A Project Presentation Submitted to the
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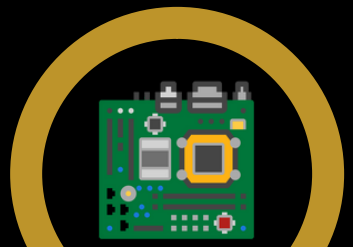
The Ultimate Arduino Uno Project: Obstacle Avoiding, Bluetooth and Voice Control Model



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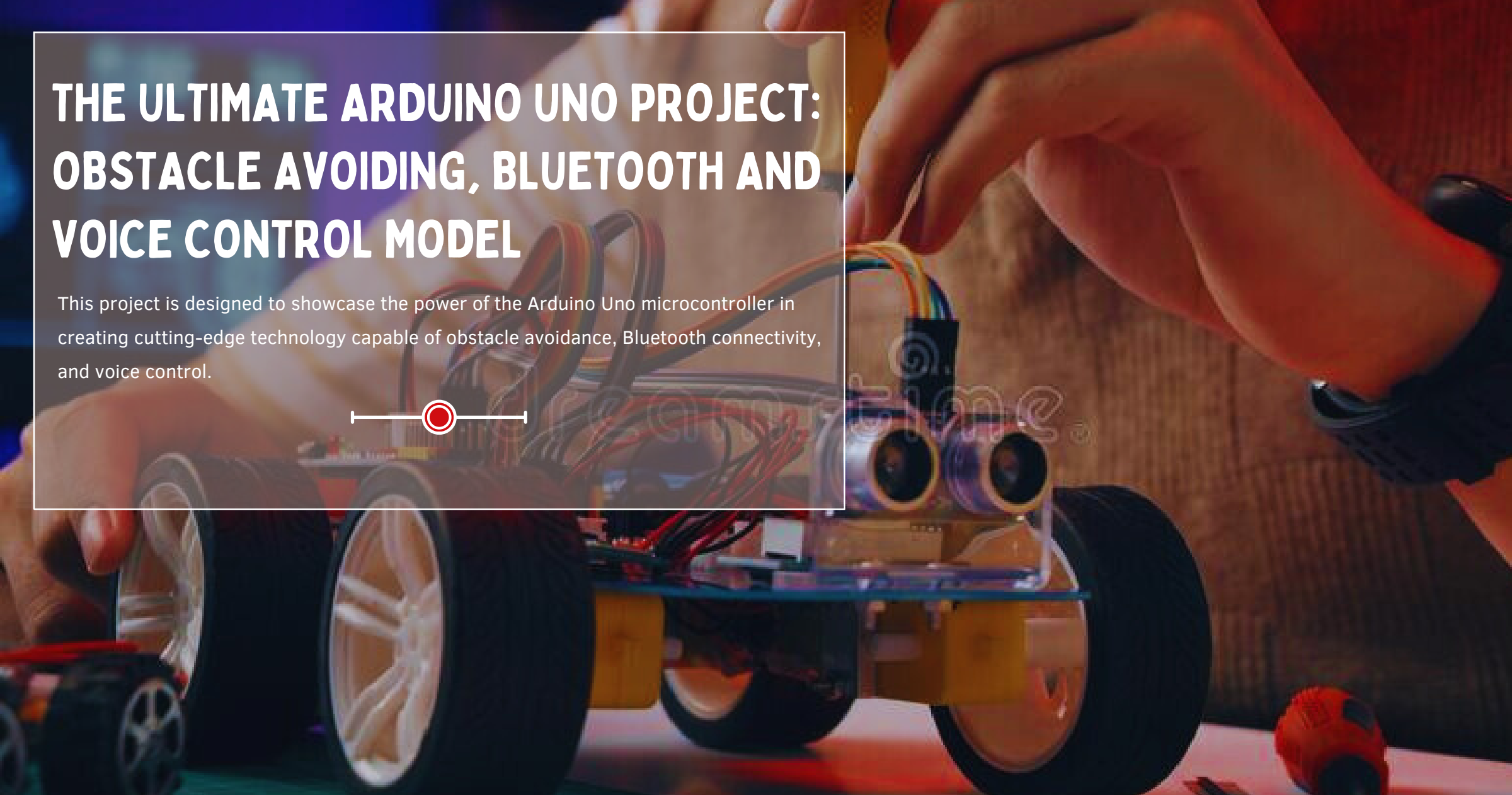

