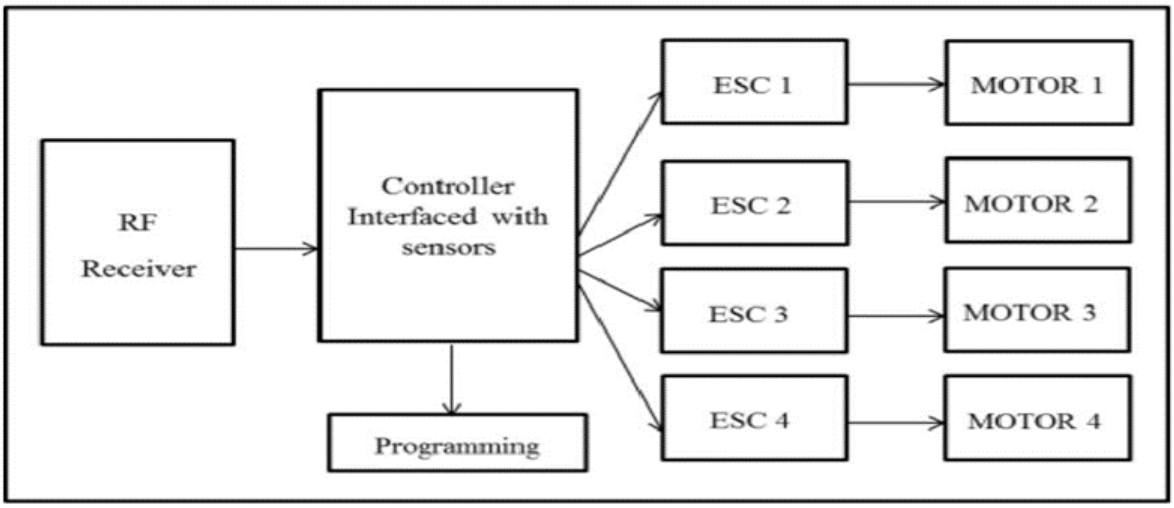

FIGURE 2

BLOCK DIAGRAM FOR RECEIVING MODULE [3]

4.3 DESIGN OF QUADCOPTER MODEL

The type of body used in this Quadcopter is x kind which is thin, sturdy and lightweight, which would be able to face up to deformation and loads. The vertical and horizontal distance from the centroid of one motor to any other is 14cm. All the digital aspects are positioned at the middle, supported by a board. Deformation on the body precipitated due to the load is directly proportional to the move sectional structure of the frame.

FIGURE 3

QUADCOPTER MODEL [3]

4.4 PROPULSION SYSTEM

The propulsion machine consists of motors, propellers, electronic pace controllers (ESCs) and batteries. Rotating action can be converted into thrust with the aid of the usage of propellers which are intended for transmitting power. The flight controller's output signal to manage the motor's speed is furnished with the aid of a system known as electronic speed controller. The power is furnished from the battery and fluctuates with the recognition of the given input signal. The kind of battery used in this Quadcopter is a lithium polymer battery which gives the required quantity of present-day to run the motors.

4.5 INTEFACING VOICE RECOGNITION MODULE:

The goal of voice attention is to analyze a word picked up with a microphone aid as the consumer enters a command and converts it into textual content to a microcontroller to recognize it as a signal.