THE ULTIMATE ARDUINO UNO PROJECT: OBSTACLE AVOIDING, BLUETOOTH AND VOICE CONTROL MODEL

This project is designed to showcase the power of the Arduino Uno microcontroller in creating cutting-edge technology capable of obstacle avoidance, Bluetooth connectivity, and voice control.

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Meet the Arduino Uno

1.Why use the Arduino Uno?

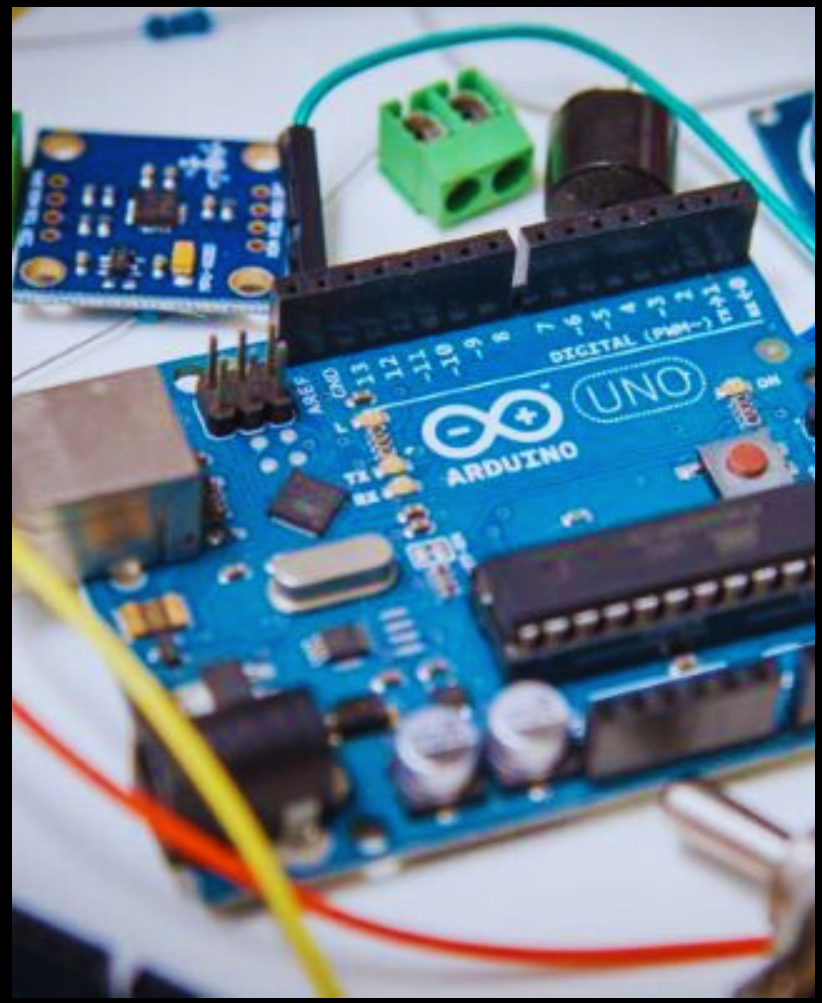
It is affordable, open-source, and has a vast community of enthusiasts constantly developing new and exciting applications.

2.What is the Arduino Uno?

The Arduino Uno is a user-friendly microcontroller board that is perfect for prototyping new gadgets and machines.

3.What can you do with the Arduino Uno?

We can create gadgets like obstacle avoidance robots, home automation systems, and even musical instruments.



Obstacle Avoidance Sensor Mechanism

01

Ultrasonic Sensor

This sensor is used to detect obstacles in the robot's path.

02

Motor & Wheels

The motor and wheels work together to steer the robot away from obstacles.

03

L293D motor driver

It has two H-bridge circuits, which can control the direction of the current flow to the motor, allowing it to rotate in either direction.

04

Servo Motor

It is a precise and controllable motor that can rotate to a specific angle with high accuracy.

Bluetooth Control

Wireless Connectivity

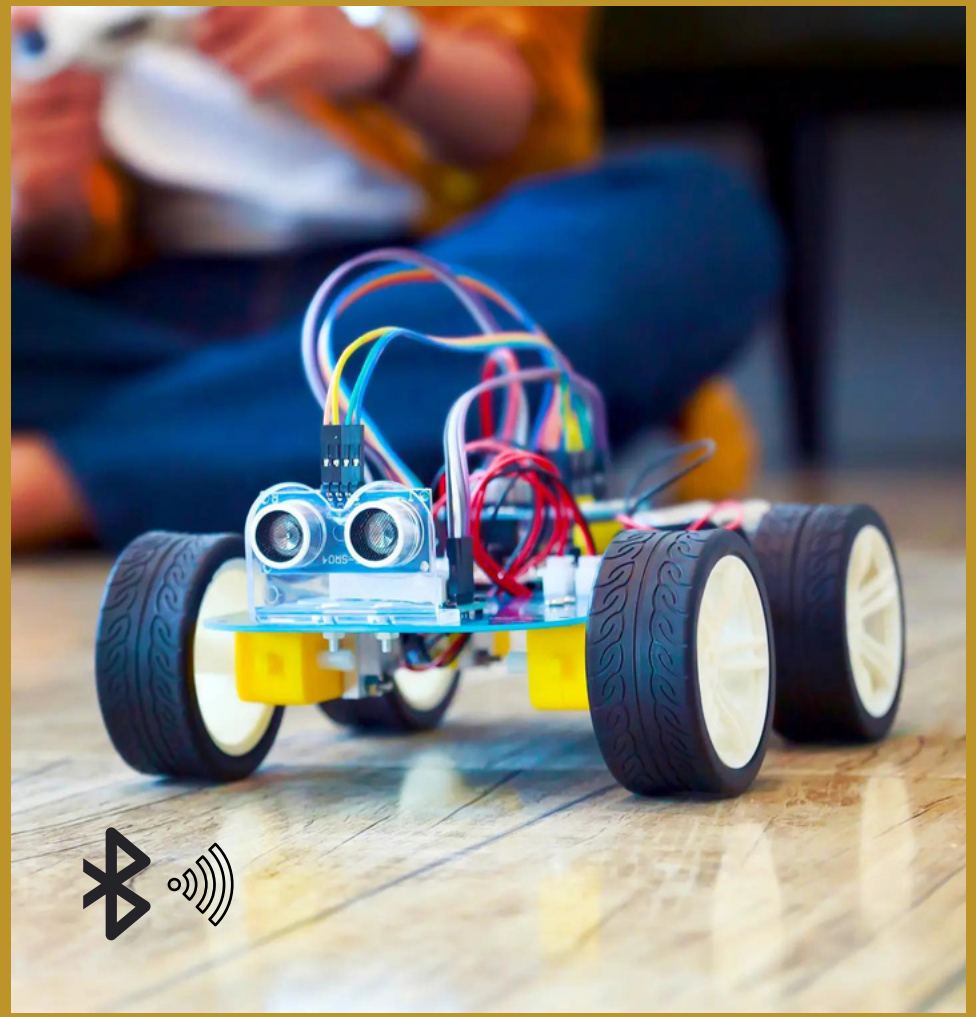
The Bluetooth module(HC-05) provides the robot with the ability to connect to other devices wirelessly, increasing its range of applications.