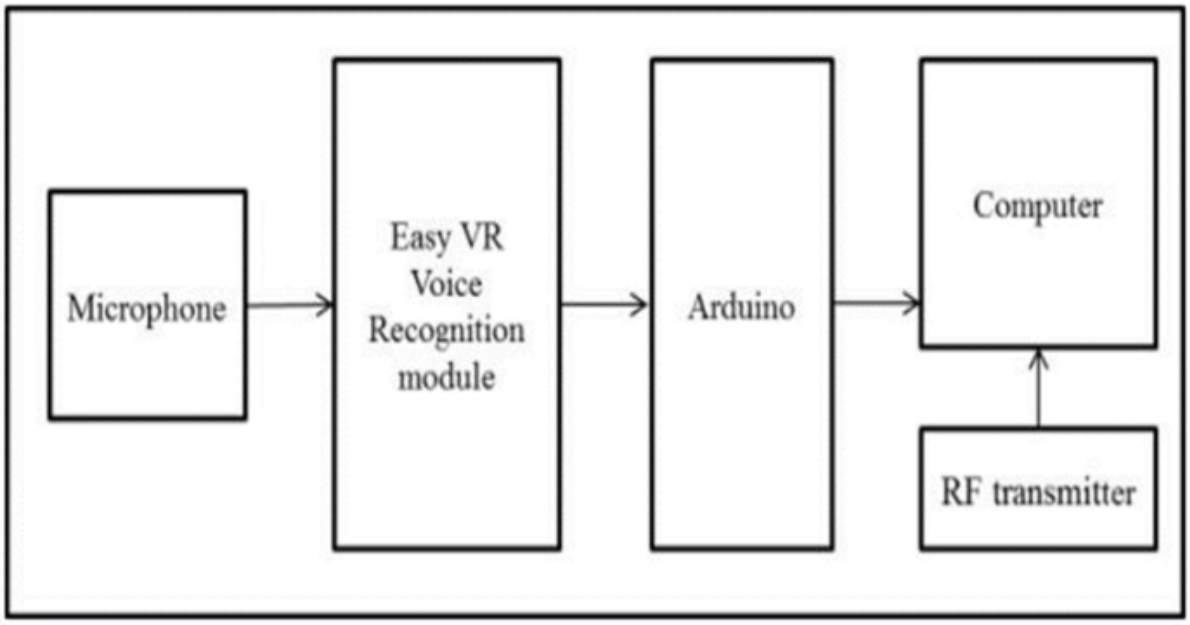

FIGURE 4

INTERFACING VOICE RECOGNITION MODULE ON THE TRANSMITTER [3]

4.6 VOICE COMMAND RECOGNITION

After interfacing voice center of the attention module to the Arduino, frequent VR commander software is downloaded and the utility is installed. When on hand VR commander gets linked to the module, it reads all the purchaser described hints that are saved in on hand VR module nonvolatile memory.

4.7 SOFTWARE DESIGN FOR VOICE COMMANDS

The module is linked to the Arduino board which sends signs and symptoms to the RF transmitter. Based on every command, tempo of the motor is programmed relying on volume of roll, pitch, yaw and throttle values that are given for each and every enter signal command.

5 CONCLUSION

In summary, this project focuses on developing a cost-effective drone that can be controlled using human voice commands. The aim is to create a smart and accessible drone control system, particularly for physically handicapped individuals. The system includes a unit to help the speaker control the drone in the desired direction. The use of voice commands allows for a more intuitive and user-friendly interface compared to traditional remote controls

S.No	Voice Commands	Actions
1	Start Motors	Motors start spinning, maintaining middle speed
2	Fly Low	Speed of motors decrease and vehicle comes lower
3	Fly High	Speed of motors increase and vehicle goes up faster
4	Go Left	Right portion of motors increases speed
5	Go Right	Left portion of motors increases speed
6	Go Forward	Left portion of motors increases speed
7	Go Backward	Left portion of motors increases speed
8	Turn Left	Counter clockwise motors increases speed
9	Turn Right	Clockwise motors increases speed
10	Hover	Speed of all motors is uniform and thrust is equal to the total weight

FIGURE 5

Input signal command [3]

6 FUTURE WORK

Regarding the future work it would be more interesting to improve the stability of Quad-copter and depending on final result, improve all the recognizer behavior and accuracy. Also, for more advancement GPS module and cameras can be embedded within the circuit which can be controlled from a very long distance and can also be extended to a level wherein the shortest Path is determined by the copter automatically. Furthermore, the drone can also be used for surveillance.

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