Secure Pairing

The Bluetooth module uses secure pairing to ensure that only authorized devices can control the robot.

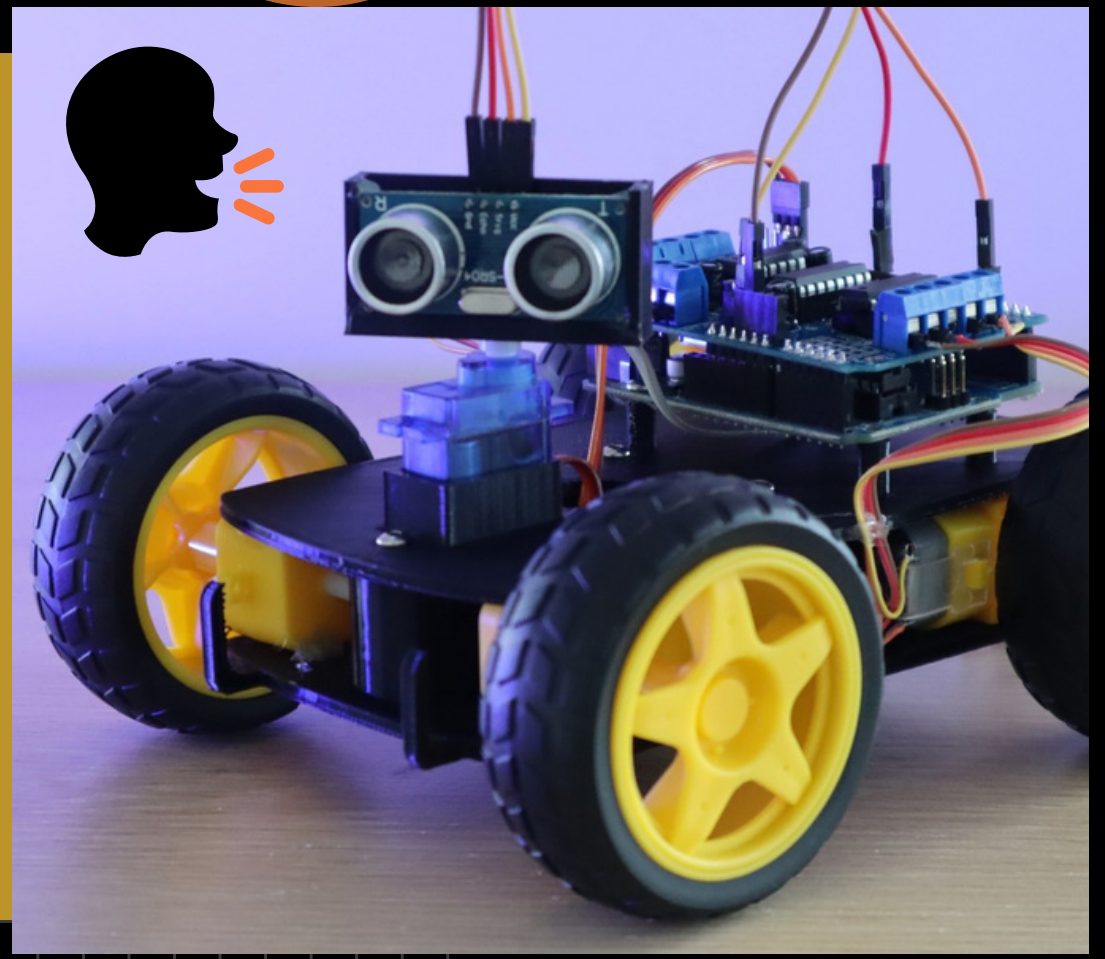
Remote Control

ready-made mobile application, users can wirelessly control the car's movements and functions. The mobile app provides an intuitive interface with directional buttons, sliders, enabling easy interaction.



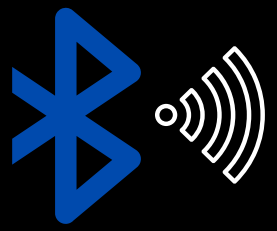
Voice Control Feature

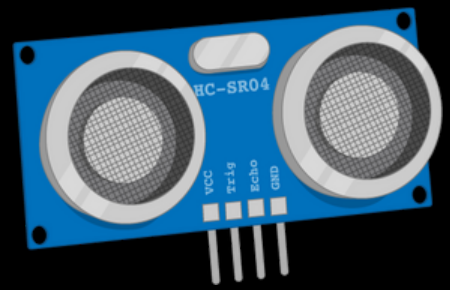
- **Speech Recognition**
  The voice control feature uses speech recognition software to interpret the user's commands.
- **Activation**
  The system is activated by the voice command "Hey Robot", which tells the robot to begin listening for further instructions.
- **Custom Commands**
  Users can program custom commands that the robot will interpret and execute, making it a truly versatile tool.

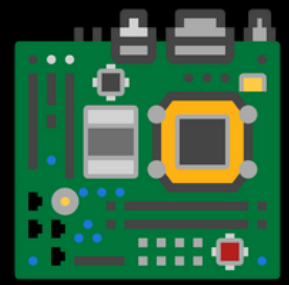


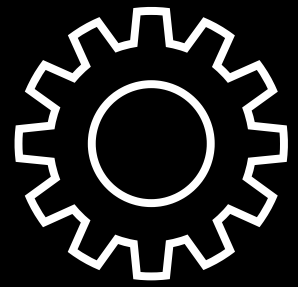
Multi-Function Robot

- The multi-function robot can be made using the Arduino platform.
- The robot includes obstacle avoidance, Bluetooth control, and voice control functions.
- The Ultrasonic sensor and Bluetooth module are the main components used in this project.
- The L293D motor drive shield is used to drive the motors.
- The robot can be controlled through an app on the smartphone using the Bluetooth module.
- Voice commands can also be used to control the robot through a mobile app.
- The required components for this project are Arduino UNO board, L293D motor driver, Ultrasonic sensor, Bluetooth module, and DC motors.
- The code for the obstacle avoiding, Bluetooth control, and voice control robot car is available online and can be easily programmed using the Arduino IDE.









Advantages & Limitations

- **Advantages :**

1.Enhanced Safety: The obstacle-avoidance mechanism ensures safe navigation by detecting and avoiding obstacles in real-time, minimizing the risk of collisions and accidents.

2. Convenience and Accessibility: Bluetooth and voice control functionalities offer intuitive and hands-free control options, making it easier for users to interact with the car without the need for complex manual controls or physical connections.

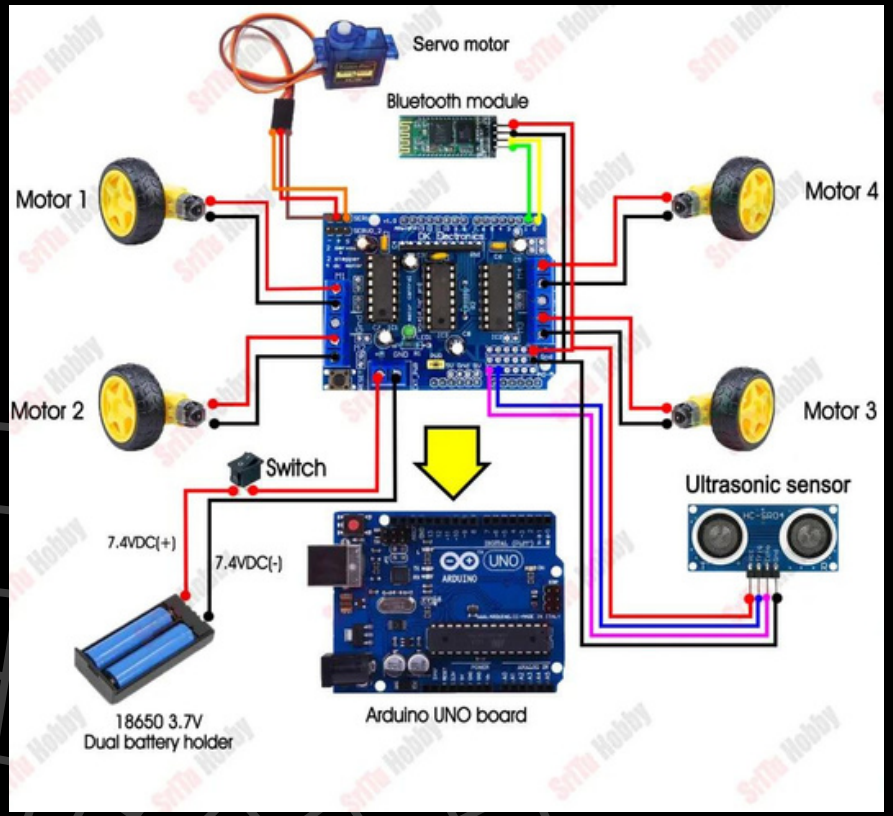
- **Limitations :**

1.Limited Range: The Bluetooth control functionality has a limited range, typically up to a few tens of meters. Users need to be within this range to establish a connection and control the car.

2. Dependency on Mobile Application: The functionality and compatibility of the car's control system rely on the specific mobile application. Any limitations or issues with the app may affect the overall user experience.

3. Voice Recognition Accuracy: Voice control accuracy can vary based on factors such as background noise, accent, and pronunciation. Inaccurate voice recognition may result in unintended commands or require repeated attempts to achieve the desired actions.

Circuit Diagram



- The circuit diagram for the obstacle avoiding, Bluetooth control, and voice control car using Arduino Uno consists of the following components:
- Arduino Uno board
- Ultrasonic sensor
- L298N motor driver module
- Servo motor
- Bluetooth module
- The ultrasonic sensor is connected to the Arduino Uno board to detect obstacles in the car's path.
- The L298N motor driver module is used to control the DC motors that drive the car's wheels.
- The Bluetooth module is connected to the Arduino Uno board to receive commands from a mobile application.
- The circuit diagram can be easily replicated using generic components that can be found in local or online stores.
- The circuit diagram can be modified to add or remove components based on the user's requirements.

Applications & Future Scope

- Autonomous Robotics: The integration of obstacle-avoidance, Bluetooth, and voice control capabilities enables the car to be used in various autonomous robotics applications, such as surveillance robots, delivery robots, or exploration robots.
- Education and Learning: The car serves as an excellent educational tool for teaching robotics, programming, and electronics. Students can learn about sensors, wireless communication, and voice recognition while building and experimenting with the car.

Future Scope :

- Enhanced Autonomy: With advancements in sensors and algorithms, the car can be further enhanced to achieve higher levels of autonomy, enabling it to navigate complex environments and handle more challenging tasks.
- Improved Voice Recognition: Future improvements in voice recognition technology can make the car more responsive and accurate, allowing for more natural and reliable voice control interactions.

References

- Arduino Website:
  (https://www.arduino.cc/)
- Multifunctional Robot:
  (https://srituhobby.com/how-to-make-a-multi-function-arduino-robot/)
- Adafruit Learning System:
  (https://learn.adafruit.com/)

ARDUINO

Conclusion

The Arduino Uno-based car integrates obstacle-avoidance, Bluetooth, and voice control, marking a significant advancement in autonomous vehicles and robotics. It ensures safe navigation by detecting obstacles in real-time, minimizing collisions. Bluetooth enables wireless control from a distance, while voice control enhances the user experience. As technology progresses, expect improved range, compatibility, voice recognition, and setup simplicity, leading to safer and more efficient autonomous systems.